CONVERSE COUNTY SCHOOL DISTRICT #2

SCIENCE CURRICULUM

2016-2017

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Converse County School District #2

VALUES

Accountability
We accept responsibility for achieving goals by evaluating our progress individually and collectively.

Collaboration
We work together by supporting the decision-making process and its resolution.

Commitment
We are dedicated to the continuos improvement in all areas.

Excellence
We embrace high expectations and believe every person can learn.

Integrity
We are honest, trustworthy, and take ownership for our actions.

Respect
We value diversity, acknowledge others' opinions, and treat each other with dignity.

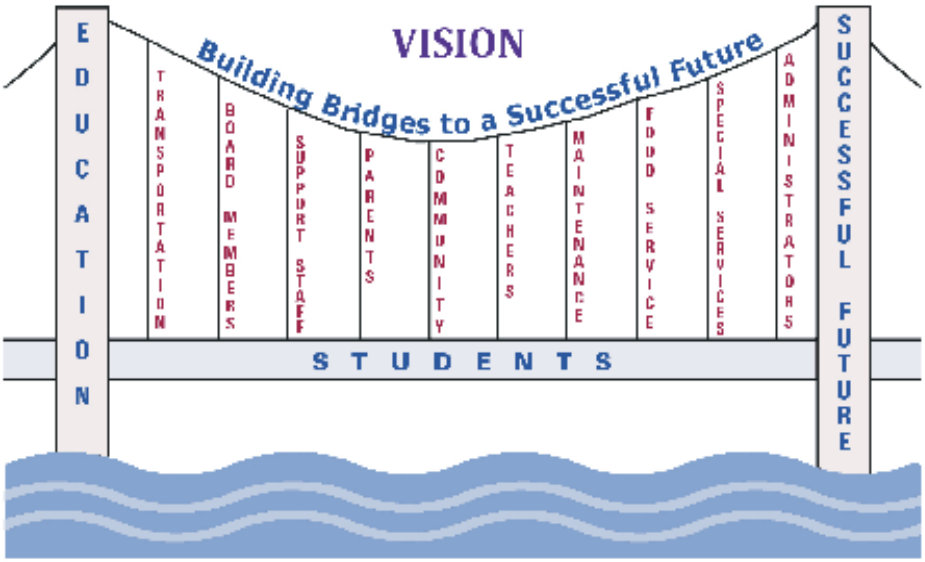
Work Ethic
We value hard work and diligence and lead by example. Success requires effort.

Revised 7/2015

MISSION

In partnership with students, parents, staff, and community, our purpose is to ensure a safe and orderly environment where all students receive quality educational experiences which empower them to be responsible citizens and lifelong learners.

VISION



Goal 1: Improve Student Achievement

OBJECTIVES:

1. All grade levels assessed will meet or exceed the Adequate Yearly Progress (AYP) target goals on the required state assessment.
2. All schools in the district will receive an 'exceeding expectations' rating on the WDE School Performance Rating Report.
3. All schools in the district will perform in the top 10% of schools in the nation using MAP testing.

Goal 2: Improve Student Academic Behaviors

OBJECTIVES:

1. The district will meet or exceed 95% daily attendance on an annual basis.
2. To enhance a safe and orderly learning environment, all students will demonstrate the academic behaviors that predict success at school and in the future.

Goal 3: The District Will Operate Efficiently and Effectively

OBJECTIVES:

1. Evaluate district, building, and department operational process each year.
2. Update and revise operational processes.

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SCIENCE MISSION

Science is a field that is constantly changing and growing. Therefore, students in Converse County School District #2 will model and apply earth, life, and physical science principles to construct and generate solutions (using available and emerging technologies) to solve current and future problems.

CURRICULUM CODES

S = Science

SK = Kindergarten

S1 = First Grade

S2 = Second Grade

S3 = Third Grade

S4 = Fourth Grade

S5 = Fifth Grade

S6 = Sixth Grade

S7 = Seventh Grade

S8 = Eighth Grade

SES = Earth Science

SBI = Biology

SGS = General Science

SCH = Chemistry

SPH = Physics

Examples:

S3:1-4 S = Science
3 = Third Grade
1 = Outcome #1
4 = Component #4

SBI:2-8 S = Science
BI = Biology
2 = Outcome #2
8 = Component #8

Kindergarten Science

Focus Statement:	**Students will use their senses to observe, identify, describe, and analyze patterns and changes in their environment.**

Outcomes:

SK:1	**Students will plan and conduct investigations to determine how pushing/pulling (force) affect the motion of objects.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SK:1-1	Demonstrate a push/pull on an object.	K-PS2-1		
SK:1-2	Describe what happens when two objects collide through classroom charts.	K-PS2-1	W.K.8	
SK:1-3	Apply forces in different directions to objects and compare results through classroom charts.	K-PS2-1	SL.K.3 SL.K.6	
SK:1-4	Apply forces in different strengths to objects and compare results through classroom charts.	K-PS2-1	SL.K.3 SL.K.6	
SK:1-5	Through small/whole group, design a solution (i.e., tool) to change the direction and/or speed of an object and develop a visual representation.	K-PS2-2 K-2-ETS1-2	SL.K.1a,b SL.K.5	

Academic Vocabulary: solution, illustrate

Topical Vocabulary: force, motion, speed, strength, collide

Outcomes and Components

SK:2	**Students will collect, record, and interpret local weather data, and draw conclusions about the data.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SK:2-1	Observe and record local weather conditions and identify patterns over time through a classroom chart.	K-ESS2-1	SL.K.5	
SK:2-2	Identify safety plans with appropriate weather events. [Ex: go to an interior room during a tornado, stay inside during a blizzard, go to higher ground during a flood, etc.]	K-ESS3-2		
SK:2-3	Make observations to determine the effect of sunlight on Earth's surface.	K-PS3-1	SL.K.3 SL.K.6	
SK:2-4	Design methods to prevent a surface from getting hot when exposed to the sun through small/whole group and compare data from multiple groups.	K-PS3-2 K-2-ETS1-3	SL.K.5 SL.K.3 SL.K.6 W.K.3	

Academic Vocabulary: observe, record, identify, compare, design

Topical Vocabulary: severe weather, exposed, effect

Outcomes and Components

SK:3	**Students will determine the needs of plants, animals, and humans in their surroundings and each one's impact on its environment and develop solutions for reducing human impact on their local environment.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SK:3-1	Create and compare lists of what plants and animals, including humans need to survive in their environment.	K-LS1-1 K-ESS3-1	W.K.2 W.K.7 W.K.8	
SK:3-2	Construct a classroom chart to represent the relationship between the needs of different plants and animals (including humans). [Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in the forested areas.]	K-ESS3-1	SL.K.3 SL.K.6	
SK:3-3	Compile a list of examples how plants, humans, and other animals change their environment through classroom charts. [Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break the concrete.]	K-ESS2-2	SL.K.3 SL.K.6	

Academic Vocabulary: relationship, compare, contrast

Topical Vocabulary: survival, needs, environment

Outcomes and Components

1st Grade Science

Focus Statement:	Students will examine the world around them to compare and contrast characteristics of living things and patterns in the natural world, including light and sound.

Outcomes:

S1:1	Students will explain the motion of the sun, moon, and stars in the sky in order to predict patterns.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S1:1-1	Make observations at different times of year to relate the amount of daylight to the time of year. [Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall. Assessment is limited to relative amounts of daylight.]	1-ESS1-2		
S1:1-2	Create a drawing to represent the pattern of the apparent motion of the sun and the moon across the sky and explain the pattern of the sun's and moon's movement. [Statement can be one or more sentences dictated to teacher or written by student.] [Sun rises in the east and sets in the west.]	1-ESS1-1 K-2-ETS1-2	SL.1.5	
S1:1-3	Describe the pattern of when the stars are visible. [Can be dictated to teacher or written by student.]	1-ESS1-1		

Academic Vocabulary: observe, represent

Topical Vocabulary: motion, visible, pattern, east, west, rises, sets

S1:2	**Students will use materials to design a solution to a human problem by mimicking how plants and animals use their external parts to help them survive, grow, and meet their needs.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S1:2-1	Create a diagram with labels of plant parts that help them survive and grow. [Roots, stems, leaves, flowers, fruits, etc.]	1-LS1-1	SL.1.5	
S1:2-2	Construct a classroom chart that identifies and explains how animals and/or plants use their external specialized parts to survive, grow, and meet their needs. [Ex: thorns, spines, coverings, claws, mouth, beak, etc.]	1-LS1-1		
S1:2-3	Design a model and describe how humans copy from animals for their protection and survival. [Ex: a bicycle helmet mimics a turtle shell, wearing a coat to keep warm mimics animal fur; tools mimic a bird's beak, etc.]	1-LS1-1	SL1.5 SL1.6	

Academic Vocabulary: model

Topical Vocabulary: mimic, survival, protection, external

S1:3	**Students will analyze patterns of physical characteristics and behavior in plants and animals in order to compare and contrast between parents and offspring.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S1:3.1	List patterns of offspring behavior and parent response as shown in text and media examples on a classroom chart. [Cause/effect: crying/cheeping lead to feeding/comforting]	1-LS1-2	RI.1.10 RI1.1	
S1:3.2	Observe a young animal or plant to compare and contrast (using a Venn diagram) the young animal or plant's physical characteristics with its parents. [Ex: Same shape, but different sizes; a particular breed of dog can have different color fur than parent; a baby deer has spots but the parent doesn't; same leaf shape but different sizes, etc.]	1-LS3-1	W1.8	

Academic Vocabulary: compare, contrast, Venn diagram

Topical Vocabulary: offspring, response, physical characteristics

Outcomes and Components

S1:4	**Students will investigate the characteristics of sound and light energy and how it travels to design and build a device to communicate light and sound over a distance.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S1:4.1	Demonstrate that vibrating materials can make sound and that sound can make materials vibrate. [Ex: tuning fork, plucked string, tuning fork in water, paper near a speaker, etc.]	1-PS4-1		
S1:4.2	Record observations on a teacher created chart to prove objects can only be seen when illuminated. [Ex: dark room, a cave explorer with a flashlight, a pinhole box, etc.]	1-PS4-2		
S1:4.3	Conduct an investigation and record the results on a classroom chart of placing objects made with different materials in the path of a beam of light (transparent, translucent, opaque, and reflective).	1-PS4-3	W.1.8	
S1:4.4	Create a list to describe the ways in which people use sound or light to communicate over distances (telephones, military drum beats, smoke/fire signals, lighthouses, landing lights at an airport, etc.) through classroom charts and design a simple model through drawings or a physical model that uses sound or light to communicate over a distance. [Ex: paper cup and string, a pattern of drum beats, light/mirrors].	1-PS4-4 K-2-ETS1-2		

Academic Vocabulary: design, investigation, observation, communicate, prove, results

Topical Vocabulary: vibrate, illuminated, transparent, translucent, opaque, reflective

2nd Grade Science

Focus Statement:	**Students will classify, compare/contrast, and model living and non-living things using collected data.**

Outcomes:

S2:1	**Students will conduct investigations and use their data to determine how the physical properties of different materials make them useful for various purposes.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S2:1-1	Classify a given set of materials by their physical properties on a teacher created chart (Ex: flexibility, texture, color, and hardness).	2-PS1-1		
S2:1-2	Conduct simple tests on teacher provided materials to determine which are best for an intended purpose and explain the strengths and weakness of the performance of each material (Ex: string vs. rubber band; ruler vs. tape measure; ball vs. cube, etc.).	2-PS1-2 K-2-ETS1-2 K-2-ETS1-3		
S2:1-3	Build an object from a small set of pieces, disassemble the created object, and reassemble to form a new object (Ex: pattern blocks, tangrams, legos, sytrofoam balls and toothpicks, beads, etc.) [Teacher must check original model as well as final model.]	2-PS1-3		

Academic Vocabulary: classify, conduct

Topical Vocabulary: physical properties, disassemble, reassemble

S2:2	**Students will conduct investigations to determine what plants and animals need to grow and how they are interdependent.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S2:2-1	Conduct a series of simple experiments to verify whether plants need sunlight and water to grow.	2-LS2-1		
S2:2-2	Illustrate how an animal disperses seeds or pollinates plants.	2-LS2-2		
S2:2-3	Construct a chart that lists the different kinds of plants and animals and their habitat.	2-LS4-1	W.2.7 W.2.8	
S2:2-4	Compare and contrast the diversity of life within different habitats using the constructed chart from S2:2-3.	2-LS4-1		

Academic Vocabulary: verify

Topical Vocabulary: habitat, pollinate, disperse, diversity

S2:3	**Students will construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S2:3-1	Identify matter as solid, liquid, or gas.	2-PS1-4		
S2:3-2	Categorize real-world examples as solid, liquid, or gas. This must include places on Earth where water is found. [Oceans, rivers, lakes, and ponds.]	2-PS1-4 2-ESS2-3		
S2:3-3	Identify the properties of a solid, liquid, and gas.	2-PS1-4		
S2:3-4	Conduct simple experiments to prove whether reversible or irreversible changes occur as a result of heating and cooling. [Ex: burning a piece of paper, cooking an egg, freezing a plant leaf, heating ice, butter, etc.]	2-PS1-4	W.2.8	

Academic Vocabulary:

Topical Vocabulary: reversible, irreversible, solid, liquid, gas, matter, properties

Outcomes and Components

S2:4	Students will illustrate how Earth events can quickly or slowly change the layout of the land, and compare how different models can slow or prevent wind or water from changing the shape of the land.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S2:4-1	Identify natural events that change the earth quickly. [Ex: flooding, earthquakes, volcanoes, tsunamis]	2-ESS1-1		
S2:4-2	Construct models to demonstrate the effects of natural events that change the earth quickly. [Ex: modeling plate tectonics using graham crackers and frosting, baking a cake and twisting a flexible pan, etc.]	2-ESS1-1		
S2:4-3	Identify natural events that change the earth slowly. [Ex: wind erosion, water, ice, vegetation, etc.]	2-ESS1-1		
S2:4-4	Construct models to demonstrate the effects of natural events that change the earth slowly. [Ex: sand tables, freezing water inside of something to make it break, rubbing rocks together, shaking a rock inside of a water jar, etc.]	2-ESS1-1		
S2:4-5	Construct a simple map to represent the shapes and kind of land and bodies of water in our community.	2-ESS1-1		
S2:4-6	Compare teacher provided solutions designed to slow or prevent wind or water from changing the shape of the land.	2-ESS1-1 K-2-ETS1-1		

Academic Vocabulary:

Topical Vocabulary: natural events, erosion, map, community, plate tectonics

Outcomes and Components

3rd Grade Science

Focus Statement:	Students will examine, in order to verify, cause and effect relationships among forces, life cycles, ecosystem relationships, weather and climate.

