MONTANA ALTERNATE ASSESSMENT FOR SCIENCE – NEXT GENERATION SCIENCE STANDARDS (NGSS)
ESSENCE STATEMENTS

Purpose of the Alternate Academic Achievement Standards in Science (AAAS)

The Montana Board of Public Education (Board) is responsible for adopting standards of accreditation for Montana schools including challenging academic achievement standards (see §20-2-121 and §20-7-101, MCA). All Montana public and non-public accredited schools are required to follow these standards of accreditation and participate in state assessments (see ARM 10.55.603):

Montana was a member-state of this consortium and leveraged the grant to help design, develop, and deliver the OPI's Alternate Assessments that assess student proficiency and progress on Alternate Academic Achievement Standards (AAAS) in mathematics (math), English Language Arts (ELA), science, and English language proficiency (ELP) for students with significant cognitive disabilities (NCSC Brief 1 and ARM 10.53).

The AAAS set expectations of performance that differ in scope and complexity from grade-level achievement standards. In Montana, the AAAS are not adopted separately by the Board because they are the "same but different" standards-based expectations for students with significant cognitive disabilities. For students who, because of their disability, cannot participate in the state's general assessment, the OPI has constructed and implemented guidelines for participation in the Alternate Assessment, including eligibility criteria (see Appendix A). The OPI meets the requirement of providing Alternate Assessments aligned to the State challenging academic achievement standards through its selection of the state assessments.

The decision to move a special education student to an Alternate Assessment has significant implications for the path that a student will take in their K–12 school career. It means the student is not able to participate in the general education curriculum even when provided with accommodations. A student who participates in an Alternate Assessment requires a modified curriculum. In addition, the IEP team for a student shall determine if the student meets the eligibility criteria for the Alternate Assessment. All students enrolled in accredited schools are expected to take part in state assessments in one of three ways:

1. Participate in the general education assessments without accommodations (ARM 10.56.104(1)).
2. Participate in the general education assessments with accommodations (ARM 10.56.104(1)).
3. Participate in Alternate Assessments when the participation criteria are met (see Appendix A and ARM 10.56.104(2)).

Essence Statement: The Essence Statement describes the core ideas within an Achievement Expectation (PE) distilled down to a level appropriate for the students participating in the Alternate Assessment.

Level 4:	A student who is Level 4 demonstrates a level of understanding that includes the ability to "bring together" the Disciplinary Core Ideas (DCI) and/or Science and Engineering Practices (SEP) and/or Cross-Cutting Concepts (CCC) associated with a PE.
Level 3:	A student who is Level 3 demonstrates an understanding of the DCI and/or SEP and/or CCC within PE at the level described in the Essence Statement.
Level 2:	A student who is Level 2 demonstrates some understanding of the content of the PE, but that understanding is incomplete and does not yet meet the expectations found in the Essence Statement. This student's understanding is partial but emerging.
Level 1:	A student who is Level 1 demonstrates a level of understanding that is at a very preliminary level. This student's understanding is nonexistent or incomplete, and he or she has difficulty meeting the expectations of a student who approaches expectations.

Standards marked as "Not Assessed on the Alternate Montana Science Assessment" are not assessed during the state standardized testing. These standards are still part of the Montana Science Content Standards and are part of a balanced curriculum taught within classrooms.

Abbreviations Used: **NGSS**: Next Generation Science Standards, **PE**: Performance Expectation

ELEMENTARY (Administered in Grade 5)

MT Alternate Science – NGSS Elementary

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
Physical Science						
Physical Science: PS1 Matter and Its Interactions						
5-PS1-1	Develop a model to describe that matter is made of particles too small to be seen.	Matter of any type can be broken down into particles that are too small to see, but still exists and can be detected by other means.	Identify examples of matter including solids, liquids, and gases.	Recognize that if a pure substance is broken up into small pieces, each piece is still a piece of that substance.	Demonstrate an understanding that when a substance is dissolved the pieces are still present but are too small to see.	Identify models that prove matter is present even though it is too small to be seen.
5-PS1-2	Measure and graph quantities to provide evidence that regardless of the type of change that occurs when melting, cooling, or mixing substances, the total weight of matter is conserved.	Mass (weight) stays the same when materials change (when melted, cooled, mixed, or react to form new materials). Note: NGSS does not distinguish between mass and weight at this grade level.	Recognize that matter (solids or liquids) has mass (weight).	Recognize that matter (solids or liquids) has the same mass (weight) after a change in shape or size, showing that matter is conserved.	Explain that matter has the same weight after melting, cooling.	Recognizing that weight is conserved, determine a missing piece of data, when a change occurs. (Given all the weights except one).
5-PS1-3	Observe and record qualitative and quantitative evidence to support identification of materials based on their properties.	Different materials have different properties (e.g., color, hardness, reflectivity, melting point, boiling point, response to magnetic forces, conductivity, solubility).	Identify a property of a material (e.g., color, hardness, flexibility, texture, luster).	Determine which materials possess a specified property (e.g., color, hardness).	Compare or contrast materials that have different physical and/or chemical properties.	Make observations and identify a material based on its properties (e.g., color, hardness, solubility).
5-PS1-4	Conduct an investigation to determine whether the mixing of two or more substances results in new substances.	Recognize changes that indicate that a chemical reaction has occurred.	Recognize a change indicating a chemical reaction has occurred (e.g., bubbles formed)	Differentiate between a physical change and a chemical change.	Use observations to determine if the mixing of two or more substances results in a chemical change. (Signs include color change, production of a different smell, change of temperature, formation of a gas [bubbles], formation of a solid.)	Use observations to explain that a new substance formed due to a chemical reaction.
Physical Science: PS2 Motion and Stability: Forces and Interactions						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
3-PS2-1	Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.	Forces can cause an object to move, and changes in forces can change that motion (e.g., students pushing on a wooden crate).	Identify a push or a pull.	Determine if an object has a force acting on it.	Identify unbalanced forces as the cause of an object's change in motion.	Predict how an object's motion would change if the forces acting on it change.
3-PS2-2	Observe and record qualitative and quantitative data about an object's motion to provide evidence that a pattern can be used to predict future motion.	Patterns of motion can be used to predict future motion (e.g., a ball bouncing [up/ down] or swing [back/ forth]).	Identify when an object is moving. (See 3-PS2-1.)	Identify motion that is following a pattern.	Use data from a visual to predict the future motion of an object moving in a pattern.	Use data in a table to predict the future motion of an object moving in a pattern.
3-PS2-3	Ask questions to determine cause and effect relationships of electrical or magnetic interactions between two objects not in contact with each other.	Some forces, such as electrical and magnetic forces, do not require objects to be in contact to interact.	Identify which objects would be affected by magnetic forces.	Recognize that magnets can pull some objects towards them AND can push some objects away (when magnets have similar poles "facing each other") without touching them.	Describe how magnets interact with metal objects when they are not in contact with each other.	Identify a question(s) (cause and effect) that could be asked and answered about the interaction of a magnet and a variety of items, given illustrations of metal objects mixed with non-metal objects.
5-PS2-1	Support an argument that the gravitational force exerted by Earth on objects is directed toward the center of the Earth.	Gravity causes objects to fall toward the Earth.	Identify that when objects fall, it is downward.	Identify that gravity is a force that causes objects to fall downward.	Use observations to determine that objects regardless of their weight fall toward the Earth due to the Earth's gravitational force.	Determine if an observation supports the claim that objects fall downward toward the center of the Earth.
Physical Science: PS3 Energy						
4-PS3-1	Use evidence to construct an explanation relating the speed of an object to the energy of that object.	The faster a given object is moving, the more energy it has. (A "given object" is important here. It is not about comparing the energy of different objects, although two identical objects at different speeds can be compared.)	Identify that an object can move at different speeds.	Identify the conditions under which an object can move at different speeds.	Recognize that if two identical objects are moving at different speeds, then the one moving faster has more energy.	Use data (information in tables, observations, or patterns) to identify the instance where energy is greatest or least if similar objects are moving at different speeds.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
4-PS3-2	Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electrical currents.	Energy can be moved from place to place by moving objects or through sound, light, or electricity.	Recognize motion, sound, light, or electricity as forms of energy.	Identify the type of energy present in different circumstances (e.g., motion, sound, light, or electricity).	Identify examples of energy moving from place to place (e.g., electrical energy in a circuit, light or sound across a room, a moving object going from one place to another).	Given a scenario where energy moves and is changed into a different form, identify the transformation.
4-PS3-3	Ask questions and predict outcomes about the changes in energy that occur when objects collide.	When a moving object collides with another object, energy is transferred and the motion changes.	Identify two objects hitting each other as a collision.	Identify that a collision of a moving object with a stationary object can cause the stationary object to move.	Identify that the energy in a moving object can be transferred to another object that it collides with.	Predict the direction an object will move after a collision.
4-PS3-4	Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.	Energy can be transferred from place to place and converted from one form to another for a variety of uses.	Identify a source of energy.	Identify what form of energy is produced by a device (source).	Identify a missing component in a device that changes energy from one form to another.	Use components to "build" a device that changes energy from one form to another.
5-PS3-1	Use models to describe that energy in animals' food was once energy from the sun.	Since all food can eventually be traced back to plants, energy that animals use for body repair, growth, motion, and warmth is energy that once came from the sun.	Identify that animals need food to survive.	Identify the source of an animal's energy as its food. (Complete a two-step food chain.)	Trace the source of the materials an animal needs for body maintenance, growth, and motion to the sun.	Given all the components of a food chain, put them in order starting with the sun and ending with an animal.
Physical Science: PS4 Waves and Their Applications in Technologies for Information Transfer						
4-PS4-1	Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	Waves can differ in amplitude (height) and wavelength (spacing between waves), but they follow a regular pattern of motion.	Identify a wave that can be seen (e.g., in a rope, in water)	Identify the parts of a wave (wavelength and amplitude)	Compare the pattern of two waves with different amplitude or wavelength.	Predict an object's motion based on the pattern of the wave.
4-PS4-2	Develop a model to describe that light reflecting from objects and entering the eyes allows objects to be seen.	Light reflecting from objects and entering the eyes allows the object to be seen.	Identify sources of light.	Identify that light is needed to see objects.	Identify a model that shows the reflection of light following a path between a light source, the object, and the eye.	Complete the components of a model (diagram) that shows the path of the reflection of light.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
4-PS4-3	Generate and compare multiple solutions that use patterns to transfer information.	Not Assessed on the Alternate Montana Science Assessment				
Life Science						
Life Science: LS1 From Molecules to Organisms: Structure and Processes						
3-LS1-1	Develop models to describe that organisms have unique and diverse life cycles, but all have in common birth, growth, reproduction, and death.	All living things have a life cycle that includes birth, growth, reproduction, and death.	Identify that organisms are born and grow.	Identify the components of an organism's life cycle.	Given the stages of the life cycle of an organism, put them in order.	Make a prediction about what would happen to a species if it didn't reproduce.
4-LS1-1	Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	Structures of organisms have different functions to support survival.	Identify plant and animal structures.	Distinguish between internal and external structures.	Identify the functions (survival, growth, behavior, and/or reproduction) of various plant and animal structures.	Identify the plant or animal structure that best meets the plant's or animal's needs in a given scenario.
4-LS1-2	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.	Animals receive information through their senses, process the information, and respond.	Identify the senses animals use to receive information.	Identify environmental stimuli to which animals respond.	Identify animal structures that enable them to detect, process, and react to information from their surroundings.	Identify how an animal responds to information from its surroundings.
5-LS1-1	Support an argument that plants get the materials they need for growth chiefly from air and water.	Water and air are essential for plant growth.	Identify a plant as a living organism.	Identify either air or water as a plant need.	Identify air and water as the chief sources of growth materials for plants. Soil is much less important.	Use data to explain that plants get the materials they need for growth from air and water.
Life Science: LS2 Ecosystems: Interactions, Energy, and Dynamics						