Outcomes:

S3:1	Students will compare and contrast organism life cycles and explain how inherited and environmental traits affect survival.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S3:1-1	Illustrate the main phases in flowering plant life cycles. [Ex: birth, growth, reproduction, death]	3-LS1-1	W.3.7 W.3.8 RI.3.1	
S3:1-2	Illustrate the main phases in animal (not including humans) life cycles. [Ex: birth, growth, reproduction, death]	3-LS1-1	W.3.7 W.3.8 RI.3.1	
S3:1-3	Compare and contrast the life cycles of plants and animals using a Venn diagram.	3-LS1-1	RI.3.9	
S3:1-4	Explain using evidence how organisms change, adapt, or survive based on their environment. [Should include that plants without enough water are stunted while those with enough water are not; may also include: A dog that gets too much food and not enough exercise will become overweight, , camouflage, plants with thorns, scent to protect, wolves form packs to hunt, fish swim in schools to protect themselves, animal calls for warning, etc.]	3-LS3-2 3-LS4-2 3-LS2-1 3-LS4-3	RI.3.1 W.3.7 W.3.8	
S3:1-5	Examine ways in which ecosystems can change (drought, fire, etc.) and list ways in which organisms/humans can respond. [Ex: adapt, relocate, die, reintroduce a species to an area, etc.]	3-LS4-4		

Academic Vocabulary: examine, evidence

Topical Vocabulary: life cycle, phases, adapt, ecosystem, germination

Outcomes and Components

S3:2	Students will examine typical weather and climatic conditions, make generalizations regarding emerging patterns, and assess possible solutions to weather hazards.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S3:2-1	Record teacher provided data for typical weather conditions (ex: average temperature, precipitation amounts, wind direction, etc. using 3 months of information for Glenrock) into pictographs and/or bar graphs.	3-ESS2-1		
S3:2-2	Record teacher provided data for typical weather conditions (ex: average temperature, precipitation amounts, wind direction, etc. using 3 months of information for a small town in Australia) into pictographs and/or bar graphs.	3-ESS2-1		
S3:2-3	Describe the climate of the different regions of the world using data from S3:2-1 and S3:2-2.	3-ESS2-2		
S3:2-4	List weather related weather hazards. [Ex: flood, tornado, drought, lightning, etc.]	3-ESS3-1		
S3:2-5	Describe the effectiveness of human made weather solutions that reduce the impact of weather-related hazards. [Ex: tornado shelters, levees, lightning rods, hail-resistant shingles, living snow fences, etc.]	3-ESS3-1		

Academic Vocabulary: average, pictograph, bar graph, solution

Topical Vocabulary: weather, weather hazards, precipitation, climate

Outcomes and Components

S3:3	**Students will investigate balanced and unbalanced forces and relate forces and their motion to the real world.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S3:3-1	Define force.	3-PS2-1	RI.3.1	
S3:3-2	Observe an object's motion to predict future motion. [Ex: two children on a see-saw, a child swinging on a swing, a ball rolling in a bowl, etc.]	3-PS2-2		
S3:3-3	Conduct simple experiments to show the effects of balanced and unbalanced forces on the motion of an object.	3-PS2-1		

Academic Vocabulary: predict, effect

Topical Vocabulary: force, motion, balanced, unbalanced

S3:4	**Students will apply principles of electric and magnetic forces to predict effects of those forces on objects.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S3:4-1	Describe concepts of attraction and repulsion of overlapping magnetic fields.	3-PS2-3	RI.3.1	
S3:4-2	Conduct simple experiments to determine cause/effect relationships of electric (static) or magnetic interactions between two objects not in contact with each other. [Ex: force on hair from an electrically charged balloon, force between a charged rod and pieces of paper, force between two magnets or a combination of magnets, force between electromagnet and paperclips, etc.]	3-PS2-3		
S3:4-3	Construct a simple invention using magnets to solve a problem and describe the results. [Ex: picking up metal, keeping a door shut, holding objects in place, etc.]	3-PS2-4 3-5-ETS1-1		

Academic Vocabulary: cause, effect, results

Topical Vocabulary: static electricity, electric force, magnetic force, attraction, repulsion

Outcomes and Components

4th Grade Science

Focus Statement:	Students will analyze energy to determine how it is transferred, transformed and what happens when it interacts with other forms of energy. Students will also examine Earth's structure to determine how it has changed over time and its impact on humans.

Outcomes:

S4:1	Students will provide evidence to show changes in earth over time.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S4:1-1	Model the rock cycle and describe how sedimentary and metamorphic rocks are formed.	4-ESS1-1	W.4.7	
S4:1-2	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. [Ex: rock layers with marine shell fossils above rock layers with plant fossils and no shells indicate a change from land to water over time; a canyon with different rock layers in the walls and a river in the bottom indicates that over time a river cut through the rock]	4-ESS1-1		
S4:1-3	Observe types of erosion to provide evidence of the effects of weathering or the rate of erosions by water, ice, wind, or vegetation.	4-ESS2-1		
S4:1-4	Analyze and interpret data from maps to describe patterns of Earth's features. [Ex: topographic maps of Earth's land and ocean floor; maps of the locations of mountains, continental boundaries, volcanoes, earthquakes]	4-ESS2-2		

Academic Vocabulary: analyze, interpret, evidence

Topical Vocabulary: sedimentary, metamorphic, weathering, erosion, fossil

Outcomes and Components

S4:2	**Students will construct an argument that organisms' structures function to support survival, growth, behavior, and reproduction and describe how senses are processed through the brain.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S4:2-1	Identify and explain the main purpose of external structures of plants. [Ex: thorns for protection, roots for taking in nutrients, colored petals to attract bees for pollination, etc.]	4-LS1-1		
S4:2-2	Identify and explain the main purpose of internal and external structures of animals. [Ex: lungs for breathing, brain for processing information, skin for protection, blubber for warmth, fur for warmth, etc.]	4-LS1-1	W.4.8	
S4:2-3	Construct a simple argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	4-LS1-1		
S4:2-4	Describe how animals are able to use their perceptions and memories to guide their actions. [Ex: animals receive images with their eyes and the brain tells them what they see and how to react; seeing a fire and knowing not to touch it from previous experience]	4-LS1-2		

Academic Vocabulary: argument

Topical Vocabulary: internal structures, external structures, perceptions, memories

S4:3	**Students will develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S4:3-1	Define a wave as energy moving through a medium.	4-PS4-1	W.4.7	
S4:3-2	Identify waves as transverse or compression.	4-PS4-1	W.4.7	
S4:3-3	Identify and label the amplitude and wavelength of a wave.	4-PS4-1		
S4:3-4	Construct a model of waves to describe patterns in terms of amplitude and wavelength (string, wire, tuning fork with water, drawing, etc.) and confirm waves can cause objects to move.	4-PS4-1		

Academic Vocabulary: label

Topical Vocabulary: amplitude, wavelength, wave, medium, transverse, compression

S4:4	**Students will compare speed to the energy of objects, provide evidence that energy can be transferred and changed, design a device that converts energy from one form to another, and apply knowledge of energy and fuels to determine how their use affects the environment.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S4:4-1	Define energy, potential energy, and kinetic energy.	4-PS3-1	W.4.7	
S4:4-2	Conduct simple experiments to construct an explanation relating the speed of an object to the energy based on potential and kinetic energy. [Pulling a rubber band back and releasing, pulling a swing back and releasing, etc.]	4-PS3-1		
S4:4-3	Ask questions that can be investigated and predict reasonable outcomes about the changes in energy that occur when objects collide. (Emphasis is on the change in the energy speed, not the forces, as objects interact. When objects collide, the contact forces transfer energy to change the objects' motions.)	4-PS3-3		
S4:4-4	Identify sound, light, heat and electricity as forms of energy.	4-PS3-2		
S4:4-5	Make observations and site examples to provide evidence that energy can be transferred from place to place by sound (waves), light (waves), heat, and electric currents.	4-PS3-2 4-PS3-4		
S4:4-6	Design, test, and refine a device that converts energy from one form to another. [Ex: solar oven-tin pan with a foil cover, cardboard box with foil (converting light to heat), electric circuit-light bulb with battery (converting electric to light).]	4-PS3-4 3-5-ETS1-1		
S4:4-7	Obtain and combine information to describe that energy and fuels can be renewable or non-renewable resources that derive from natural sources and how their uses can affect the environment. [Ex: loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.]	4-ESS3-1	RI.4.9	

Academic Vocabulary: identify, predict

Topical Vocabulary: kinetic, potential, renewable, non-renewable, transfer

Outcomes and Components

5th Grade Science	
Focus Statement:	**Students will develop and use models, plan and carry out investigations, analyze and interpret data to demonstrate understanding of the changes of matter and energy, structures and processes of organisms, and the Earth's systems.**

Outcomes:

S5:1	**Students will develop a model to describe that matter is made of particles too small to be seen. They will make observations and measurements to identify materials based on their physical properties. Students will also demonstrate that matter is conserved in physical and chemical changes.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S5:1-1	Investigate and explain how matter can be separated into particles that are too small to see, but even then the matter still exists *as* particles can be detected by other means. *[Ex: gas in a balloon, dissolving sugar into water, evaporating salt water, or magnification of particles, etc.]*	5-PS-1	RI.5.7 W.5.8 W.5.9 MP.2	
S5:1-2	Describe substances according to their identifying physical properties. *[Ex: color, hardness, conductivity, reflectivity, response to magnetic force, solubility, boiling point, freezing point, etc.]*	5-PS-3	W.5.8 W.5.9 MP.2	
S5:1-3	Measure and graph quantities to provide evidence that mixing of two or more substances may result in a new substance while conserving mass. *(Regardless of the type of change that occurs when heating, cooling or mixing of substances the total mass of matter is conserved.)*	5-PS-2	W.5.8 W.5.9 MP.2	
S5:1-4	Identify evidence of chemical change. *[Production of a gas- example: baking soda and vinegar, production of heat or light-example: hot or cold packs, and producing an insoluble solid-example: lemon juice in milk.)*	5-PS-4	W.5.8 W.5.9	

Academic Vocabulary:

Topical Vocabulary: matter, particles, properties of matter, substances, chemical change, physical change

Outcomes and Components

S5:2	**Students will develop and use models to demonstrate how energy from the sun and matter become food for plants and animals.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S5:2-1	Describe a plant's structures that function to use the suns energy to produce food by photosynthesis. *(chloroplasts in cells)*	5-LS2-1	RI.5.7 SL.5.5	
S5:2-2	Summarize how plant growth is dependent on air and water.	5-LS1-1 5-PS3-1	RI.5.7 RI.5.1 SL.5.5	
S5:2-3	Create a model that shows the uses of energy in plants and animals.	5-PS3-1	RI.5.7 SL.5.5	
S5:2-4	Identify the roles and give examples of producers, consumers, and decomposers within an ecosystem.	5-LS2-1	RI.5.7 SL.5.5	
S5:2-5	Construct a food web in an ecosystem to demonstrate the cycle of energy and matter into food. *(Label-sun, producers, consumers, decomposers, and matter-nitrogen, water, air, and carbon)*	5-LS2-1	RI.5.7 SL.5.5	

Academic Vocabulary:

Topical Vocabulary: photosynthesis, producer, consumer, decomposer, ecosystem, food chain, food web, matter, energy, chloroplast