3-LS2-1	Construct a cause and effect argument communicating some animals, including humans, form groups and communities that help members survive.	Some animals form groups to help them survive.	Identify predator and prey animals or groups of animals.	Identify an animal groups' behavior (herding, hunting in packs, raising and protecting young, etc.).	Determine how the group behavior helps the animals survive.	Use evidence to determine a predator or prey groups' behaviors and how they help the animals.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
5-LS2-1	Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.	Producers, consumers, and decomposers have roles in the movement of matter in a food web.	Identify plants and animals as producers or consumers.	Identify the components of a food web (producer, consumer, and decomposer).	Identify the role of producers, consumers, and decomposers.	Use a model to show how matter flows through an ecosystem. Given a food chain, identify the flow of energy between organisms.
Life Science: LS3 Heredity: Inheritance and Variation of Traits						
3-LS3-1	Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.	Many of the traits of organisms are similar to those of their parents (e.g. size, color).	Identify a trait of a plant or animal.	Identify one similarity between parents and their offspring.	Identify similarities and differences between parents and their offspring.	Analyze and interpret data (including pictures) to identify similarities and differences between parents and offspring.
3-LS3-2	Use evidence to support the explanation that traits can be influenced by the environment.	Some characteristics of organisms result from environmental factors (e.g. lack of food or water).	Identify the needs of a plant or animal.	Sort organisms that have had their needs met vs. organisms that do not have their needs met.	Identify how traits of a plant or animal can be affected by its environment.	Determine environmental factors that affect traits of organisms of the same type.
Life Science: LS4 Biological Evolution: Unity and Diversity						
3-LS4-1	Analyze and Interpret data from fossils to provide evidence of the organisms and environments in which they lived long ago.	Fossils provide information about plants and animals that once lived and the environment in which they once lived.	Identify a fossil.	Identify whether the fossil was an animal or a plant.	Identify the environment (land or water, forest, or desert) in which a fossil animal or plant lived.	Identify the fossil trait that supports the environment in which the animal or plant lived. (This may include illustrations)
3-LS4-2	Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.	Sometimes differences in the characteristics between individuals of the same species provide advantages.	Identify a characteristic of an individual plant or animal.	Identify the differences in the characteristics of individuals of a species.	Determine which variation of a characteristic is most helpful to an animal or plant.	Classify variations as likely to be an advantage or disadvantage to an animal or plant's survival.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
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3-LS4-3	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.	Sometimes the differences in characteristics between individuals of the same species provide advantages in a particular habitat.	Identify an organism in a habitat.	Identify the features of a habitat, including the organisms living in it.	Determine the characteristics an organism needs to survive in a particular habitat.	Interpret data to provide evidence that some organisms of a species can survive better in a specific habitat.
3-LS4-4	Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.	When an environment changes, the organisms in the environment are impacted, some positively and others negatively.	Identify how the environment changed after a natural or human-caused event.	Identify an organism(s) that will be affected by a change in an environment.	Determine if a change in the environment is likely to have a positive or negative impact on a particular organism.	Given a simple data table, determine if a solution to the environmental change was effective (i.e. Did replanting trees lead to more birds being present?)
Earth and Space Science						
Earth and Space Science: ESS1 Earth's Place in the Universe						
4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	Patterns of rock formations and locations of fossils in rock layers reveal changes over time.	Identify that there are different rock layers in Earth and that fossils can be found in some rock layers.	Identify that the lower rock layers are the oldest rock layers.	Determine the environment of a given rock layer based on fossil evidence.	Determine a change that occurred in an environment based on the patterns/evidence found in the rock layers.
5-ESS1-1	Use evidence or models to support the claim that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	The universe has many stars. Some are brighter than the sun but appear less bright because of their distance from Earth.	Identify the sun as a star.	Demonstrate an understanding that a luminous object close to a person appears much brighter and larger than a similar object that is far away.	Use data to show that the closer a star is to Earth, the brighter the star appears.	Use data to determine which of two equally bright stars is closest to Earth based upon their apparent brightness.
5-ESS1-2	Graph the daily changes in the length, shape, and direction of shadows; lengths of day and night; and the seasonal appearance of select stars to communicate the patterns of the Earth's movement and describe how astronomical	Phases of the moon, shadows, and day and night follow a regular pattern.	Identify a shadow, the moon, and the sun.	Identify that the size of a shadow changes, that the appearance of the moon changes, and that there are changes in the day and night patterns.	Use data to identify patterns in the size of shadows, in the phases of the moon, and in lengths of day and night.	Use data to identify patterns in the size of shadows including the relationship between the shadow and the position of the sun. Use data to identify a future phase of the moon.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
	knowledge is used by American Indians.					
Earth and Space Science: ESS2 Earth's Systems						
3-ESS2-1	Obtain and represent data using tables and graphical displays to describe observed and predicted weather conditions during a particular season.	Use data to identify weather patterns.	Identify weather (sunny, windy, rainy, etc.).	Identify common weather factors such as temperature, precipitation, sky cover (clear, partly cloudy, very cloudy).	Use a simple graphical display or data table (limited to 3 or 4 data points) to identify a factor such as the time of the year when it rained the most or when it was hottest.	Recognize that weather predictions can be made based upon patterns but that they are not always accurate.
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.	Describe typical weather conditions expected during a particular season in different parts of the world.	Given illustrations, identify winter, spring, summer or fall based on "typical" conditions in many parts of the world (in temperate climates such as much of the mainland US).	Identify the temperature, precipitation, and other weather conditions as components of climate.	Describe the climate of a region of the world using weather data (e.g., using data to predict the weather of a region of the world at a given time of year given the climate.)	Identify differences between the climates found in two regions of the world.
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Erosion and weathering reshape the landscape over time.	Identify erosion and/or weathering. (For this group of students, differentiating between weathering and erosion is probably not important.)	Identify a source of erosion and weathering that can cause changes to the landscape.	Identify examples of changes to the landscape caused by erosion and/or weathering.	Given a scenario, predict the effects of weathering and erosion on a landscape.
4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.	Interpret data from maps of plate boundaries, mountain ranges, volcanoes, and earthquakes to identify patterns.	Identify a volcano, an earthquake, or a mountain range.	Identify the locations of volcanos, earthquake sites, and mountain ranges given a map.	Use a map key to identify the pattern of earthquakes, mountain ranges, or volcanoes relative to plate boundaries.	Predict a likely site of a future earthquake given a map showing plate boundaries.
5-ESS2-1	Develop a model using an example to describe ways in which the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	Earth's systems (geosphere, biosphere, hydrosphere, and atmosphere) interact in multiple ways.	Given a visual, identify the system.	Given a visual, identify the two systems interacting with one another.	Given a model, identify the result of the interaction of the two Earth systems.	Develop a model showing the interaction of two Earth systems.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
5-ESS2-2	Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	The majority of the water found on Earth is salt water. Fresh water is limited.	Identify a body of water.	Identify where fresh water and salt water are found.	Use visuals to show that the ocean contains most of Earth's water.	Use data to determine the amount of salt water and fresh water on Earth.
Earth and Space Science: ESS3 Earth and Human Activity						
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	Humans can take steps to reduce the impacts of natural weather-related hazards.	Identify a weather hazard.	Identify an impact of a weather hazard.	Identify ways to help reduce the impact of a weather hazard.	Given a scenario, determine if a solution to reduce the impact of a weather hazard will help animals and plants remain safe.
4-ESS3-1	Obtain and combine information to describe that energy and fuels are derived from natural resources and that their uses affect the environment.	The use of renewable and nonrenewable sources for energy and fuel affect the environment.	Identify an energy source that is used by people.	Determine whether an energy source is renewable or non-renewable.	Identify an effect that the use of a given energy source would have on the environment.	Use evidence to determine how the use of a particular energy source might impact the environment.
4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	Humans can take steps to reduce the impact of natural hazards.	Identify a natural hazard.	Identify the potential impact of a natural hazard.	Given a natural hazard, choose the design that would lessen the impact of the hazard.	Given two design solutions, explain why one of them will be more effective in reducing the impacts of a natural hazard.
5-ESS3-1	Obtain and combine information from various sources about ways individual communities use science ideas to protect the Earth's resources, environment, and systems and describe examples of how American Indians use scientific knowledge and practices to maintain relationships with the natural world.	Human activity can affect the environment, but steps can be taken to protect it.	Determine a source of pollution.	Identify an effect of pollution on air quality or water quality.	Identify actions humans can take to protect the environment.	Determine a way to clean up the environment.

MIDDLE SCHOOL (Administered in Grade 8)

MT Alternate Science – NGSS Middle School

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
Physical Science						
Physical Science: MS-PS1 Matter and Its Interactions						
MS-PS1-1	Develop and critique models that describe the atomic composition of simple molecules and extended structures.	Matter is made of very small pieces called atoms, and atoms join together to create molecules.	Observe that all things (matter) can be broken up into smaller and smaller pieces until they eventually become too small to see, but even then, they still exist.	Identify that the smallest parts of all molecules are atoms.	Classify molecules by make up: one type of atom or multiple atoms making up molecules and comparing simple molecules (e.g., carbon dioxide, water, salt) to complex molecules (e.g., sugar, plastics, or nylon).	Use models as evidence (e.g., pictures, 3D ball, stick structures) to explain that atoms can combine to form molecules, including those made up of the same type of atom (e.g., iron, oxygen) and those made up of different types of atoms (e.g., water, ammonia, sodium chloride).
MS-PS1-2	Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.	Some substances, when mixed, interact to form new substances with new properties.	Identify the physical and/or chemical properties of a substance before a reaction.	Observe and identify examples of changes in substances.	Use data to support a claim that properties have changed, and a new substance has been formed.	Recognize that chemical changes involve changes in the molecules (atoms are rearranged), leading to a new substance with properties that are different from the properties of the original substances.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-PS1-3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.	Natural resources can be used to make materials useful to society.	Identify common natural resources.	Identify examples of materials that are made from natural resources (e.g., iron ore into steel, wood into furniture).	Identify the natural resources used to make a synthetic product that is useful to society (e.g., petroleum into plastics, aluminum into cans).	Using information from a passage, support a claim about the impact on society of synthetic materials made from natural resources.
MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	Matter exists in various states, including solid, liquid, and gas. The molecules behave differently in each state. The state of matter of a material can change when heat is added or removed.	Identify matter as a solid, liquid, or gas.	Use a model as evidence to identify that the particles that make up an object move fast or slow depends on the temperature of the object.	Recognize that adding or removing heat can cause a change in the state of a material as the motion of its molecules increases or decreases.	Predict the change in particle motion and state of matter that will occur when heat is introduced or removed.
MS-PS1-5	Develop, use, and critique a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.	Not Assessed on the Alternate Montana Science Assessment				
MS-PS1-6	Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.	Some chemical reactions release heat; others absorb heat.	Observe that chemical reactions create new substances. (Also see MS-PS1-2.)	Recognize that, sometimes, chemical reactions cause temperature changes within the substance.	Use presented evidence to determine if a reaction has released or absorbed thermal energy.	Given criteria, choose a design solution that absorbs or releases heat to solve a problem (i.e., use common objects, like chemical reactions that produce temperature changes in heat packs; chemical reactions that are used in ice packs).
Physical Science: MS-PS2 Motion and Stability: Forces and Interactions						
MS-PS2-1	Apply Newton s Third Law to design a solution to a problem involving the motion of two colliding objects.	When objects collide, they exert force on each other, which will affect their motion (e.g., collisions between toy cars or	Observe that force can cause motion. (Also see 3-PS2-1)	Relate the speed of a moving object to the impact of a collision with a stationary object (e.g., toy cars hitting a wall).	Use models as evidence to predict how the motion of objects with different speeds will be affected when the objects collide.	Conduct an investigation (simulation or simple data sets provided) to determine how the changing speed of objects affects the motion of the objects when they collide.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
		between a toy car and a stationary object).				
MS-PS2-2	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.	Unbalanced forces cause a change in motion. The amount of change depends upon the size of the force and mass of the object. (Also see MS-PS3-1)	Identify that an object changed position due to an outside factor (e.g., a bowling ball hits a pin, and the pin moves).	Identify that a force (push/pull) is needed to change an object s motion.	Predict how the motion of an object will change when acted on by forces of different sizes or when objects have different masses.	Use data from an investigation where two objects with different masses are acted on by a series of forces to reach conclusions.
MS-PS2-3	Ask questions about data to determine the factors that affect the strength of electrical and magnetic forces.	Some forces, such as magnetic forces, act at a distance (push/pull) without physical contact with an object.	Identify a magnet as something that exerts an attractive force on some materials.	Sort objects based on whether they are attracted by a magnet.	Use data to make statements about the effect of distance on the interactions between magnets.	Identify a question that could be answered by a scientific investigation involving one or more magnets.
MS-PS2-4	Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects.	Gravitational force exists between any two objects. The size of the force depends upon the mass of the object.	Observe that objects fall to the ground when dropped.	Use models as evidence to illustrate the effect of Earth s gravity on the motion of an object relative to its mass.	Use models as evidence to demonstrate the effects of Earth s gravitational force on objects of different masses.	Analyze and interpret data to describe and predict the effects of gravitational force of two objects with large mass (e.g., Earth and the sun).
MS-PS2-5	Design and conduct an investigation to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.	The behavior of magnets varies with changes in orientation, distance, and the strength of the magnet. (Gravitational forces are largely addressed in MS-PS2-4.)	Identify the poles of a bar magnet.	Recognize that like poles repel each other and unlike poles attract.	Relate the orientation of magnets and the distance between them to the behavior of the magnets.	Use data from an experiment to explain the effect of changing the orientation of two magnets, changing the distance between two magnets, or changing the strength of two magnets.
Physical Science: MS-PS3 Energy						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-PS3-1	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.	Kinetic energy (motion energy) is proportional to the mass of the object. Kinetic energy increases as speed increases.	Identify mass and speed of an object.	Use mass data to identify the object with the greatest mass or use speed data to determine which object moves the fastest.	Use mass or speed data to determine the object with the greatest kinetic energy.	Use graphical data to identify that kinetic energy changes as mass or speed increases (e.g., two objects with different masses moving at the same speed or two objects with the same mass moving at different speeds, or a single object whose speed changes).
MS-PS3-2	Develop and critique models to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system.	Not Assessed on the Alternate Montana Science Assessment				
MS-PS3-3	Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.	Heat can be transferred from one object to another. Humans have invented devices to manage this transfer.	Identify objects that are hot and cold.	Identify things used to keep something hot or cold.	Realize that heat can be transferred (e.g., if ice is added to a cup of water or if water in a pot is heated on a stove).	Use data to identify the tool that is most efficient at keeping something hot or cold.
MS-PS3-4	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.	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-PS3-5	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.	When the motion energy of an object changes, the object may gain or lose energy. (Motion energy refers to kinetic energy)	Observe that the motion energy of an object can change.	Identify the motion energy transfer in presented examples (e.g., a ball that was moving begins to slow down, so this means that energy was transferred from the object).	Predict what will happen to the motion energy between two similar objects when one collides with the other (e.g., a ball rolling down a hill collides with a ball that is at rest at the bottom of the hill).	Use data from an experiment to determine the reasoning behind motion energy being transferred to or from an object (e.g., when two balls collide, one begins to move due to motion energy being transferred to it).
Physical Science: MS-PS4 Waves and Their Applications in Technologies for Information Transfer						
MS-PS4-1	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.	Mechanical waves (water, sound, waves in a rope at the gym) have a repeating pattern, including amplitude, which reflects the energy of the wave. (Note: tsunamis should not be used as examples)	Give/identify examples of waves.	Identify a property of a wave (e.g., frequency, amplitude, wavelength).	Compare wave diagrams to identify differences in wavelength and amplitude.	Use data to show that greater water wave height (i.e., amplitude) results in a greater force and more impact if it strikes shore or another object.
MS-PS4-2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	Light waves can be reflected, refracted (transmitted), or absorbed by different materials.	Recognize that light travels through some objects and not others.	Use observations to identify transparent materials.	Use models as evidence to recognize that light can be reflected, absorbed, or transmitted (light passes through the object).	Use models as evidence to describe how light behaves when striking transparent, translucent, and opaque materials.
Life Science						
Life Science: MS-LS1 From Molecules to Organisms: Structures and Processes						
MS-LS1-1	Conduct an investigation to provide evidence that living things are made of cells: either one cell or many different numbers and types of cells.	All living things are made up of cells, which are the smallest units that can be said to be alive.	Identify living and nonliving things.	Recognize that the cell is the smallest living unit.	Recognize that all living things are made up of one or more cells.	Recognize that many organisms have many different types of cells (e.g., skin cells, blood cells, muscle cells, brain cells).