Outcomes and Components

S5:3	**Students will develop a model to show the ways the geosphere, biosphere, and atmosphere interact. Students will show how communities use science principles to protect these resources.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S5:3-1	Describe the characteristics and the cycles of the geosphere *(rock cycle)*, biosphere *(producer, consumer, and decomposer)*, hydrosphere and atmosphere *(water cycle)*.	5-ESS2-1	SL.5.5 RI.5.7	
S5:3-2	Develop a model to show the ways two of Earth's systems interact. *[Ex: the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere, etc.]*	5-ESS2-1 5ETS1-3	SL.5.5 RI.5.7 RI.5.1 RI.5.9 W.5.8 W.5.9	
S5:3-3	Identify land, air, and water as resources and describe how humans use them.	5-ESS3-1	RI.5.1 RI.5.7 RI.5.9 W.5.8 W.5.9	
S5:3-4	Examine human impact on the Earth's resources and what changes are being made to protect them.	5-ESS3-1 5-ETS1-3	RI.5.1 RI.5.7 RI.5.9 W.5.8 W.5.9	
S.5.3.5	Describe and graph the amounts and percentages of water in various reservoirs to provide evidence about the distribution of the water on earth. *[Ex: lakes, rivers, glaciers, ground water, polar icecaps, ocean, etc.]*	5-ESS2-2	SL.5.5 RI.5.7 W.5.8 5.G.A.2	

Academic Vocabulary:

Topical Vocabulary: biosphere, geosphere, hydrosphere, atmosphere, interactions

S5:4	**Students will support arguments that Earth's position in space exerts force on objects around it, affects the appearance of stars depending on their distance from Earth, and determines daily and seasonal patterns on Earth itself.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S5:4-1	Explain how gravity works on Earth and support an argument that gravitational force exerted by Earth on the objects is directed toward the center of the Earth. *(The definition of true up and down.)*	5-PS2-1	RI.5.1 RI.5.9	
S5:4-2	Identify characteristics of the sun as a star and support an argument that differences in the apparent brightness of the sun compared to other stars is due to its relative distance from Earth.	5ESS1-1	RI.5.1 RI.5.7 RI.5.9	
S5:4-3	Describe the movement of the Earth in space. *(Include orbit of Earth around the sun, the moon around Earth and how Earth rotates on an axis causing the appearance of movement of the sun.)*	5ESS1-1	RI.5.1 RI.5.7 RI.5.9	
S5:4-4	Use collected data in a graphical display to demonstrate the daily changes in length and direction of a shadow.	5ESS1-2	SL.5.5	
S5:4-5	Explain how the position of Earth relates to the sun and creates our day/night and seasons.	5ESS1-2	SL.5.5	
S5:4-6	Analyze seasonal positions of stars and constellations to show that the apparent movement of stars is caused by the position of Earth in its orbit.	5ESS1-2	SL.5.5	

Academic Vocabulary:

Topical Vocabulary: gravitational force, rotation, orbit, axis, seasons, revolution, constellations, up, down

Outcomes and Components

6th Grade Science

Focus Statement:	Students will use the principles of Earth and space sciences to describe the dynamic relationships of Earth processes and Earth's place in the universe.

Outcomes:

S6:1	Students will 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 Earth's seasons.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:1-1	Model to show the lunar phases due to the rotation and revolution of the Earth-sun-moon system. *(Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.)*	MS-ESS1-1 MS-ETS1-4	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	
S6:1-2	Model to show the lunar and solar eclipses of the Earth-sun-moon system.	MS-ESS1-1 MS-ETS1-4	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	
S6:1-3	Model to show seasonal changes on Earth due to the Earth-sun-moon system.	MS-ESS1-1 MS-ETS1-4	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	

Academic Vocabulary:

Topical Vocabulary: declination, cyclic, lunar phases, eclipses, seasons, rotation, revolution, solar eclipse, lunar eclipse, seasonal, sun, moon, earth

S6:2	**Students will develop and use a model to describe the role gravity plays in the motion of celestial bodies.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:2-1	Identify and explain Newton's description of falling objects.	MS-ESS1-2		
S6:2-2	Develop and use a model (Newton's description of falling objects) to illustrate the effects of gravity on orbital motions. *(Centripetal [inward force= gravity] and centrifugal [outward force = speed of planet] forces are balanced in orbital motion.)*	MS-ESS1-2		
S6:2-3	Compare and contrast the relative motion of objects in the universe. *(Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.)*	MS-ESS1-2		

Academic Vocabulary:

Topical Vocabulary**:** role, gravity, celestial, motion, orbital, relative motion, universe, solar system, galaxy

Outcomes and Components

S6:3	**Students will compare and contrast properties of objects in our solar system including the effects of gravity.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:3-1	Analyze data to determine the similarities and differences between the atmospheres of the solar system objects. *[Examples of scale properties include the sizes of an atmosphere. Examples of data include statistical information, drawings, photographs and models.]*	MS-ESS1-3	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	
S6:3-2	Analyze data to determine the similarities and differences between the surface features of solar system objects. *[Examples of scale properties include the surface features such as volcanoes, composition of the crust, etc. Examples of data include statistical information, drawings, photographs and models.]*	MS-ESS1-3 MS-ETS1-3	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	
S6:3-3	Analyze data to determine the similarities and differences between the orbital radii of solar system objects. *(Emphases are on the analysis of data from Earth-based instruments, space-based telescopes, and spacecraft to determine similarities and differences among solar system objects. Examples of data include statistical information, drawings, photographs and models.)*	MS-ESS1-3 MS-ETS1-3	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	
S6:3-4	Draw a conclusion based on the analyzed data to determine scale properties of objects in the solar system. *(Kepler's Laws of Planetary Motion)*	MS-ESS1-3	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2 6.RP.A.1	

Academic Vocabulary:

Topical Vocabulary: properties, layers, crust, atmosphere, surface, features, radii, scale, telescope, spacecraft, centripetal force, centrifugal force

Outcomes and Components

S6:4	**Students will construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:4-1	Construct a scale timeline of the Earth's geologic history to establish relative ages of major events. *(The geologic time scale interpreted from rock strata provides a way to organize Earth's history.)*	MS-ESS1-4 MS-ETS1-1	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2	
S6:4-2	Explain what criteria were used to identify the organization of Earth's geologic time. *(epoch, period, era, eon)*	MS-ESS1-4		
S6:4-3	Conduct an analysis of rock strata to determine relative ages of major events in the Earth's history. *(Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale.)* *[Examples can include the formation of mountain chains and ocean basins, the evolution or extinction of particular living organisms or significant volcanic eruptions.]*	MS-ESS1-4	RST.6-8.1 RST.6-8.7 WHST.6-8.2 SL.8.5 MP.2	

Academic Vocabulary:

Topical Vocabulary: strata, geological time scale, relative ages, superposition, uniformitarianism, formation, fossils, homo sapiens, mountain chain, ocean basin, evolution, extinction, living organisms, volcanic eruption, epoch, period, era, eon.

S6:5	**Students will develop a model describing the cycling of Earth's materials and how processes have changed the Earth's surface and our ability to predict related natural disasters.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:5-1	Develop a model to show how rocks form, change and recycle through the Earth. Differentiate between metamorphic, igneous and sedimentary rocks. *(Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.)*	MS-ESS2-1 MS-ETS1-4	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.2 WHST.6-8.8 SL.8.5	
S6:5-2	Make observations to determine the classification of different rock samples.	MS-ESS2-1	RST.6-8.7 RST.6-8.9 WHST.6-8.2 SL.8.5	
S6:5-3	Interpret data on how the Earth's surface has changed. *[Ex: earthquakes, volcanoes, weathering, deposition, etc.]*	MS-ESS2-2	RST.6-8.1 RST.6-8.9 WHST.6-8.2 SL.8.5	
S6:5-4	Construct an explanation about how processes change Earth's surface over time, and compare the speed at which it can change the Earth's surface. *(Emphasis is on how processes that can be large (such as slow plate motions or the uplift of large mountain ranges) or small (such as rapid landslides or microscopic geochemical reactions), and how many processes (such as earthquakes, volcanoes, and meteor impact) usually behave gradually, but are punctuated by catastrophic events.)* *[Ex: surface weathering and deposition by the movements of water, ice, wind, etc.]*	MS-ESS2-2	RST.6-8.1 RST.6-8.9 WHST.6-8.2 SL.8.5	

Academic Vocabulary:

Topical Vocabulary: recycle, classification, processes, weathering, decomposition, earthquakes, volcanoes, energy, melting, crystallization, weathering, deformation, sedimentation, minerals

Outcomes and Components

S6:6	**Students will analyze and interpret the data that provides evidence of plate tectonics and how they continually generate new sea floor.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:6-1	Analyze and interpret data on different continents to show evidence of past tectonic plate motion. *[Ex: similarities of rock and fossil types on different continents]*	MS-ESS2-3 MS-ETS1-3	RST.6-8.1 RST.6-8.9 WHST.6-8.2 WHST.6-8.8 SL.8.5	
S6:6-2	Analyze and use small-scale changes caused by earthquakes to explain large-scale features of the Earth. *(Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.)*	MS-ESS2-3 MS-ETS1-3	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.2 WHST.6-8.8 SL.8.5	
S6:6-3	Create a design of the ocean floor to show floor structure and how tectonic plates continually generate a new ocean floor. *(The shapes of the continents including continental shelves*, and *locations of ocean structures such as ridges, fracture zones, and trenches.)*	MS-ESS2-3 MS-ETS1-4	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.2 WHST.6-8.8 SL.8.5	

Academic Vocabulary:

Topical Vocabulary: plate tectonics, continental, fossil, rock, continental shelves, plate, seafloor, seafloor structures, ridges, fracture zones, trench

S6:7	**Students will develop a diagram that describes the cycling of water on the Earth and the effects of that cycling on weather and climate.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:7-1	Construct a diagram that describes the hydrologic cycle driven by energy from the sun and the force of gravity. *(Emphases are on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, crystallization, and precipitation, as well as downhill flows on land.)*	MS-ESS2-4 MS-ETS1-4	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.8 SL.8.5	
S6:7-2	Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. *(Emphasis is on how air masses flow from regions of high pressure to low pressure, causing weather, defined by temperature, pressure, humidity, precipitation, and wind, at a fixed location to change over time, and how sudden changes in weather can result when different air masses collide.)*	MS-ESS2-5 MS-ETS1-3	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.8 SL.8.5	
S6:7-3	Collect data to provide evidence on how weather can be predicted within probabilistic ranges. *{Examples of data can be provided to students such as weather maps, diagrams, and visualizations or obtained through laboratory experiments (condensation). Because these patterns are complex, weather can only be predicted probabilistically.}*	MS-ESS2-5 MS-ETS1-3	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.8 SL.8.5	
S6:7-4	Develop and use a model to describe how rotation and unequal heating of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. *{Examples of models can be diagrams, maps and globes, or digital representations.}*	MS-ESS2-6	RST.6-8.1 RST.6-8.7 RST.6-8.9 WHST.6-8.8 SL.8.5	

Academic Vocabulary:

Topical Vocabulary: weather, climate, pathways, hydrologic cycle, evaporation, condensation, vaporization, precipitation, air, regions, pressure, high pressure, low pressure, temperature, humidity

S6:8	**Students will apply scientific principles to design a method for monitoring and minimizing the human impact on the environment and on global climate change.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S6:8-1	Identify energy sources. *[Ex: wind, solar, tidal, nuclear, coal, petroleum, geothermal, hydroelectric, (ethanol or biodiesel), biomass, etc.]*	MS-ESS3-1	RST.6-8.1 WHST.6-8.8	
S6:8-2	Differentiate renewable and non-renewable resources. *(Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes.)*	MS-ESS3-1	RST.6-8.1 WHST.6-8.1 WHST.6-8.9	
S6:8-3	Describe the environmental impact humans have on the taking of non-renewable resources. *[Ex: water, petroleum, etc]* *(Emphasis is on how these resources are limited and typically non-renewable, and how their distributions are significantly changing as a result of removal by humans.)*	MS-ESS3-1 MS-ETS1-1	RST.6-8.1 WHST.6-8.1 WHST.6-8.2 WHST.6-8.8 WHST.6-8.9	
S6:8-4	Show how Earth's resources are unevenly distributed as a result of past geologic processes. *[Ex: petroleum, ores]* *(Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. These resources are distributed unevenly around the planet as a result of past geologic processes.)*	MS-ESS3-1 MS-ETS1-1	RST.6-8.1 RST.6-8.7 WHST.6-8.1 7.EE.B.4	
S6:8.5	Apply scientific principles to design a method for monitoring and minimizing human environmental impacts. *{Ex: human impacts can include water usage such as the withdrawal of water from streams and aquifers or the construction of dams and levees, land usage such as urban development, agriculture, or the removal of wetlands, and pollution of the air, water, or land.]*	MS-ESS3-3 MS-ETS1-1	RST.6-8.1 RST.6-8.7 WHST.6-8.1 7.RP.A.2 6.EE.B.6 7.EE.B.4	
S6:8-6	Construct an argument supported by evidence for how increases in human population and per capita consumption of natural resources impact Earth's systems. *{Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources such as freshwater, mineral, and energy. Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change.}*	MS-ESS3-2 MS-ESS3-4 MS-ESS3-5	RST.6-8.1 WHST.6-8.7 WHST.6-8.8 WHST.6-8.9	

Outcomes and Components

Academic Vocabulary:

Topical Vocabulary:

7th Grade Life Science

Focus Statement:	**Students will investigate, analyze, and model living things according to structures, functions, and interdependence.**

Outcomes:

S7:1	**Students will conduct an investigation about the structure and function of cells, cell organelles and the hierarchy from cells to organ systems in organisms.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S7:1-1	Conduct an investigation to provide evidence that living things are made of cells; either one or many different numbers and types of cells.	MS-LS1-1	RST.6-8.1 RST.6-8.2 6.SP.B.4	
S7:1-2	Compare and contrast the differences between plant and animal cells. Use a microscope to examine samples of both types. (Onion, cheek, cork.)	MS-LS1-1	RST.6-8.1 RST.6-8.2	
S7:1-3	Develop a model to describe the function of a cell as a whole and identify parts of the cell that contribute to the function.	MS-LS1-2	SL.8.5	
S7:1-4	Investigate and generate evidence that unicellular and multicellular organisms obtain food, water and dispose of waste.	MS-LS1-2	RST.6-8.1 RST.6-8.2 WHST.6-8.7	
S7:1-5	Describe the organizational hierarchy in living things from the cell level to the organism.	MS-LS1-3	RST.6-8.1 RST.6-8.2	
S7:1-6	Describe how the body is a system of interacting subsystems composed of groups of cells.	MS-LS1-3	WHST.6-8.9	

Academic Vocabulary:

Topical Vocabulary: cell, cell membrane, nucleus, ribosome, golgi body, cytoplasm, endoplasmic reticulum, vacuole, chromatin, chloroplast, mitochondria, cell wall, cell membrane, prokaryote, eukaryote, organelle, tissue, organ, organ system, organism, circulatory system, excretory system, digestive system, respiratory system, muscular system, nervous system

Resources:

- Inside a cell
- inside a cell worksheet
- cell tutorial and game
- cell size and scale
- Diffusion through a semi-permeable membrane
- 3D printing of organs video

Outcomes and Components

S7:2	Use empirical evidence and scientific reasoning to support an explanation for how characteristic behaviors, specialized structures, and environmental factors affect reproduction, growth, and development of organisms.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S7:2-1	Describe and explain asexual and sexual reproduction in plants	MS-LS1-4	RST.6-8.2	
S7:2-2	Diagram and explain asexual and sexual reproduction in animals	MS-LS1-4	RST.6-8.2	
S7:2-3	Research and share examples of how plant structures affect the probability of successful reproduction. [Transferring of pollen, bright flowers, flower nectar, hard seed shells, etc.]	MS-LS1-4	WHST.6-8.7 6.SP.A.2 6.SP.B.4	
S7:2-4	Construct a scientific explanation based on evidence for how environmental factors influence the growth of organisms. (Food, light, space, water, drought, fertilizer, large breeds, large ponds for fish, etc.)	MS-LS1-5	WHST.6-8.2 6.SP.A.2	
S7:2-5	Diagram and explain the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	MS-LS1-6	6.EE.C.9	
S7:2-6	Create an explanation based on evidence for how food is rearranged through chemical reactions to support growth and/or release energy as this matter moves through an organism. (Emphasis on molecules get broken apart and put back together and energy is released.)	MS-LS1-7	RST.6-8.1 WHST.6-8.9	

Academic Vocabulary:

Topical Vocabulary: asexual, sexual, photosynthesis, cellular respiration, chlorophyll, digestion,

Resources:

- Good photosynthesis simulation
- Flow of energy through plants and animals
- Reproductive behavior animals

S7:3	**Students will analyze data to provide evidence to verify interdependent relationships between biotic and abiotic factors within and across ecosystems.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S7:3-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. (Ex: Quadrat studies, limiting factors, population size, drought, etc.)	MS-LS2-1	RST.6-8.1	
S7:3-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. (Ex: Predator/prey relationships, symbiotic relationships, etc.)	MS-LS2-2	WHST.6-8.9 RST.6-8.1	
S7:3-3	Develop a model to describe the cycling of matter and flow of energy among the biotic and abiotic components of an ecosystem. (Ex: energy pyramid)	MS-LS2-3	SL.8.5 RST.6-8.7	
S7:3-4	Construct an argument supported by empirical evidence that changes to physical and biological components of an ecosystem affect populations. (Emphasis on evaluating patterns in data and making warranted inferences.)	MS-LS2-4	6.SP.B.5 6.RP.A.3 MP.4	
S7:3-5	Predict how changes in abiotic factors affect biotic factors in an ecosystem.	MS-LS2-4	SL.8.1	
S7:3-6	Research and evaluate competing design solutions for maintaining biodiversity and ecosystem services. (Ex: water recycling, nutrient recycling, prevention of soil erosion, etc.) (Constraints could include scientific, economic, and social considerations.)	MS-LS2-5	RST.6-8.1 RI.8.8 WHST.6-8.9	

Academic Vocabulary:

Topical Vocabulary: Ecosystem, population, interdependent, biotic, abiotic, biodiversity, limiting factors, biosphere, predator, prey, symbiosis, carrying capacity, autotrophs, heterotrophs.

Resources:

- Should we fight natural fires?
- Dueling mandates
- Yellowstone management decisions
- Ecosystem problem solving situations *Instructions for ecosystem problem solving situations

S7:4	**Students will construct models to describe genetic inheritance and variation of traits.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S7:4-1	Model the basic double-strand helical structure with base pairing of DNA		RST.6-8.7	
S7:4-2	Describe how changes in genetic material may result in the making of different proteins.	MS-LS3-1	RST.6-8.1	
S7:4-3	Develop and use a model to describe why structural changes to genes (mutations) may result in harmful, beneficial, or neutral effects.	MS-LS3-1	RST.6-8.7	
S7:4-4	Construct Punnett Squares for monohybrid crosses to predict outcomes based on probability.		RST.6-8.4 RST.6-8.7 MP.4	
S7:4-5	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and why sexual reproduction results in offspring with genetic variation.	MS-LS3-2	RST.6-8.7	
S7:4-6	Research and describe technologies that have changed the way humans influence the inheritance of desired traits. (Ex: genetic modification, animal husbandry, gene therapy, etc.)	MS-LS4-5	SL.8.5	

Academic Vocabulary:

Topical Vocabulary: DNA, RNA, tRNA, mRNA, amino acids, ribosome, gene, genotype, phenotype, mutation, protein, punnett square, chromosomes, traits, homozygous, heterozygous, dominant, recessive, deletion, insertion, substitution, base pairs, adenine, thymine, guanine, adenine, phosphate, sugar

Resources:

- Transcription/Translation video
- Gene Therapy Video
- What is a mutation
- DNA and mutations
- Sexual reproduction and genetic variability video

Outcomes and Components

S7:5	Students will provide evidence that shows common ancestry and diversity in organisms throughout the history of life on earth.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S7:5-1	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction and changes of life forms throughout the history of earth.	MS-LS4-1	SL.8.1	
S7:5-2	Find patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers under the assumption that natural laws operate the same today as in the past.	MS-LS4-1	SL.8.1 RST.6-8.1	
S7:5-3	Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern and fossil organisms to infer evolutionary relationships.	MS-LS4-2	SL.8.1 SL.8.4	
S7:5-4	Compare and contrast pictorial data to find patterns of similarities in embryological development across multiple species.	MS-LS4-3	RST.6-8.9 WHST.6-8.9	
S7:5-5	Construct an explanation based on evidence that describes how genetic variation of traits in a population increases some individuals' probability of surviving and reproducing in a specific environment.	MS-LS4-4	SL.8.1 WHST.6-8.9 SL.8.4	
S7:5-6	Use mathematical representations to support explanations of how natural selection may lead to variances of specific traits in populations over time. (The distribution of traits in a population are variable)	MS-LS4-6	6.SP.B.5 7.RP.A.2	

Academic Vocabulary:

Topical Vocabulary: Genetic variation, species, anatomical structures, fossil record, embryology, vestigial structure, evolution, homologous structures, natural selection, variation,

Resources:

- Fossil record adds relative to family tree article
- Bitesize science (evolution)
- Darwin's theory critical reading
- Phet natural selection simulation (rabbits)
- Whale evolution
- Chickenosaurus
- All about evolution and activities

Other Life Science resources:

- Biological animations

8th Grade Physical Science

Focus Statement:	**Students will apply inquiry, investigation, develop models, interpret data and use mathematical calculations to verify principles of matter, energy, and forces.**

Outcomes:

S8:1	**Students will model and differentiate the structure and properties of matter including elements, compounds and mixtures.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:1-1	Construct a model representing the structure of an atom.	MS-PS1-1 PS1.A	WHST.6-8.8 8.EE.A.3 RST.6-8.7	
S8:1-2	Use chemical formulas to distinguish the identity and number of atoms of each element present in a molecule.	MS-PS1-1 PS1.A	6.RP.A.3 RST.6-8.7 MS.4	
S8:1-3	Demonstrate that compounds keep their characteristics in a mixture.	MS-PS1-1 PS1.A	RST.6-8.3	
S8:1-4	Compare elements, compounds and mixtures.	MS-PS1-1 PS1.A	RST.6-8.1	

Academic Vocabulary:

Topical Vocabulary: matter, atom, electrons, nucleus, protons, neutrons, element, compound, mixture, atomic number, mass number, atomic mass, metal, non-metal, metalloid

Outcomes and Components

S8:2	**Students will differentiate and describe changes in states of matter and how it relates to thermal energy, kinetic energy, pressure and the mass of objects.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:2-1	Compare the properties of the states of matter.	MS-PS1-4 PS3.A PS3.B	RST.6-8.1	
S8:2-2	Predict how changes in thermal energy affect states of matter.	MS-PS1-4 PS3.A PS3.B	6.NS.C.5 6.SP.B.5	
S8:2-3	Predict how changes in pressure affect states of matter.	MS-PS1-4	6.NS.C.5 6.SP.B.5	
S8:2-4	Plan an investigation to determine the relationship of energy transferred to the type of matter, the mass and the change in the average kinetic energy using temperature as an indicator. *[Ex: ice, chocolate, etc.]*	MS-PS3-4 ETS1.A ETS1.B	RST.6-8.1 RST.6-8.3	
S8:2-5	Design a device that will minimize or maximize thermal energy transfer and, using the data gathered to assess its effectiveness, modify plans to improve the device's effectiveness. *[Ex: insulated box, solar slow cooker, styrofoam cup, etc.]*	MS-PS3-2 ETS1.A ETS1.B	6.SP.B.5 WHST.6-8.1	
S8:2-6	Defend the design of the thermal energy device created in S8:2-5 using specific evidence gathered from data during the experiment to demonstrate the energy transferred to and from the objects.	MS-PS3-2 MS-PS3-5 ETS1.A ETS1.B	6.SP.B.5 WHST.6-8.1 WHST.6-8.7 SL.8.5	

Academic Vocabulary:

Topical Vocabulary: solid, liquid, gas, crystalline solids, amorphous solids, viscosity, surface tension, thermal energy, temperature, heat, kinetic energy, melting, freezing, vaporization, condensation, boiling point, melting point, buoyant force, sublimation, law of conservation of mass

S8:3	**Students will analyze and interpret data to classify properties of matter, chemical interactions and support the law of conservation of matter.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:3-1	Classify properties and changes in matter as chemical or physical.	MS-PS1-2 PS1.B		
S8:3-2	Analyze and interpret data to determine if a chemical reaction has occurred.	MS-PS1-2 PS1.B	RST.6-8.1	
S8:3-3	Cite specific evidence that supports the law of conservation of matter using real world examples.	MS-PS1-5 PS1.B	RST.6-8.1	
S8:3-4	Use experimental data to differentiate between endothermic or exothermic reactions. *[Ex: sunset in a bag lab, baking soda and vinegar, etc.]*	MS-PS1-6	RST.6-8.3	
S8:3-5	Devise and execute a plan to modify the outcome of the lab activity used for component S8:3-4.	MS-PS1-6 ETS1.B ETS1.C	RST.6-8.3 MP.2 MP.4 6.NS.C.5	

Academic Vocabulary:

Topical Vocabulary: physical properties, chemical properties, physical changes, chemical changes, density, size dependent properties, size independent properties, reactivity, salts, endothermic, exothermic

S8:4	**Students will use the location of elements on the periodic table to determine the type of chemical bond that is present.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:4-1	Construct electron dot diagrams of various elements.		RST.6-8.7	
S8:4-2	Using chemical formulas, diagram ionic bonds and use them to determine the charge of resulting ions.		RST.6-8.7	
S8:4-3	Using chemical formulas diagram covalent bonds and use them to determine if a single, double or triple bond is present and if they are polar or non-polar molecules.		RST.6-8.7	
S8:4-4	Use principles of atomic arrangement on the periodic table to determine if atoms are bonded by ionic, covalent or metallic bonds.		RST.6-8.7	

Academic Vocabulary:

Topical Vocabulary: chemical bond, electron cloud, energy levels, ionic bond, ion, metallic bond, covalent bond, molecule, polar bond, non polar bond, chemical formula

S8:5	**Students will gather and interpret information about natural resources and the impact of synthetic materials on society.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:5-1	Investigate a synthetic material to deduce what natural resources and chemical processes are used to create it.	MS-PS1-3	WHST.6-8.8 RS.6-8.1	
S8:5-2	Evaluate the impact that synthetic materials have on society.	MS-PS1-3	RS.6-8.1	
S8:5-3	Develop a plan to help improve the negative effects that synthetic materials have on society and/or the environment.	MS-PS1-3	WHST.6-8.7	

Academic Vocabulary:

Topical Vocabulary: synthetic material, natural resources, renewable, nonrenewable, greenhouse gas