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-LS1-2	Develop and use a model to describe the function of a cell as a whole and ways the parts of cells contribute to the function.	Cells are made up of parts that work together. Cells have different parts with various functions.	Identify cells as the basic component of all living things.	Identify parts of a plant cell and/or animal cell.	Identify how two cell parts work together to perform a function: nucleus, chloroplast, mitochondria, cell membrane, and cell wall.	Use a model as evidence to describe how the functions of the parts of a plant or animal cell contribute to the cell as a whole.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting sub-systems composed of groups of cells.	The body is a group of systems that work together to carry out body functions. Within the systems, groups of cells form tissues and organs.	Identify a major organ in the body.	Recognize that organs have specialized functions.	Recognize that groups of cells create tissues. Tissues come together to create organs, and multiple organs create organ systems.	Use a model as evidence to demonstrate how organs are connected in major organ systems.
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants, respectively.	Animals exhibit behaviors and plants have characteristics that contribute to successful reproduction. (Assessment boundary: Assessment does not include human reproduction.)	Identify plant or animal structures or behaviors that contribute to their survival.	Match plant or animal structural or behavioral adaptations to survival needs.	Use observations to match structural adaptations and/or behaviors to successful reproduction of plants and animals in an environment.	Read a short passage on animal behaviors that affect plant reproduction and identify the behavior that assists plants.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	An organism s growth is affected by environmental factors.	Identify characteristics of an organism's habitat/environment.	Identify environmental factors that can influence an organism's growth.	Use qualitative data to identify environmental factors that lead to optimum organism growth (e.g., number of trees for camouflage, nest building).	Use evidence from qualitative data to explain an increase or decrease in organism growth in a specific environment.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-LS1-6	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.	Plants take in matter (in the form of carbon dioxide and water), and use energy from the sun to produce food, and release oxygen into the environment through photosynthesis.	Observe that plants need light and water to live.	Recognize that light energy (sunlight), water, and carbon dioxide are necessary for plants to make food.	Use a model as evidence to show that in photosynthesis, light energy (sunlight), carbon dioxide and water are taken in by plants to produce oxygen and food molecules which can be used or stored by the plant.	Use a model as evidence to describe that photosynthesis is necessary for plant survival.
MS-LS1-7	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.	Food moves through different processes to form new molecules that support growth and release energy. (Photosynthesis is in MS-LS1-6.)	Observe that organisms eat to survive.	Recognize that food must be broken down by chewing and digesting so that the nutrients can be absorbed by the organism.	Recognize that food molecules are broken down and put back together during digestion to be useful to the organism.	Use a model to explain nutrient data that shows organisms using food for growth and energy. (Assessment boundary: Assessment does not include humans.)
Life Science: MS-LS2 Ecosystems: Interactions, Energy, and Dynamics						
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem and analyze scientific concepts used by American Indians to maintain healthy relationships with environmental sources.	Organisms are dependent on interactions in their environment, including other living things and the physical environment.	Identify an organism or environmental factor.	Identify factors in an ecosystem, that can impact an organism or a population of organisms.	Identify if a population increases or decreases as a result of a change in the ecosystem.	Describe how the availability of resources in a habitat changes when a population changes.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.	There are a variety of interactions in an ecosystem that may be predatory, competitive, or mutually beneficial.	Identify an example of an organism interacting with its environment.	Identify an interaction between two organisms within an ecosystem.	Describe interactions among organisms across multiple ecosystems.	Describe patterns of interactions, including those which are predatory, competitive, and mutually beneficial.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	Food webs are models that demonstrate how matter and energy is transferred between living things (producers, consumers, decomposers) and nonliving parts of an ecosystem.	Identify parts of a food web (producer, consumer, decomposer).	Complete a food web given a set of common organisms.	Complete a food web showing the flow of energy between living organisms and nonliving parts of an ecosystem.	Develop a model to describe the cycling and flow of energy in living organisms and nonliving parts of an ecosystem.
MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.	Not Assessed on the Alternate Montana Science Assessment				
Life Science: MS-LS3 Hereditary: Inheritance and Variation of Traits						
MS-LS3-1	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 an organism.	Structural changes to genes lead to mutations that may be helpful or harmful.	Identify a gene and the location of a gene.	Recognize that genes create proteins that the body needs.	Recognize that changes to gene structures cause changes to the proteins that they create and may lead to the development of new traits that may be helpful or harmful.	Given a scenario, recognize that any variation in the structure and function of an organism is the result of a genetic mutation.
MS-LS3-2	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.	All organisms reproduce, either sexually and/or asexually. Asexual reproduction occurs from a single organism. Sexual reproduction leads to offspring that inherit traits from both their parents.	Identify that all living organisms reproduce.	Differentiate between asexual and sexual reproduction. (Assessment boundary: Assessment does not include human reproduction.)	Use a model as evidence to describe why asexual reproduction differs from sexual reproduction.	Use data to show why sexual reproduction leads to trait variation among offspring.
Life Science: MS-LS4 Biological Evolution: Unity and Diversity						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-LS4-1	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.	Fossils and their placement in rock layers provide information about the age of fossils and how living things have changed over time.	Identify a fossil in a geologic context.	Identify the relative age of fossils based upon their location in rock layers.	Match a fossil to a similar organism found on Earth today or identify that organism as extinct.	Use patterns in fossil data or pictorial information to explain how an organism changed over time.
MS-LS4-2	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.	There are anatomical similarities and differences between past and present-day organisms. These enable the inference of lines of evolutionary descent (Also see MS-LS4-1)	Identify a fossil in a biological context.	Match an anatomical structure of a living organism to a similar fossil.	Compare fossils with present-day organisms with similar characteristics.	Compare and contrast similarities and differences among related modern organisms and with those in the fossil record.
MS-LS4-3	Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-LS4-4	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.	Natural selection favors organisms that have traits that increase the likelihood of survival and reproduction in a specific environment. (Also see MS-LS3-2)	Identify a trait.	Identify a trait that helps individuals survive and reproduce in a specific environment.	Explain that some traits help individuals in a population to survive and reproduce in a specific environment.	Explain changes in the population size, given data showing a variation of traits within a population in a specific environment (the population size should change based on the trait).
MS-LS4-5	Gather and synthesize information about technologies that have changed the way humans influence the inheritance of desired traits in organisms.	Humans have the ability to influence the traits that organisms have through selective breeding.	Identify that traits are passed from parent to offspring from the organism s parent.	Identify the undesired and desired traits of an organism undergoing selective breeding.	Recognize selective breeding to be a process that allows the desirable traits to be chosen.	Given a small passage, determine how a desired trait was acquired.
MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.	Natural selection may lead to increases and decreases of specific traits in populations.	Identify the traits of an animal or plant.	Identify the differences in traits among members of the same animal or plant species.	Given a description of an environment, determine if a trait will increase or decrease in a specific population over time.	Given data, predict future population size based upon the survival of organisms with favorable traits.
Earth and Space Science						
Earth and Space Science: MS-ESS1 Earth's Place in the Universe						
MS-ESS1-1	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.	Models of the Earth-sun-moon system can describe patterns of day and night, seasons, and lunar phases.	Identify the sun, Earth, and moon in a model.	Identify day, night, and the four seasons using a model or diagram.	Use a model as evidence to identify Earth s seasons and relate them to Earth s tilt and revolution around the sun.	Use a model of the sun-moon system as evidence to explain day and night, seasons, and/or phases of the moon.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	The solar system consists of the sun, planets, and their moons. Gravity is the attractive force between objects in the system.	Identify that the solar system consists of the sun, planets, and moons.	Identify gravity as the force that pulls objects together (e.g., dropped objects fall toward the ground).	Describe the motions of all objects in the solar system that occur due to the gravitational force of the sun.	Develop a model that compares the gravitational force of the sun to the gravitational forces of planets (e.g., the motions of moons around the planets and the role of gravity in these motions).
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.	The solar system consists of the sun, planets, and their moons. The properties of these objects can be observed at various scales.	Observe that Earth is part of the solar system.	Locate the sun, Earth, and Earth s moon in a diagram of the solar system.	Use data to order the planets based on their size or distance from the sun.	Compare and contrast the scale properties of objects in the solar system including scale drawings.
MS-ESS1-4	Construct a scientific explanation based on evidence from rock strata for how the geologic timescale is used to organize Earth s 4.6-billion-year-old history.	Rock layers and fossils provide a way to organize Earth's history.	Observe rock layers and fossils.	Identify the youngest and oldest rock layers based upon their position in a column.	Identify the relative age of fossils based on their location in a column of rock layers.	Use data to estimate the age of a fossil in a rock layer.
Earth and Space Science: MS-ESS2 Earth's Systems						
MS-ESS2-1	Develop a model to describe the cycling of Earth s materials and the flow of energy that drives this process.	Earth materials cycle through processes such as the rock cycle and water cycle.	Identify Earth materials (e.g., water, rocks, minerals, soils).	Identify the rock cycle and different type of rocks (sedimentary, igneous, metamorphic). Identify stages in the water cycle.	Describe how heat from Earth’s core powers the rock cycle. Describe how heat from the sun powers the water cycle.	Use models as evidence to describe the importance of the heat from Earth’s core or the sun’s energy to drive Earth processes.
MS-ESS2-2	Construct an explanation based on evidence for how geoscience processes have changed Earth s surface at varying times and spatial scales.	Fast and slow processes (geoscience processes) shape and reshape the surface of the Earth.	Identify that the Earth s surface features change over time.	Classify processes as slow or fast (e.g., erosion and weathering, landslides and earthquakes).	Recognize that surface processes such as erosion, movement, weathering, and the deposition of sediment can modify surface features, such as mountains, or create new features, such as canyons.	Given a scenario, describe which process (weathering, erosion, deposition) contributed to the change of Earth s surface.