Outcomes and Components

S8:6	Students will use principles of motion, gravity and Newton's three laws to describe an object's state of motion.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:6-1	Calculate and graph measures of motion including speed, velocity, acceleration, and momentum.		MP.2 6.NS.C.5 6.EE.A2 7.EE.B3 7.EE.B4	
S8:6-2	Demonstrate the law of conservation of momentum.	MS-PS3-2		
S8:6-3	Summarize Newton's three laws of motion.	MS-PS2-1 MS-PS2-2 PS2.A	RST.6-8.1 RST.6-8.3	
S8:6-4	Relate Newton's three laws of motion to real world examples.	MS-PS2-1 MS-PS2-2 MS-PS2-4 PS2.A		
S8:6-5	Apply Newton's three laws of motion to plan and design a model.	MS-PS2-1 MS-PS2-2 MS-PS2-4 PS2.A		
S8:6-6	Assess model design from S8:6-5 and explain where each of Newton's three laws is represented.	MS-PS2-1 MS-PS2-2 MS-PS2-4 PS2.A	WHST.6-8-1	
S8:6-7	Relate weight to gravity and compare weights of objects on different planets.	MS-PS2-4 PS2.A		

Academic Vocabulary:

Topical Vocabulary: speed, motion, momentum, velocity, acceleration, inertia, momentum, law of conservation of momentum, force, balanced force, unbalanced force, Newton's first law of motion, Newton's second law of motion, Newton's third law of motion, friction, weight, mass, gravity

S8:7	**Students will compare and contrast kinetic and potential energy and relate them to the mass and speed using real world examples.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:7-1	Differentiate between potential and kinetic energy. *[Ex: pendulum]*			
S8:7-2	Construct and interpret graphical displays of data to describe the relationship between kinetic energy and the mass of an object. *[Ex: water bottle ramp, cars down a ramp, etc.]*	MS-PS3-1 PS3.A	RST.6-8.3 RST.6-8.7 MP.2 6.SP.B.5	
S8:7-3	Construct and interpret graphical displays of data to describe the relationship between kinetic energy and the speed of an object.	MS-PS3-1 PS3.A	RST.6-8.3 RST.6-8.7 MP.2 6.SP.B.5	
S8:7-4	Develop a model that demonstrates that the amount of potential energy is related to the position and the mass of the object. *[Ex: height of an object above a surface]*	MS-PS3-2 PS3.A PS3.C	RST.6-8.3 RST.6-8.7 MP.2 6.SP.B.5	
S8:7-5	Apply knowledge of the law of conservation of energy to energy changes that occur in everyday life.	PS3.C	RST.6-8.1 WHST.6-8.1	

Academic Vocabulary:

Topical Vocabulary: energy, kinetic energy, potential energy, chemical energy, nuclear energy, radiant energy/electromagnetic, thermal energy, electrical energy, law of conservation of energy, energy transformation

Outcomes and Components

S8:8	**Students will collect and analyze data to determine the factors that affect the strength of magnetic fields.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:8-1	Define the features of a magnet. *[Ex: poles, magnetic fields]*	MS-PS2-3 PS2.B		
S8:8-2	Verify the relationship between electricity and magnetism using an electromagnet.	MS-PS2-3 PS2.B	RST.6-8.3	
S8:8-3	Conduct an experiment to demonstrate how to increase and decrease the strength of an electromagnet.	MS-PS2-3 PS2.B	MP.2	
S8:8-4	Design and conduct an experiment to show how magnets and their fields attract and repel.	MS-PS2-5 PS2.B		
S8:8-5	Design and conduct an experiment to show how distance between magnets affects the strength of the magnetic field.	MS-PS2-3 PS2.B		

Academic Vocabulary:

Topical Vocabulary: magnet, electromagnet, magnetic field, magnetic domain, magnetosphere, generator, alternating current, direct current, transformer

S8:9	**Students will demonstrate properties of waves and wave behaviors through the use of models using qualitative and quantitative measures.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
S8:9-1	Distinguish between mechanical and electromagnetic waves.	MS-PS4-2 PS4.A	RST.6-8.1	
S8:9-2	Draw and label the components of waves and describe how a change in each component changes the behavior of the wave.	MS-PS4-1 PS4.A	RST.6-8.1 MP.2 MP.4	
S8:9-3	Model how wave behavior changes with different media including reflection, refraction, absorption, transmission, frequency. *(Include discussion of how speed of the wave is affected by changes in medium.)*	MS-PS4-2 PS4.B	SL.8.5 MP.2	
S8:9-4	Compile information about an object that emits a digital signal, and support the claim that this object is more reliable using a digital signal than if the signal was transmitted in a different way. *[Ex: fiber optics, radio waves, wifi, sounds from phones or computers, etc.]*	MS-PS4-3 PS4.C	RST.6-8.1 RST.6-8.2 RST.6-8.9 WHST.6-8.9 SL.8.5	

Academic Vocabulary:

Topical Vocabulary: waves, mechanical wavers, transverse wave, compressional wave, electromagnetic wave, amplitude, wavelength, frequency, reflection, refraction, diffraction, interference, absorption, transmission

EARTH SCIENCE

Focus Statement:	**Students will develop and use models, construct explanations, evaluate and apply scientific reasoning to Earth's place in the universe, Earth's systems, and Earth and human activity.**

Outcomes:

SES:1		Students will construct an explanation for the origin and evolution stars and the universe, including the Big Bang theory, cosmic background radiation, dark matter and energy, the Doppler effect, and the dispersion of elements.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:1-1	**Use and evaluate 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**	HS-ESS1-1	MP.2 MP.4	
	SES:1-2	**Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.**	HS-ESS1-2	RST.11-12.1	
	SES:1-3	**Communicate scientific ideas about the way stars, over their life cycle, produce elements.**	HS-ESS1-3	RST.11-12.1	

Academic Vocabulary: Construct, evolution

Topical Vocabulary: Big Bang theory, cosmic background radiation, dark matter, dark energy, Doppler effect, nucleosynthesis, electromagnetic spectra, electromagnetic radiation, solar flares, space weather

SES:2		Students will use mathematical or computational representation to illustrate the formation of the solar system and the Earth's movement with it.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:2-1	Develop a timeline detailing major astronomical discoveries and the associated scientists.		WHST.9-12.2	
	SES:2-2	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	HS-ESS1-4	MP.4	
	SES:2-3	Illustrate and explain the effects of Earth's motion in space utilizing Newton's Law of Motion and Gravitation. (Rotation, revolution, time zones, seasons, etc.)	HS-ESS1-4	HSN-Q.A.2	

Academic Vocabulary: Computational, timeline

Topical Vocabulary: Orbit, Newton's Laws of Motion and Gravitation, rotation, revolution

SES:3		Students will apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and history.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:3-1	Develop a model that illustrates the geologic time scale and highlight each era, period and epoch.	HS-ESS1-6	MP.4	
	SES:3-2	Compare and contrast rock dating methods. Give examples of each type and describe the correct application of each method.	HS-ESS1-6	RST11-12.8	
	SES:3-3	Apply the principles of superposition and uniformitarianism to the process of rock sequencing.	HS-ESS1-6	MP.2	
	SES:3-4	Collaborate with other students to describe the formation of Earth's hydrosphere, atmosphere, and biosphere.	HS-ESS1-6 HS-ESS2-7	WHST.9-12.1	
	SES:3-5	Construct an argument based on evidence about the interactions of Earth's systems and life on Earth.	HS-ESS2-7	WHST.9-12.1	
	SES:3-6	Examine how variations in the flow of energy into and out of Earth's systems result in changes in Earth's climate over time.	HS-ESS2-4	WHST.9-12.7	

Academic Vocabulary: Collaborate

Topical Vocabulary: Era, period , epoch, hydrosphere, atmosphere, geosphere, superposition, uniformitarianism

SES:4		Students will develop a model to illustrate how Earth's internal and external surface processes operate at different spatial and temporal scales to form continental and ocean-floor features over time.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:4-1	Construct a timeline describing the development of the plate tectonics theory.	HS-ESS1-5	WHST.9-12.7	
	SES:4-2	Differentiate between continental and oceanic crust based on density, composition, and other physical properties.	HS-ESS2-1		
	SES:4-3	Describe the different mountain building processes. (Plate boundaries, volcanism, and earthquakes.)	HS-ESS2-1		
	SES:4-4	Use seismic waves and their reflections at interfaces between layers to develop a model that illustrates the different compositional layers of the Earth.	HS-ESS2-3 PS4.A		
	SES:4-5	Design a model that illustrates the mechanisms of plate movement to include mantle convection, slab pull, and ridge push.	HS-ESS2-3		
	SES:4-6	Evaluate the past and current movements of continental and oceanic crust to provide evidence of plate movement.	HS-ESS1-5		

Academic Vocabulary: Spatial, temporal, compositional

Topical Vocabulary: Plate tectonics, density, volcanism, mantle convection, slab pull, ridge push

Outcomes and Components

SES:5		Students will analyze weathering and erosional processes to show how the Earth's crust is reshaped.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:5-1	Differentiate the types of weathering (mechanical/chemical) and identify processes by which each occurs.			
	SES:5-2	Plan and conduct an investigation of the properties of water and its effects on mechanical weathering.	HS-ESS2-5	MP.2, HSN-Q.A.2	
	SES5-3	Plan and conduct an investigation determining the effects of chemical weathering.	HS-ESS2-5	MP.2	

Academic Vocabulary: Mechanical, chemical

Topical Vocabulary: Weathering, erosion

SES:6		Students will evaluate characteristics of the atmosphere to determine how weather is generated, and differentiate between weather and climate.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SES:6-1	Use a model to illustrate the composition of the atmosphere.	HS-ESS2-2	MP.4	
	SES:6-2	Describe how solar energy interacts with the atmosphere.	HS-ESS2-4	RST.11-12.2 WHST.9-12.7	
	SES:6-3	Construct a model that demonstrates how clouds form.	HS-ESS2-2	HSN-Q.A.3	
	SES:6-4	Plan and conduct an investigation to determine how different surfaces absorb and reflect the sun's radiation.	HS-ESS2-4	HSN-Q.A.3	
	SES:6-5	Differentiate between weather and climate.	HS-ESS2-2	RST.11-12.1	

Academic Vocabulary: Forecast

Topical Vocabulary: weather, climate, humidity, barometric pressure

BIOLOGY

Focus Statement:	**Students will design and conduct investigations, develop and use models, and evaluate evidence to explore the unifying themes of biology: cellular structure and processes from molecules to organisms; the interactions, energy, and dynamics of ecosystems; the inheritance and variation of traits; and biological evolution.**

Outcomes:

SBI:1		Students will illustrate and apply safe laboratory practices, demonstrate the unique properties of water due to chemical bonding, and identify the characteristics of life.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:1-1	List and describe tools to conduct scientific investigations. (To include but not limited to, temperature probes, pH probes, microscopes, thermometers, meter sticks, scalpels, hemostats, and tweezers.)			
	SBI:1-2	Demonstrate correct use of laboratory tools.			
	SBI:1-3	Describe safe laboratory procedures.			
	SBI:1-4	Conduct investigation to identify cell types and visible structures following correct laboratory procedures following the scientific method.			
	SBI:1-5	Conduct an investigation illustrating the unique properties of water.			
	SBI:1-6	List and describe the characteristics of life.			

Academic Vocabulary:

Topical Vocabulary: temperature probe, pH probe, meter stick, hemostat

Outcomes and Components

SBI:2		Students will apply models and laboratory investigations to illustrate cellular processes.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:2-1	Model the phospholipid bilayer and describe membrane transport.	HS-LS1-2		
	SBI:2-2	Identify the structures of interacting systems that provide specific functions within multicellular organisms. *(Digestive, respiratory, circulatory, urogenital, and nervous systems.)*	HS-LS1-2		
	SBI:2-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	HS-LS1-3		
	SBI:2-4	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	HS-LS1-5		
	SBI:2-5	Construct an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and other carbon molecules. (Lipids, fats, etc.)	HS-LS1-6		
	SBI:2-6	Use a concept map to illustrate that cellular respiration is a chemical process.	HS-LS1-7		
	SBI:2-7	Conduct an investigation to provide evidence that the bonds of food molecules and oxygen molecules are broken and the bonds of new compounds are formed resulting in the net transfer of energy.	HS-LS1-7		

Summative: Describe how light energy is converted into food or other molecules, converted into cellular energy, used by the cell, then eliminated. (Use labs, system presentations, drawings.) Modified: give word bank.
Academic Vocabulary: Investigation, organism,

Topical Vocabulary: Homeostasis, feedback mechanism, digestive, respiratory, circulatory, urogenital, nervous systems, amino acids, photosynthesis, cellular respiration, Kreb's cycle

Outcomes and Components

SBI:3		Students will analyze the relationship between DNA and the construction of molecules as it applies to the growth and development of organisms.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:3-1	Model how cellular division (mitosis and meiosis) and the limits of cell growth act in maintaining homeostasis in unicellular and multicellular organisms.	HS-LS1-4	SL.11-12.5	
	SBI:3-2	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins	HS-LS1-1	WHST.9-12.9	
	SBI:3-3	Examine the role of RNA to model transcription, translation, and protein synthesis.	HS-LS1-1	WHST.9-12.9	

Academic Vocabulary:

Topical Vocabulary: DNA, RNA, mitosis, meiosis, protein synthesis, transcription, translation, unicellular, multicellular, cellular division

SBI:4		Students will apply the use of statistics and probability to predict patterns of inheritance and explain the variability of genetic traits.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:4-1	Define probability and provide probability is used in the construction of monohybrid crosses and pedigree analysis.	HS-LS3-3	MP.2	
	SBI:4-2	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	HS-LS3-1	WHST.11-12.1 RST.11-12.9	
	SBI:4-3	Make and defend a claim based on evidence that inheritable genetic variations may result from: 1) new genetic combinations through meiosis, 2) viable errors occurring during cell division, 3) mutations caused by environmental factors. (*Emphasis is on using data to support arguments for the way variation occurs.]*	HS-LS3-2	WHST.9-12.1	
	SBI:4-4	Research and evaluate genetically modified organism (GMO); describe the method of modification, the purpose of modification, and the morals and ethics associated with the use of the GMO.		RST.11-12.9	
	SBI:4-5	Define dominant, recessive, trait, allele, homozygous, heterozygous, incompletely dominant, co-dominant.			

Academic Vocabulary: probability

Topical Vocabulary: dominant, recessive, trait, allele, homozygous, heterozygous, incompletely dominant, co-dominant, GMO, mutation, inheritance, DNA, chromosomes, monohybrid cross, pedigree, meiosis

Outcomes and Components

SBI:5		Students will evaluate evidence to explain the unity and diversity of life on Earth			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:5-1	Create a timeline showing the development of evolutionary theory.		WHST.9-12.2	
	SBI:5-2	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) Variability within species, 3) competition for limited resources, and 4) the proliferation of those organisms that are better able to survive and reproduce in an environment.	HS-LS4-2	RST.11-12.1 SL.11-12.4	
	SBI:5-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.	HS-LS4-3	MP.4	
	SBI:5-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	HS-LS4-4	MP.2,4	
	SBI:5-5	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	HS-LS4-1	RST.11-12.1	
	SBI:5-6	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	HS-LS4-5	WHST.9-12.9 RST.11-12.8	
	SBI:5-7	Create and describe unique organism that evolved from a life form that existed in the past.			

Academic Vocabulary: Evolution, scientific theory, empirical evidence

Topical Vocabulary: abiotic, allele frequency

SBI:6		Students will analyze the cycling of carbon to illustrate the transfer of matter and energy through ecosystems.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:6-1	Construct and revise an explanation based on evidence for the cycling of matter and energy in aerobic and anaerobic conditions.	HS-LS2-3	RST.11-12.1	
	SBI:6-2	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	HS-LS2-5 HS-ESS2-6	MP.2	
	SBI:6-3	Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	HS-LS2-4	MP.4 HSN-Q.A.1	

Academic Vocabulary:

Topical Vocabulary: aerobic, anaerobic, atmosphere, hydrosphere, biosphere, geosphere, biomass, chemosynthesis, biogeochemical cycling

SBI:7		Students will examine biotic and abiotic relationships in ecosystems to illustrate the interdependency of organisms with their environment.			
		Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
	SBI:7-1	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	HS-LS2-1	MP.2,4	
	SBI:7-2	Use mathematical representations to support and revise explanations based on evidence about	HS-LS2-2	MP.2,4	

		factors affecting biodiversity and populations in ecosystems of different scales.			
	SBI:7-3	Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	HS-LS2-6	RST.11-12.8	
	SBI:7-4	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	HS-LS2-8		
	SBI:7-5	Research a large scale ecosystem (biome). Describe community interactions and population characteristics of the organism created in SBI:5-7 as it fits into that specific biome.		WHST.9-12.7	

Academic Vocabulary: reasoning

High School General Science

- Components embedded throughout outcomes:
  - Interpret charts, tables and graphs from a variety of science topics.
  - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
  - Correctly demonstrate the ability to use precision and accuracy in measurements.
  - Use the metric system in problem solving.
  - Utilize mathematics, organizational tools, and graphing skills to solve problems.
  - Use technology when appropriate to enhance laboratory investigations and presentations of findings.

Focus Statement:	**Students will relate matter to its reactions, focusing on the atomic nature of matter, the elements, general chemical principles, chemical reactions, and the general mathematical and laboratory skills related to chemistry. Students will also develop investigative skills and mathematical problem solving skills related to forces, energy and motion.**

Outcomes:

SGS:1	**Students will perform a variety of labs which require write-ups that utilize proper use of the scientific method.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:1-1	Given a description of an experiment, identify appropriate safety measures.	HS-LS2-7 HS-LS4-6 HS-ESS3-2 HS-ESS3-4 HS-ETS1-3	RST.11-12.8	
SGS:1-2	Write a testable question and hypothesis when given a topic.	HS-PS4-2 HS-PS4-3 HS-PS4-4 HS-LS2-6 HS-LS2-7 HS-LS2-8 HS-LS4-5 HS-ESS1-5 HS-ESS1-6 HS-ESS3-2 HS-ESS3-4 HS-ETS1-1 HS-ETS1-3	RST.11-12.8	
SGS:1-3	Plan and record step-by-step procedures for an investigation that tests the stated hypothesis, select equipment and materials, and identify variables and controls.	Same as above	RST.11-12.8	

SGS:1-4	Conduct an investigation that includes multiple trials and record, organize, and display data appropriately.	Same as above	RST.11-12.8	
SGS:1-5	Write and defend a conclusion based on logical analysis of experimental data.	Same as above	RST.11-12.8	

Academic Vocabulary: write, plan, conduct, record, defend, identify, analyze.

Topical Vocabulary: question, hypothesis, control, independent variables, dependent variables, data, graph, chart, table, conclusion

SGS:2	**Students will differentiate between types of matter and kinetic energy associated with states of matter.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:2-1	Identify characteristics associated with the 5 states of matter as it relates to kinetic theory.	HS-PS1-4	SL.11-12.5 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	
SGS:2-2	Classify matter as a pure substance (element or compound), or as a mixture (solution, suspension, colloid, heterogeneous, homogeneous).		Same as above	
SGS:2-3	Identify solutions in terms of a dissociated solute in a solvent.			

Academic Vocabulary: relate, differentiate, focus, apply

Topical Vocabulary: kinetic theory, atom, element, reaction, plasma, pure substance, compound, mixture, solution, suspension, colloid, heterogeneous, homogeneous, dissociated, solvent, solute, acid, base.

SGS:3	**Students will describe chemical and physical processes, analyze their rates, and whether or not energy is stored or released, in terms of the collisions of molecules and the rearrangements of atoms into new molecules.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:3-1	Using examples, differentiate between chemical and physical properties of matter.			
SGS:3-2	Evaluate factors that affect rates of phase changes, which may include, but are not limited to: temperature, pressure, and concentration.			
SGS:3-3	Identify processes which experimentally verify a chemical reaction has taken place.			
SGS:3-4	Identify processes as endothermic or exothermic.			

Academic Vocabulary: describe, analyze, differentiate, evaluate, verify

Topical Vocabulary: molecules, chemical, physical, phase, temperature, pressure, concentration, endothermic, exothermic.

Outcomes and Components

SGS:4	Students will explore the historical events that led to the development of modern atomic theory.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:4-1	Identify atoms, isotopes, and ions by substructure consisting of protons, neutrons, and electrons.	HS-PS1-1	RST.9-10.7	
SGS:4-2	Explain that the periodic table orders elements horizontally by the number of protons in the atom's nucleus and places elements with similar electron configurations in columns.			
SGS:4-3	Describe historical developments of the periodic table.			
SGS:4-4	Identify experiments that have led to our modern model of atomic structure, identifying the scientists who performed the experiments.			
SGS:4-5	Describe the changes to the atomic theory over time, identifying scientists involved and citing evidence that lead to each change.			

Academic Vocabulary: explore, explain, identify, describe

Topical Vocabulary: atomic theory, atom, isotope, ion, proton, neutron, electron, period, family, group

SGS:5	**Students will differentiate between 3 types of chemical bonds based on the behavior of the valence electrons.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:5-1	Explain how and why bonds form between atoms to make molecules.	HS-PS2-3	WHST.9-12.7	
SGS:5-2	Differentiate between ionic, covalent, and metallic bonding.			
SGS:5-3	Draw different ions and compounds using Lewis structures.			
SGS:5-4	Name compounds when given formulas.			
SGS:5-5	Write Formulas when given names.			

Academic Vocabulary: plan, conduct, gather, compare, infer, explain, differentiate, draw, name, write, describe

Topical Vocabulary: bond, molecule, ionic, covalent, Lewis structure, ions, compounds, formula, metallic

SGS:6	**Students will identify factors that influence motion in one dimension. Student's will mathematically and experimentally determine rates of motion and the factors that effect motion.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:6-1	Measure motion in terms of position, direction, velocity, and acceleration.	HS-PS2-1	RST.11-12.1 RST.11-12.7 WHST.9-12.9 MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1 HSA-SSE.B.3 HSA-CED.A.1 HSA-CED.A.4 HSF-IF.C.7 HSS-ID.A.1	
SGS:6-2	Utilize vectors, graphs, models, and simulations to compare and contrast velocity and acceleration.	HS-PS2-1	Same as above	
SGS:6-3	Interpret graphs of linear motion variables such as distance, time, position, velocity, and acceleration.	HS-PS2-1	Same as above	
SGS:6-4	Experimentally verify Newton's 3 laws of motion	HS-PS2-1	RST.11-12.1 RST.11-12.7 WHST.9-12.9 MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1 HSA-SSE.B.3 HSA-CED.A.1 HSA-CED.A.4 HSF-IF.C.7 HSS-ID.A.1	
SGS:6-5	Mathematically determine the forces acting on an object and the resultant acceleration produced by a net force	HS-PS2-1	Same as above	
SGS:6-6	Experimentally verify how the magnitude of a force is related to the object's mass and acceleration.	HS-PS2-1	Same as above	

Academic Vocabulary: analyze, represent, compare, contrast, verify, design, evaluate, describe, predict

Topical Vocabulary: speed, velocity, acceleration, vector, scalar, distance, displacement, force, mass, weight

SGS:7	**Students will build models of interacting objects to illustrate the forces between the objects and the changes in energy of the objects due to the interactions.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SGS:7-1	Analyze data from student investigations and use mathematical thinking to describe energy changes.	HS-PS3-4	WHST.11-12.8 RST.11-12.1 WHST.9-12.9 MP.2 MP.4	
SGS:7-2	Describe energy manifestations in multiple ways, such as in motion, sound, light, and thermal energy.	HS-PS3-2 HS-PS3-3	MP.2 MP.4 SL.11-12.5 WHST.9-12.7 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	
SGS:7-3	Apply the law of conservation of energy (energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems) to explain experimentally collected data.	HS-PS3-1 HS-PS3-4	WHST.11-12.8 RST.11-12.1 WHST.9-12.9 MP.2 MP.4	
SGS:7-4	Explain how the availability of energy limits what can occur in any system.	HS-PS3-1	MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 SL.11-12.5	

Academic Vocabulary: develop, build, analyze, describe, apply, explain, predict

Topical Vocabulary: energy transfers, potential energy, kinetic energy, work

High School CHEMISTRY

- Components embedded throughout outcomes:
  - Interpret charts, tables and graphs from a variety of chemistry topics.
  - Use a computer simulation to model the impact of proposed solutions to a problem.
  - Correctly demonstrate the ability to use precision, accuracy, scientific notation, and significant figures in metric measurements.
  - Differentiate derived units from fundamental units.
  - Apply derived units to solve problems.
  - Interpret which concept(s) is required to solve chemistry problems.
  - Apply a formula to the correct concept(s) to solve chemistry problems.
  - Perform a variety of labs which require write-ups that utilize proper use of the scientific method.
  - The student will demonstrate the ability to carry out effective scientific investigations, analyze data, communicate results, and apply results to explain phenomena occurring outside the laboratory.

Focus Statement:	**Students will relate matter to its reactions, focusing on the atomic nature of matter, the elements, general chemical principles, chemical reactions, and the general mathematical and laboratory skills related to chemistry. Students will apply general principles of chemistry to the real world.**

Outcomes:

SCH:1	**Students will differentiate between types of matter and kinetic energy associated with states of matter.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:1-1	Identify characteristics associated with the 5 states of matter as it relates to kinetic theory.			
SCH:1-2	Use mathematical representation to model/illustrate forces between particles that release or absorb energy.	HS-PS1-4	SL.11-12.5 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	
SCH:1-3	Classify matter as a pure substance (element or compound), or as a mixture (solution, suspension, colloid, heterogeneous, homogeneous).			
SCH:1-4	Identify solutions in terms of a dissociated solute in a solvent. *[Ex: acids & bases, molarity of solutions, alloys, etc.]*			

Academic Vocabulary: relate, differentiate, focus, apply

Topical Vocabulary: kinetic theory, atom, element, reaction, Bose-Einstein, plasma, pure substance, compound, mixture, solution, suspension, colloid, heterogeneous, homogeneous, dissociated, solvent, solute, acid, base, molarity, alloy.