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-ESS2-3	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of past plate motions.	Maps of ancient land and water patterns, as well as investigations of rocks and fossils, show that the surface of the Earth consists of plates, which have moved, collided, and spread apart.	Identify that the Earth is divided into plates.	Identify plate movement.	Recognize how continent shapes fit together as evidence of plate motions.	Use fossil evidence to describe how continental and sea floor structures have changed over time.
MS-ESS2-4	Develop a model to describe the cycling of water though Earth s systems driven by energy from the sun and the force of gravity.	Driven by the force of gravity and energy from the sun, water continually cycles through Earth's systems: among land, ocean, and atmosphere.	Identify bodies of water on the earth.	Identify the parts of the water cycle.	Use a model of the water cycle as evidence to explain the role of the sun in the water cycle.	Use a model of the water cycle as evidence to explain the cycling of water through the Earth s systems.
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.	The movement of air masses causes changes in weather, including temperature, precipitation, and wind.	Identify a weather condition.	Use objects and pictures to identify local weather conditions and patterns.	Use observational data to identify and describe weather conditions to predict local weather patterns.	Describe how the movement of air masses causes changes in weather, including temperature, precipitation, and wind.
MS-ESS2-6	Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	Climates vary and are influenced by interactions involving sunlight, the ocean, the atmosphere, and landforms.	Identify a feature of a climate.	Match a climate to an area or region.	Describe how climate is determined in an area based on location, shape of land, and distance from water.	Use models as evidence to explain how climate is determined in an area (e.g., latitude, elevation, shape of land, distance from water, global wind patterns).
Earth and Space Science: MS-ESS3 Earth and Human Activity						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
MS-ESS3-1	Construct a scientific explanation based on evidence for how the uneven distributions of Earth s minerals, energy, and groundwater resources are the result of past and current geoscience processes.	Humans depend on a variety of natural resources for survival. These come from various parts of the world, and many are not renewable.	Identify a natural resource.	Identify the locations of natural resources used in daily life.	Use data to explain why specific resources are limited.	Describe how the use of nonrenewable resources changes how much of the resources remain for future use.
MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	Natural hazards include volcanic eruptions, earthquakes, tsunamis, severe weather, hurricanes, tornados, landslides, floods, and forest fires. Data from these events can be used to prevent the effects of future events.	Identify examples of a natural hazard.	Identify locally relevant natural hazards.	Classify natural hazards as predictable or not yet predictable.	Associate a technology/safety measure with a given natural hazard to mitigate the effect.
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	Human activities can alter the environment in positive and negative ways.	Identify the needs of organisms in a specific environment.	Identify human actions that can alter the environment.	Match human activities with their effect on the Earth.	Given a scenario, compare design solutions for monitoring and/or mitigating an environmental problem caused by human activity.
MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth s systems.	Human populations and the resources they use impact Earth systems.	Recognize resources that humans need to survive.	Describe ways in which human activity uses natural resources.	Use evidence to link an environmental change to human population increase.	Predict the effect of human population increase on an environment.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.	Human activities are major factors that have led to a rise in global temperatures over the past century.	Identify human activities that have an impact on the environment.	Match human activities to possible factors causing gradual temperature changes.	Identify a question that could be answered using data that depicts rising temperatures over the last 100 years.	Identify ways in which rising temperatures could have an impact on the environment.

HIGH SCHOOL (Administered in Grade 11)

MT Alternate Science – NGSS High School

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
Physical Science						
Physical Science: HS-PS1 Matter and Its Interactions						
HS-PS1-1	Develop models to describe the atomic composition of simple molecules and extended structures.	Matter is made up of single and complex molecules, and within molecules there are atoms.	Identify that atoms are the smallest parts of all molecules.	Identify the elements present in a simple molecule (O_2) or complex molecule (NaCl or CO_2). Differentiate atoms versus molecules.	Use a model to show how atoms combine to form simple molecules (O_2) or complex molecules (NaCl or CO_2).	Use models (e.g., pictures, diagrams, 3-D balls and sticks) to explain how atoms can combine to form simple molecules (O_2) and complex molecules (NaCl or CO_2).
HS-PS1-2	Construct and revise an explanation for outcomes of simple chemical reactions based on outer electron states of atoms, trends in the periodic table, and patterns of chemical properties.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
	forces between particles.					
HS-PS1-4	Develop a model to illustrate that the release or absorption of energy from chemical reactions is dependent upon changes in total bond energy.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS1-5	Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.	Chemical reactions can be sped up by increasing the amount of reactants or by increasing the temperature.	Identify the reactants in a chemical reaction.	Understand that a reaction rate can be increased when factors change.	Identify increasing the amount of reactants or increasing the temperature as ways to speed up a chemical reaction.	Use evidence from an investigation to explain how changing the amount of reactant or the temperature changed the speed of the reaction.
HS-PS1-6	Refine the design of a chemical system by specifying changes in conditions that would alter the amount of products at equilibrium.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	When substances change, mass is conserved (i.e., the masses before and after the reaction are present in different forms).	Identify a chemical reaction.	Identify an atom that changes in a chemical reaction. In a chemical reaction, identify that the initial mass equals the final mass.	Recognize that when chemicals change, new material is formed after the reaction and the initial mass/atoms equals the final mass/atoms.	Use data and/or mathematical computation to support a claim that mass is conserved in a chemical reaction.
HS-PS1-8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission,	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
	fusion, and radioactive decay.					
Physical Science: HS-PS2 Motion and Stability: Forces and Interactions						
HS-PS2-1	Analyze data to support the claim that Newton's Second Law of Motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS2-2	Use mathematical representations to demonstrate how total momentum of a system is conserved when there is no net force on the system.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS2-3	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	When objects collide, they exert forces on each other, which affects their motion. Some objects minimize force (e.g., bumper on a car, helmet on a football player).	Identify a collision.	Identify ways to minimize the force in a collision (e.g., bumper, helmet, air bags in cars).	Use models to predict how impact is minimized when protective components are included.	Use data to describe the best device that will reduce impact in a collision.
HS-PS2-4	Use a mathematical representation of Newton's Law of Gravitation and Coulomb's Law to explain gravitational and electrostatic forces between objects.	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
HS-PS2-5	Plan and conduct investigations to provide evidence that electric currents can produce magnetic fields and changing magnetic fields can produce electric currents.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS2-6	Communicate through scientific and technical information roles of molecular-level structure in the functioning of designed materials.	Not Assessed on the Alternate Montana Science Assessment				
Physical Science: HS-PS3 Energy						
HS-PS3-1	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 and energy flows in and out of the system are known.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles and energy associated with the relative position of particles.	Not Assessed on the Alternate Montana Science Assessment				