SCH:2	**Students will describe chemical and physical processes, analyze their rates, and whether or not energy is stored or released, in terms of the collisions of molecules and the rearrangements of atoms into new molecules.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:2-1	Using examples, differentiate between chemical and physical properties of matter.			
SCH:2-2	Evaluate factors that affect rates of phase changes, which may include, but are not limited to: temperature, pressure, and concentration.			
SCH:2-3	Identify processes which experimentally verify a chemical reaction has taken place.			
SCH:2-4	Identify processes as endothermic or exothermic.			

Academic Vocabulary: describe, analyze, differentiate, evaluate, verify

Topical Vocabulary: molecules, chemical, physical, phase, temperature, pressure, concentration, endothermic, exothermic.

SCH:3	**Students will explore the historical events that led to the development of modern atomic theory.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:3-1	Identify atoms, isotopes, and ions by substructure consisting of protons, neutrons, and electrons.	HS-PS1-1	RST.9-10.7	
SCH:3-2	Explain that the periodic table orders elements horizontally by the number of protons in the atom's nucleus and places elements with similar electron configurations in columns.	HS-PS1-1	RST.9-10.7	
SCH:3-3	Describe historical developments of the periodic table.			
SCH:3-4	Identify experiments that have led to our modern model of atomic structure, identifying the scientists who performed the experiments.			
SCH:3-5	Describe the changes to the atomic theory over time, identifying scientists involved and citing evidence that lead to each change.			
SCH:3-6	Identify families of particles associated with the Standard Model of the Atom.			

Academic Vocabulary: explore, explain, identify, describe

Topical Vocabulary: atomic theory, atom, isotope, ion, proton, neutron, electron, quarks, period, family, group

SCH:4	**Students will use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:4-1	Explain how the repeating patterns on the table reflect patterns of outer electron states.	HS-PS1-1	RST.9-10.7	
SCH:4-2	Use the periodic table to categorize attraction and repulsion between charges at the atomic scale to explain the structure, properties, and transformations of matter.	HS-PS1-1	RST.9-10.7	
SCH:4-3	Demonstrate the role of electron configuration in placing elements in blocks (s,p,d,f)	HS-PS1-1	RST.9-10.7	
SCH:4-4	Explain trends down groups, and across periods, of the periodic table which include, but are not limited to: atomic size, ion size, ionization energy, electron affinity, electronegativity.	HS-PS1-1	RST.9-10.7	

Academic Vocabulary: predict

Outcomes and Components

SCH:5	Students will plan and conduct an investigation to gather evidence to compare the structure of substances to infer the strength of electrical forces between particles.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:5-1	Explain how and why bonds form between atoms to make molecules.			
SCH:5-2	Explain how the structure and interactions of matter are determined by electrical forces within and between atoms.	HS-PS2-3	WHST.9-12.7	
SCH:5-3	Differentiate between ionic and covalent compounds/bonding.			
SCH:5-4	Draw different ions and compounds using Lewis structures.			
SCH:5-5	Name compounds when given formulas.			
SCH:5-6	Write formulas when given names.			
SCH:5-7	Predict formulas based on oxidation numbers.			
SCH:5-8	Describe metallic bonding and illustrate examples of matter that use these attractive forces.			
SCH:5-9	Describe hydrogen bonding and illustrate examples of matter that use these attractive forces.			

Academic Vocabulary: plan, conduct, gather, compare, infer, explain, differentiate, draw, name, write, describe

Topical Vocabulary: electromagnetic, bond, molecule, ionic, covalent, Lewis structure, ions, compounds, formula, oxidation number, metallic, hydrogen bonding

SCH:6	**Students will construct and revise an explanation for the outcome of a chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:6-1	Identify types of reactions by their associated chemical equations.			
SCH:6-2	Write and balance chemical equations for the fundamental types of reactions (synthesis, decomposition, single replacement, double replacement, and combustion).			
SCH:6-3	Use the fact that atoms are conserved, together with knowledge of the chemical properties of the elements involved, to describe and predict chemical reactions.	HS-PS1-2 HS-PS1-7	WHST.9-12.5 HSN-Q.A.1 HSN-Q.A.3 MP.2 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	

Academic Vocabulary: construct, revise, identify, write, describe, predict

Topical Vocabulary: periodic table, chemical reaction, single replacement, double replacement, synthesis, decomposition, combustion

SCH: 7	**Students will use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH: 7-1	Solve mole to mole stoichiometry problems.	HS-PS1-7	MP.2 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	
SCH: 7-2	Solve mole to mass stoichiometry problems.	HS-PS1-7	Same as above	
SCH: 7-3	Solve mass to mass stoichiometry problems.	HS-PS1-7	Same as above	
SCH: 7-4	Predict the mass of products in chemical reactions.	HS-PS1-7	Same as above	
SCH: 7-5	Conduct an experiment in which percent yield is calculated from the reaction.	HS-PS1-7	Same as above	
SCH: 7-6	Apply percent-composition to identify a formula.	HS-PS1-7	Same as above	

Academic Vocabulary: support, solve, predict, conduct, apply

Topical Vocabulary: law of conservation, stoichiometry, mole, percent yield, formula

SCH: 8	**Students will refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH: 8-1	Calculate limiting factors and percent yield using balanced equations. *(In many situations, a dynamic and condition-dependent balance between a reaction and the reverse reaction determines the numbers of all types of molecules present.)*	HS-PS1-6		
SCH: 8-2	Manipulate the conditions of a reaction to change the percent yield.			
SCH: 8-3	Use the activity series of elements to predict reactions.			

Academic Vocabulary: calculate, refine

Topical Vocabulary: limiting factors, percent yield, dynamic, activity series

SCH:9	**Students will use mathematical representations to support a claim regarding relationships among the frequency, wavelengths, and speed of waves.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SCH:9-1	Perform calculations involving various aspects of the electromagnetic spectrum.	HS-PS4-1	HSA.CED.A.4 HSA-SSE.B.3 HSA-SSE.A.1 MP.4 MP.2 RST.11-12.7	
SCH:9-2	Evaluate the claims, evidence, and reasoning behind the ideas that electromagnetic radiations can be described either by a wave model, or a particle model.	HS-PS4-3	RST.9-10.8 RST.11-12.1 RST.11-12.8 MP.2 HSA-SSE.A.1 HSA.CED.A.4	
SCH:9-3	Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	HS-PS4-4	WHST.11-12.8 RST.11-12.8 RST.11-12.7 RST.11-12.1 RST.9-10.8	
SCH:9-4	Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter, to transmit and capture information and energy.	HS-PS4-5	WHST.9-12.2	
SCH:9-5	Assess affects of electromagnetic radiation (EMR). *(When light of longer wavelength EMR is absorbed by matter, it is generally converted into thermal energy/heat. Shorter wavelength EMR can ionize atoms and cause damage to living cells.)*	HS-PS4-4	WHST.11-12.8 RST.11-12.8 RST.11-12.7 RST.11-12.1 RST.9-10.8	
SCH:9-6	Explain how the wave model is useful for explaining many features of EMR, and the particle model explains other features. *(EMR can be modeled as a wave of changing electric and magnetic fields, or as particles called photons.)*	HS-PS4-4	WHST.11-12.8 RST.11-12.8 RST.11-12.7 RST.11-12.1 RST.9-10.8	
SCH:9-7	Identify events about photoelectric materials emitting electrons when they absorb light of a high-enough frequency.	HS-PS4-5	WHST.9-12.2	
SCH:9-8	Identify multiple technologies based on the understanding of waves and their interactions with matter which are part of everyday experiences in the modern world (e.g. medical imaging, communications, scanners) and in scientific research. *(They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them.)*	HS-PS4-5	WHST.9-12.2	
SCH:9-9	Calculate the change in the energy of one component in a system when the change in energy	HS-PS3-1	SL.11-12.5 MP.2 MP.4	

	of the other component(s) and energy flows in and out of the system are known. ($E=mc^2$ and $E=hf$)		HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3	

Academic Vocabulary: support, perform, evaluate, communicate, assess, explain, identify, calculate

Topical Vocabulary: frequency, wavelengths, speed, electromagnetic spectrum

High School PHYSICS

- Components embedded throughout outcomes:
  - Interpret charts, tables and graphs from a variety of physics topics.
  - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.
  - Correctly demonstrate the ability to use precision, accuracy, scientific notation, and significant figures in metric measurements.
  - Differentiate derived units from fundamental units.
  - Apply derived units to solve problems.
  - Interpret which concept(s) is required to solve physics problems.
  - Apply a formula to the correct concept(s) to solve physics problems.
  - Perform a variety of labs which require write-ups that utilize proper use of the scientific method.
  - The student will demonstrate the ability to carry out effective scientific investigations, analyze data, communicate results, and apply results to explain phenomena occurring outside the laboratory.

Focus Statement:	**Physics students will develop investigative skills, mathematical problem solving skills, and independent and creative thinking skills, as well as effective report writing skills applied to solving problems related to the topics of nuclear energy, thermodynamics, forces, energy and motion.**

Outcomes:

SPH:1	**Students will apply models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH:1-1	Communicate scientific and technical information about why the atomic structure is important in the functioning of designed materials.	HS-PS2-6	RST.11-12.1 MP.4	
SPH:1-2	Compare and contrast nuclear processes of fusion and fission.	HS-PS1-8	HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 MP.4	
SPH:1-3	Compare and contrast types of radioactive decay of unstable nuclei (alpha, beta, gamma radiation).	HS-PS1-8	HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 MP.4	
SPH:1-4	Verify how nuclear processes involve release or absorption of energy.	HS-PS1-8	HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 MP.4	
SPH:1-5	Use models to verify the total number of neutrons plus protons is conserved in any nuclear process.	HS-PS1-8	HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 MP.4	

Academic Vocabulary: verify, compare, contrast, communicate

Topical Vocabulary: fission, fusion, radioactive decay, alpha, beta, gamma radiation, protons, neutrons

SPH:2	**Students will plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined, within a closed system, results in a more uniform energy distribution among the components in the system (thermodynamics).**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH:2-1	Describe energy manifestations in multiple ways, such as in motion, sound, light, and thermal energy.	HS-PS3-2 HS-PS3-3	SL.11-12.5 MP.2 MP.4	
SPH:2-2	Apply the law of conservation of energy (energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems) to explain experimentally collected data.	HS-PS3-1 HS-PS3-4	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	
SPH:2-3	Apply mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and velocity, allow the concept of conservation of energy to be used to predict and describe system behavior.	HS-PS3-1	SL.11-12.5 MP.2 MP.4	
SPH:2-4	Predict how energy will distribute throughout systems toward more stable states— that is, toward more uniform energy distribution (e.g. water flows downhill, objects hotter than their surrounding environment cool down).	HS-PS3-4	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	
SPH:2-5	Predict how two objects interacting through a field will change relative position when the energy stored in the field is changed.	HS-PS3-5	WHST.9-12.7 WHST.11-12.8 WHST.9-12.9 SL.11-12.5 MP.2 MP.4	
SPH:2-6	Describe how energy is conserved during transformation to less useful forms. *[Ex: thermal energy loss to the surrounding environment.]*	HS-PS3-3 HS-PS3-4	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	
SPH:2-9	Compare and contrast heat and temperature, conductors and insulators, methods of heat transfer, different temperature scales, and forms of energy.	HS-PS3-4	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	
SPH:2-10	Experimentally determine specific heat of various substances.	HS-PS3-4	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	

Academic Vocabulary: manifestations, quantify

Topical Vocabulary: thermodynamics, law of conservation of energy, heat, temperature, conductors, insulators, Kelvin, Celsius, Bose-Einstein condensate, plasma

SPH:3	**Students will develop models of interacting objects to illustrate the forces between the objects and the changes in energy of the objects due to the interactions.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH:3.1	Analyze data from student investigations and use mathematical thinking to describe energy changes.	HS-PS3-4	RST.11-12.1 WHST.11-12.8 WHST.9-12.9 MP.2 MP.4	
SPH:3-2	Describe energy manifestations in multiple ways, such as in motion, sound, light, and thermal energy.	HS-PS3-2 HS-PS3-3	SL.11-12.5 MP.2 MP.4	
SPH:3-3	Apply the law of conservation of energy (energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems) to explain experimentally collected data.	HS-PS3-1 HS-PS3-4	RST.11-12.1 WHST.11-12.8 WHST.9-12.9 MP.2 MP.4	
SPH:3-4	Explain how the availability of energy limits what can occur in any system.	HS-PS3-1	SL.11-12.5 MP.2 MP.4	
SPH:3-5	Utilize criteria and constraints to satisfy a requirement set by society, and quantify a way that one can tell to what degree a given design meets the criteria.	HS-PS3-3	WHST.9-12.7 MP.2 MP.4	

Academic Vocabulary: develop, analyze, describe, apply, explain, predict, utilize, quantify

Topical Vocabulary: models, forces, energy, law of conservation

SPH:4	**Students will analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH:4-1	Identify current global challenges in quantifiable terms.	HS-ETS1-1	RST.11-12.7 RST.11-12.8 RST.11-12.9 MP.2 MP.4	
SPH:4-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	HS-ETS1-2	MP.4	
SPH:4-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, which may include, but are not limited to, cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.	HS-ETS1-3	MP.2 MP.4 RST.11-12.9 RST.11-12.8 RST.11-12.7	

Academic Vocabulary: analyze, identify, design, evaluate, utilize

Topical Vocabulary: qualitative, quantitative, global challenge, constraints, impacts, criteria