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
HS-PS3-3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS3-4	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.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS3-5	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.	When two objects interact in a magnetic field, forces between the objects change due to the interaction.	Observe that like poles repel each other and unlike poles attract each other.	Recognize how the strength of a magnetic force affects magnetic behavior (e.g., stronger magnets versus weaker magnets; number of paper clips one magnet can hold versus another).	Use a model to predict the change in behavior of magnets based on their orientation and the distance between them.	Explain the effect of one magnet on the behavior of another magnet when distance or force is changed in an investigation.
Physical Science: HS-PS4 Waves and Their Applications in Technologies for Information Transfer						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
HS-PS4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	Mechanical waves (water, sound, waves in a rope at the gym) have repeating patterns (including amplitude, frequency, wavelength) that are impacted by the media (e.g., air, water) through which they travel.	Identify different media that waves travel through (e.g., air, water, solid objects).	Identify a property of a wave (e.g., frequency, amplitude, wavelength).	Compare wave diagrams to identify differences in frequency, wavelength, and amplitude through media.	Use data to show the effects of waves travelling through different media.
HS-PS4-3	Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	Not Assessed on the Alternate Montana Science Assessment				
HS-PS4-4	Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	Not Assessed on the Alternate Montana Science Assessment				
Life Science						
Life Science: HS-LS1 From Molecules to Organisms: Structures and Processes						

Next Generation Science Standards		Essence Statement	Performance Level Descriptors			
Code	PE		Level 1	Level 2	Level 3	Level 4
HS-LS1-1	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.	Living things are made up of a variety of types of cells that have different functions. The function of a cell is determined by its DNA, which is found in the cell's nucleus.	Identify that living things are made up of cells.	Identify the nucleus as the center of a cell for controlling the function of a cell. Recognize that DNA is found in the nucleus of the cell.	Explain that the DNA in a cell's nucleus is the genetic code that creates proteins that determine a cell's function.	Explain that body cells with different functions underwent different gene expression.
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	Living organisms have systems that work together to maintain life. The organs that make up these systems carry out specific functions.	Identify major organs in the body.	Identify a body system.	Use a model to explain the function of a body system and identify the major organ in the system.	Use a model to demonstrate how two body systems work together.
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	Organisms, and the organs and cells within them, react to maintain an internal balance (homeostasis). [Note: The term "homeostasis" should not be used within items for the Low and Moderate levels.]	Identify stimuli that lead to reactions in a living system (e.g., temperature, amount of light present, sounds, smells).	Identify ways the body reacts to stimuli to maintain internal balance (e.g., sweating when hot, increasing heart rate and breathing during exercise, pupils reacting to light).	Sequence the steps in an investigation to show how an organism reacts to stimuli (e.g., eyes reacting to light, heart or lungs reacting to exercise).	Use data (graphical or in a table) to identify that changes in body systems occur during exercise or other activities. [Note: Graphs should show the body's response and a return to homeostasis].
HS-LS1-4	Construct an explanation using evidence from multiple sources to describe the role of cellular division and differentiation in producing and maintaining complex organisms.	Cell division and multiplication, which occurs through a process called mitosis, enables growth and the replacement of dead or damaged cells.	Identify that cells divide.	Identify a model of the cellular division process.	Use a model to explain what happens during cell division.	Use a model to explain the role of cellular division in growth and repair.
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	Plants produce their food through a process called photosynthesis. Photosynthesis uses light energy to convert carbon dioxide and water into sugars plus released oxygen.	Identify that plants make their own food with energy from the sun.	Recognize the purpose of photosynthesis.	Use a model to identify the conversion of carbon dioxide, sunlight and water into food and oxygen.	Use a model (using words, pictures, etc.) to describe how the overall process of photosynthesis transforms light energy into stored chemical energy.

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HS-LS1-6	Construct an explanation based on evidence from multiple sources for how carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur may combine with other elements to form organic macromolecules with different structures and functions.	Sugar molecules contain carbon, hydrogen, and oxygen. They are used to make other carbon-based molecules.	Identify that plants and animals rely on sugar molecules to survive.	Identify that sugar molecules contain carbon, hydrogen, and oxygen.	Use a model to identify that the elements that make up sugar molecules are present in other molecules.	Use a model to explain how sugar molecules are recombined to form other molecules.
HS-LS1-7	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.	Cellular respiration converts oxygen and sugar into carbon dioxide, water, and energy.	Identify that animals need food and air.	Identify that organisms obtain molecules from food and air that provide energy to sustain them.	Use a model of cellular respiration to explain the input and output of the process.	Given a scenario, describe how food is broken down and used in cellular respiration.
Life Science: HS-LS2 Ecosystems: Interactions, Energy and Dynamics						
HS-LS2-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	Ecosystems have carrying capacities, which limit the numbers of organisms and populations they can support. Balance exists in organisms, populations, and ecosystems.	Identify organisms as belonging to a specific ecosystem.	Identify factors that could affect the balance in an ecosystem (e.g., population increases or decreases, immigration and emigration, invasive species).	Use data to determine if the food supply present in an ecosystem can sustain a specified increase in the number of organisms, or populations of organisms, eating that food supply in an ecosystem.	Use data, including graphical representations, to predict the result of a change in the population of an organism or a change in the resources found in a specific ecosystem.
HS-LS2-3	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	Not Assessed on the Alternate Montana Science Assessment				

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HS-LS2-4	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	Matter and energy flow through a food web (ecosystem) with only a small fraction transferred from one level to another.	Identify that matter and energy are transferred when an organism eats another organism.	Identify types of matter that may flow through a food web (e.g., oxygen, carbon dioxide).	Given an example of a food web, identify that progressively reduced amounts of energy and matter transfer to higher trophic levels.	Given an example of a food web, explain why there are more producers than consumers in an ecosystem, based on how progressively reduced amounts of energy and matter transfer to higher trophic levels
HS-LS2-6	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but the changing conditions may result in a new ecosystem.	Changes in the physical environment (e.g., landslides, floods, development) can lead to temporary or permanent changes to an ecosystem.	Identify a non-living environmental factor in an ecosystem.	Identify a non-living factor that affects and changes a population.	Given a model, identify changes in the physical environment that can lead to temporary or permanent changes in ecosystems and populations.	Given a model, support a claim that changes in the physical environment can affect the populations in an ecosystem.
HS-LS2-7	Design, evaluate, and refine a solution for reducing the direct and indirect impacts of human activities on the environment and biodiversity and analyze scientific concepts used by American Indians to maintain healthy relationships with environmental resources.	Human activity can change the environment. Many changes are harmful, but humankind can also take steps to preserve and restore the environment/ ecosystems.	Identify ways in which humans interact with Earth.	Match human activities with their effects on Earth and categorize them as having a positive or negative impact on Earth.	Identify actions that can be taken to preserve or restore the environment.	Given data, evaluate a solution to reduce the impact of human activities on the environment.
Life Science: HS-LS3 Heredity: Inheritance and Variation of Traits						
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through	Genetic variation can involve reproduction between two individuals and the process of meiosis (cell division).	Identify that traits are determined by genetic information that is kept in the chromosome.	Recognize that two siblings can look different even though they have the same parents due to genetic variation (e.g., meiosis, errors during replication, or genetic mutations).	Use a model to explain how new genetic combinations are a result of meiosis, DNA replication errors, or mutations caused by environmental factors.	Given a scenario, explain why reproduction may or may not result in offspring with different traits.

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	meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.					
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	Not Assessed on the Alternate Montana Science Assessment				
Life Science: HS-LS4 Biological Evolution: Unity and Diversity						
HS-LS4-1	Evaluate and communicate scientific information about how common ancestry and biological evolution are supported by multiple lines of empirical evidence.	Many organisms currently found on Earth are similar and can be traced back to common ancestors that lived very long ago.	Identify two present-day species of organisms that have similar anatomical structures (e.g., pigeons and myna birds, cows and horses).	Identify a fossil organism and a present-day organism that have similar anatomical structures.	Using descriptions and pictures, determine the sequential development pattern from a fossil to a present-day organism (e.g., whale limb evolution, horse toe evolution).	Using fossil evidence or DNA sequencing data, sequence organisms from past to present.
HS-LS4-2	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.	Evolution explains the change across successive generations in a biological population.	Identify evolution as a process that results in species developing new characteristics.	Identify that evolution results in species developing new characteristics that increase the odds of survival.	Determine which factor (e.g., an inherited genetic variation, limited resources, organisms that were more fit to survive in an environment) resulted in a specific adaptation within a species.	Given a scenario (e.g., limited resources), predict an adaptation that a specific species may develop.
HS-LS4-3	Apply concepts of statistics and probability to support explanations that	Organisms with traits that are advantageous and affect survival are more likely to be reproduced,	Identify a trait.	Identify an advantageous inherited trait.	Given a scenario of similar organisms with different traits, predict which organism will likely survive.	Use data (pictorial, graphical, or tabular) to explain why more individual organisms

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	organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	and thus become more common in the population.				exhibit an advantageous trait over time.
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	Natural selection is the result of the survival of organisms with traits that increase the survival rate and the production of more offspring.	Recognize that some organisms survive better in certain environments.	Recognize when natural selection has occurred.	Use evidence to explain that organisms that survive can pass on beneficial traits.	Use evidence to explain that populations become better adapted over time.
HS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in changes in the number of individuals of some species, the emergence of new species over time, the extinction of other species; investigate and explain American Indian perspectives on changes in environmental conditions and their impacts.	Changes in an environment favor the survival of some organisms over others and can support the emergence of new species.	Identify the needs of the organisms present in a specific environment.	Identify a change factor in a specific environment (e.g., deforestation, fishing, fertilizer application, drought, flood).	Describe an environmental change that will result in changes in the population of organisms.	Predict what will happen to specific species over time based on an environmental change.
HS-LS4-6	Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.* [Clarification Statement: Emphasis is on designing solutions for a proposed problem related to threatened or endangered species, or to genetic variation of	Not Assessed on the Alternate Montana Science Assessment				

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	organisms for multiple species.]					
Earth and Space Science						
Earth and Space Science: HS-ESS1 Earth's Place in the Universe						
HS-ESS1-1	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.	Energy from the sun reaches Earth in the form of radiation.	Recognize the sun as a source of energy in the solar system.	Recognize that energy from the sun reaches Earth.	Use a model to explain that the energy released from the sun's core warms the Earth and provides the surface of Earth with light.	Use a model to describe how the rotation of Earth changes the amount of energy it receives from the sun to produce unequal heating.
HS-ESS1-2	Construct an explanation of the current model of the origin of the universe based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	The expansion of the universe from its origins can be explained in multiple ways, one of which is the motion of distant galaxies.	Identify that we live in the Milky Way galaxy and that there are many distant galaxies in the universe.	Identify that the universe is expanding.	Use evidence to explain that the motion of distant galaxies is one way we know that the universe is expanding from its origin.	Explain pictorial or graphical data representing the expansion of the universe from its origin based on the motion of distant galaxies.
HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycles, produce elements.	Stars, throughout their life cycles, produce elements.	Identify that stars are made of elements.	Identify that a star has a life cycle. Recognize elements commonly found in stars.	Use a model to explain that stars produce elements (including hydrogen, helium, and iron) during their life cycles.	Use a model to explain that the elements stars produce during their life cycles get larger and heavier.

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HS-ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	Data can be used to predict the motion of orbiting objects in the solar system.	Identify objects that have orbits in the solar system.	Recognize that the moon is in orbit around Earth. Recognize that Earth is in orbit around the sun.	Use data to predict the motion of an object with a consistent orbit.	Use data to compare orbits in our solar system.
HS-ESS1-5	Evaluate evidence of past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	The theory of plate tectonics and evidence from movements of continental and oceanic plates can be used to explain the ages of crustal rocks.	Recognize that Earth's crust is divided into tectonic plates.	Recognize that the tectonic plates move toward each other, move away from each other, or slide next to each other.	Explain that the youngest rocks are formed as tectonic plates move apart.	Use evidence to show the ages of crustal rocks near and far from a divergent boundary (e.g., rocks closest to the boundary are youngest).
HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.	Not Assessed on the Alternate Montana Science Assessment				
Earth and Space Science: HS-ESS2 Earth's Systems						
HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	Changes to Earth's continental and ocean-floor features are caused by Earth's internal and surface processes over time.	Identify surface processes that change Earth's features.	Identify internal processes that change Earth's features.	Use models to demonstrate the results of surface and internal processes (e.g., mountains, valleys, sea mounts, volcanoes).	Use a model to determine which surface or internal process formed a specific feature.
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other earth systems.	Not Assessed on the Alternate Montana Science Assessment				
HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.	Not Assessed on the Alternate Montana Science Assessment				

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HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	Not Assessed on the Alternate Montana Science Assessment				
HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth's materials and surface processes.	Water affects Earth's materials and changes the Earth's surface.	Identify materials in Earth's surface.	Identify the effect that water has on Earth's surface.	Use a model to explain how water changes Earth's surface through erosion.	Use data to predict how water changes Earth's surface over time.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	Not Assessed on the Alternate Montana Science Assessment				
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	Changes in Earth's systems and life on Earth occur simultaneously.	Identify Earth's systems (biosphere, hydrosphere, atmosphere, geosphere).	Identify cause-and-effect relationships between Earth's systems and life on Earth.	Explain how life on Earth changes as Earth's systems change (Note: limit to common occurrences and simple cause/effects relationships).	Predict how the biosphere will change as one of Earth's systems changes. [ok]
Earth and Space Science: HS-ESS3 Earth and Human Activity						
HS-ESS3-1	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.	Human activity can be influenced by the availability of natural resources and occurrence of natural hazards.	Recognize that resources used by humans are impacted by natural hazards.	Recognize a pattern between available natural resources and human activity or recognize a relationship between the occurrence of natural hazards and human activity.	Evaluate how the availability of natural resources and/or the occurrence of natural hazards influence human activity.	Predict human activity based on the availability of natural resources and the occurrence of natural hazards.
HS-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	Not Assessed on the Alternate Montana Science Assessment				

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HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, biodiversity, and investigate and explain how some American Indian tribes use scientific knowledge and practices in managing natural resources.	Recognize a natural resource, identify ways in which humans use resources, identify ways to sustain both human populations and living resources, and/or use data to show how managing natural resources promotes sustainability.	Identify a natural resource that humans need and use.	Identify ways in which humans use living and natural resources.	Identify steps that can be taken to sustain human society and living resources.	Use data to show how the management of natural resources promotes the sustainability of human populations and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.	Technology can be used to reduce the impacts of human activities on natural systems.	Identify human actions that can affect natural systems.	Identify technologies that can reduce the effect of human activities on natural systems.	Predict how given technologies (e.g., recycling plants, devices to reduce emissions, etc.) will reduce the effect of human activities on natural systems based on a scenario.	Evaluate or refine a technological solution that can reduce the effect of human activities on natural systems.
HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.	Data and evidence forecast the current and future rates of global or regional change that impact Earth's systems.	Recognize patterns of change on Earth's systems.	Identify trends in climate data.	Determine environmental changes based on current climate data.	Use data to predict the future rates of change in Earth's systems based on current trends.