Outcomes and Components

SPH: 5	**Students will analyze data collected from experimentation to mathematically represent Newton's Laws of Motion.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH: 5-1	Use mathematical representations to support the claim that the total momentum of a system of objects in equilibrium is conserved when there is no net force on the system.	HS-PS2-3	WHST.9-12.7	
SPH: 5-2	Compare and contrast weight and mass of an object.	HS-PS2-1	RST.11-12.1 RST.11-12.7 WHST.9-12.9 MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1 HSA-SSE.B.3 HSA-CED.A.1 HSA-CED.A.4 HSF-IF.C.7 HSS-ID.A.1	
SPH: 5-3	Experimentally verify how the magnitude of a force is related to the object's mass and acceleration.	HS-PS2-1	Same as above	
SPH: 5-4	Apply scientific and engineering ideas to design, evaluate, and refine a device that minimizes the force on an object during a collision.	HS-PS2-3	WHST.9-12.7	
SPH: 5-5	Use mathematical representations to describe and predict forces between objects, which may include, but are not limited to gravitational, electrical, and magnetic forces.	HS-PS2-4	MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1	
SPH: 5-6	Use a model of two objects interacting to illustrate the forces between the objects and the changes in energy of the objects due to the interactions.	HS-PS3-5	WHST.9-12.7 WHST.11-12.8 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	

Academic Vocabulary: analyze, represent, compare, contrast, verify, design, evaluate, describe, predict

Topical Vocabulary: Newton's Laws, momentum, weight, mass, magnitude, force, mass, acceleration

Outcomes and Components

SPH: 6	Students will quantify the qualities of linear motion.			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH: 6-1	Identify, interpret, and solve problems in one-dimensional motion.	HS-PS2-1	RST.11-12.1 RST.11-12.7 WHST.9-12.9 MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1 HSA-SSE.B.3 HSA-CED.A.1 HSA-CED.A.4 HSF-IF.C.7 HSS-ID.A.1	
SPH: 6-2	Measure length, mass, volume, and time with appropriate metric units.	HS-PS2-1	Same as above	
SPH: 6-3	Measure motion in terms of position, direction, velocity, and acceleration.	HS-PS2-1	Same as above	
SPH: 6-4	Identify factors that influence the relative motion of an object which may include, but are not limited to: wind, friction, currents, potential differences, gradients.	HS-PS2-1	Same as above	
SPH: 6-5	Utilize vectors, graphs, models, and simulations to compare and contrast velocity and acceleration.	HS-PS2-1	Same as above	
SPH: 6-6	Explain principles of free-fall and gravitational acceleration.	HS-PS2-4	MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1	
SPH: 6-7	Draw and label free-body diagrams to help solve kinematic equations.	HS-PS2-4	Same as above	
SPH: 6-8	Calculate kinematics of an object in free-fall.	HS-PS2-4	Same as above	
SPH: 6-9	Interpret graphs of linear motion variables such as distance, time, position, velocity, and acceleration.	HS-PS2-4	Same as above	

Academic Vocabulary: quantify, measure, identify, utilize, calculate, explain, analyze, draw

Topical Vocabulary: linear motion, direction, displacement, vector, scalar, metrics, velocity, position, speed, relative motion, kinematics, free-fall, gravity, free-body diagram

SPH: 7	**Students will describe projectile motion using vectors, graphs, models, and simulations.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH: 7-1	Identify, interpret, and solve problems in two-dimensional motion.	HS-PS2-4	MP.2 MP.4 HSN-Q.A.1 HSN-Q.A.2 HSN-Q.A.3 HSA-SSE.A.1	
SPH: 7-2	Construct vector diagrams of projectile motion.	HS-PS2-4	Same as above	
SPH: 7-3	Resolve vectors into horizontal and vertical components.	HS-PS2-4	Same as above	
SPH: 7-4	Compare calculated with actual projectile motion through experimentation.	HS-PS2-4	Same as above	

Academic Vocabulary: describe, identify, construct, resolve, compare

Topical Vocabulary: projectile, vector, resolve

SPH:8	**Students will develop and apply models to illustrate that energy can be accounted for as a combination of energy associated with the motions of particles/objects and energy associated with the relative position of particles/objects.**			
	Components:	**Wyoming Content and Performance Standard**	**ELA / Math Standard**	**PAWS / ACT Standard**
SPH:8-1	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	HS-PS3-3 HS-ETS	RST.11-12.1 WHST.11-12.8 SL.11-12.5 MP.2 MP.4	
SPH:8-2	Calculate work done when forces are applied and identify classes, forms, and transformations of energy associated with the concept of conservation of energy.	HS-PS3-2	SL.11-12.5 MP.2 MP.4	
SPH:8-3	Solve problems using the work-kinetic energy theorem and show the effects of machines on work and power.	HS-PS3-2	SL.11-12.5 MP.2 MP.4	
SPH:8-4	Solve problems in momentum that involve objects with different/same mass, velocity, and/or impulse, while utilizing conservation of momentum.	HS-PS3-2	SL.11-12.5 MP.2 MP.4	

Academic Vocabulary: develop, apply, design, build, refine, calculate, solve

Topical Vocabulary: models, energy, motion, forces, conservation laws, kinetic energy, momentum

Kindergarten 2015-2016 Teacher_____
Science Curriculum Checklist

DATE COMPLETED

_____ SK:1 Students will plan and conduct investigations to determine how pushing/pulling (force) affect the motion of objects.

_____ SK:1-1 Demonstrate a push/pull on an object.

_____ SK:1-2 Describe what happens when two objects collide through classroom charts.

_____ SK:1-3 Apply forces in different directions to objects and compare results through classroom charts.

_____ SK:1-4 Apply forces in different strengths to objects and compare results through classroom charts.

_____ SK:1-5 Design a solution and develop a visual representation to illustrate the change of direction or speed of an object through small/whole group.

_____ SK:2 Students will collect, record, and interpret local weather data, and draw conclusions about the data.

_____ SK:2-1 Observe and record local weather conditions and identify patterns over time through a classroom chart.

_____ SK:2-2 Identify safety plans with appropriate weather events. [Ex: go to an interior room during a tornado, stay inside during a blizzard, go to higher ground during a flood, etc.]

_____ SK:2-3 Make observations to determine the effect of sunlight on Earth's surface.

_____ SK:2-4 Design methods to prevent a surface from getting hot when exposed to the sun through small/whole group.

_____ SK:2-5 Compare data from multiple methods to determine which one works best through classroom charts.

DATE COMPLETED

_____ SK:3 Students will determine the needs of plants, animals, and humans in their surroundings and each one's impact on its environment and develop solutions for reducing human impact on their local environment.

_____ SK:3-1 Create a list of what plants and animals, including humans need to survive.

_____ SK:3-2 Use the list to compare and contrast the needs of plants and animals, including humans, in their environment.

_____ SK:3-3 Construct a classroom chart to represent the relationship between the needs of different plants and animals (including humans). [Examples of relationships could include that deer eat buds and leaves, therefore, they usually live in the forested areas.]

_____ SK:3-4 Compile a list of examples how plants, humans, and other animals change their environment through classroom charts. [Examples of plants and animals changing their environment could include a squirrel digs in the ground to hide its food and tree roots can break the concrete.]

First Grade 2015-2016 Teacher_____
Science Curriculum Checklist

DATE COMPLETED

_____ S1:1 Students will explain the motion of the sun, moon, and stars in the sky in order to predict patterns.

_____ S1:1-1 Make observations at different times of year to relate the amount of daylight to the time of year. [Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall. Assessment is limited to relative amounts of daylight.]

_____ S1:1-2 Create a drawing to represent the apparent motion of the sun across the sky and explain the pattern of the sun's movement. [Statement can be one or more sentences dictated to teacher or written by student.] [Sun rises in the east and sets in the west.]

_____ S1:1-3 Create a drawing to represent the motion of the moon and explain the pattern of the moon's movement. [Statement can be one or more sentences dictated to teacher or written by student.]

_____ S1:1-4 Describe the pattern of when the stars are visible. [Can be dictated to teacher or written by student.]

_____ S1:2 Students will use materials to design a solution to a human problem by mimicking how plants and animals use their external parts to help them survive, grow, and meet their needs.

_____ S1:2-1 Create a diagram with labels of plant parts that help them survive and grow. [Roots, stems, leaves, flowers, fruits, etc.]

_____ S1:2-2 Construct a classroom chart that identifies and explains how animals and/or plants use their external parts to survive, grow, and meet their needs. [Ex: thorns, spines, coverings, claws, mouth, beak, etc.]

_____ S1:2-3 Design a model and describe how humans copy from animals for their protection and survival. [Ex: a bicycle helmet mimics a turtle shell, wearing a coat to keep warm mimics animal fur; tools mimic a bird's beak, etc.]

DATE COMPLETED

_____ S1:3 Students will analyze patterns of physical characteristics and behavior in plants and animals in order to compare and contrast between parents and offspring.

_____ S1:3.1 List patterns of offspring behavior and parent response as shown in text and media examples on a classroom chart. [Cause/effect: crying/cheeping lead to feeding/comforting]

_____ S1:3.2 Observe a young animal or plant to compare and contrast (using a Venn diagram) the young animal or plant's physical characteristics with its parents. [Ex: Same shape, but different sizes; a particular breed of dog can have different color fur than parent; a baby deer has spots but the parent doesn't; same leaf shape but different sizes, etc.]

_____ S1:4 Students will investigate the characteristics of sound and light energy and how it travels to design and build a device to communicate light and sound over a distance.

_____ S1:4.1 Demonstrate that vibrating materials can make sound and that sound can make materials vibrate. [Ex: tuning fork, plucked string, tuning fork in water, paper near a speaker, etc.]

_____ S1:4.2 Record observations on a teacher created chart to prove objects can only be seen when illuminated. [Ex: dark room, a cave explorer with a flashlight, a pinhole box, etc.]

_____ S1:4.3 Conduct an investigation and record the results on a classroom chart of placing objects made with different materials in the path of a beam of light (transparent, translucent, opaque, and reflective).

_____ S1:4.4 Create a list to describe the ways in which people use sound or light to communicate over distances (telephones, military drum beats, smoke/fire signals, lighthouses, landing lights at an airport, etc.) through classroom charts.

_____ S1:4.5 Design and build a device with provided materials in cooperative groups that uses sound or light to communicate over a distance. [Ex: paper cup and string, a pattern of drum beats, light/mirrors]

Second Grade 2015-2016 Teacher_____
Science Curriculum Checklist

DATE COMPLETED

_____ S2:1 Students will conduct investigations and use their data to determine how the physical properties of different materials make them useful for various purposes.

_____ S2:1-1Classify a given set of materials by their physical properties on a teacher created chart (Ex: flexibility, texture, color, and hardness).

_____ S2:1-2 Conduct simple tests on teacher provided materials to determine which are best for an intended purpose and explain the strengths and weakness of the performance of each material (Ex: string vs. rubber band; ruler vs. tape measure; ball vs. cube, etc.).

_____ S2:1-3 Build an object from a small set of pieces, disassemble the created object, and reassemble to form a new object (Ex: pattern blocks, tangrams, legos, sytrofoam balls and toothpicks, beads, etc.) [Teacher must check original model as well as final model.]

_____ S2:2 Students will conduct investigations to determine what plants and animals need to grow and how they are interdependent.

_____ S2:2-1 Conduct a series of simple experiments to verify whether plants need sunlight and water to grow.

_____ S2:2-2 Illustrate how an animal disperses seeds or pollinates plants.

_____ S2:2-3 Construct a chart that lists the different kinds of plants and animals and their habitat.

_____ S2:2-4 Compare and contrast the diversity of life within different habitats using the constructed chart from S2:2-3.

DATE COMPLETED

_____ S2:3 Students will construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

_____ S2:3-1 Identify matter as solid, liquid, or gas.

_____ S2:3-2 Categorize real-world examples as solid, liquid, or gas. This must include places on Earth where water is found. [Oceans, rivers, lakes, and ponds.]

_____ S2:3-3 Identify the properties of a solid, liquid, and gas.

_____ S2:3-4 Conduct simple experiments to prove whether reversible or irreversible changes occur as a result of heating and cooling. [Ex: burning a piece of paper, cooking an egg, freezing a plant leaf, heating ice, butter, etc.]

_____ S2:4 Students will illustrate how Earth events can quickly or slowly change the layout of the land, and compare how different models can slow or prevent wind or water from changing the shape of the land.

_____ S2:4-1 Identify natural events that change the earth quickly. [Ex: flooding, earthquakes, volcanoes, tsunamis]

_____ S2:4-2 Construct models to demonstrate the effects of natural events that change the earth quickly. [Ex: modeling plate tectonics using graham crackers and frosting, baking a cake and twisting a flexible pan, etc.]

_____ S2:4-3 Identify natural events that change the earth slowly. [Ex: wind erosion, water, ice, vegetation, etc.]

_____ S2:4-4 Construct models to demonstrate the effects of natural events that change the earth slowly. [Ex: sand tables, freezing water inside of something to make it break, rubbing rocks together, shaking a rock inside of a water jar, etc.]

_____ S2:4-5 Construct a simple map to represent the shapes and kind of land and bodies of water in our community.

_____ S2:4-6 Compare teacher provided solutions designed to slow or prevent wind or water from changing the shape of the land.