

Wyoming Science Content and Performance Standards, PAWS Key Concepts, and Science Academic Benchmarks Alignment Chart

Grade 11 Content Standard: Concepts and Processes		
Benchmark	Key Concept	Academic Benchmark
<p>1. <u>The Cell</u>: Students explain the processes of life, which necessitates an understanding of relationship between structure and function of the cell and cellular differentiation. They identify activities taking place in an organism related to metabolic activities in cells, including growth, regulation, transport, and homeostasis. Students differentiate between asexual and sexual reproduction.</p>	<p>Key concepts are the metabolic activities performed by cells as fundamental units of homeostasis</p>	Life Systems
		<p>11.A.S.1.1 Students identify activities taking place in an organism related to metabolic activities in cells.</p>
<p>2. <u>Molecular Basis of Heredity</u>: Students demonstrate an understanding that organisms ensure species continuation from parent to offspring. They utilize genetic information to make predictions about possible offspring. Students apply concepts of molecular biology (DNA and genes) to recent discoveries.</p> <p>3. <u>Biological Evolution</u>: Students explain how species evolve over time. They understand that evolution is the consequence of various interactions, including the genetic variability of offspring due to mutation and recombination of genes, and the ensuing selection by the environment of those offspring better able to survive and leave additional offspring. Students discuss natural selection and that its evolutionary consequences provide a scientific explanation for the great diversity of organisms as evidenced by the fossil record. They examine how different species are related by descent from common ancestors. Students are able to explain how organisms are classified based on similarities that reflect their evolutionary relationships, with species being the most fundamental unit of classification.</p> <p>6. <u>Behavior and Adaptation</u>: Students examine behavior as the sum of responses of an organism to stimuli in its environment, which evolves through adaptation, increasing the potential for species survival. They identify adaptations as characteristics and behaviors of an organism that enhance the chance for survival and reproductive success in a particular environment.</p>	<p>Key concepts include the concept of natural selection and the theory of biological evolution</p>	<p>11.A.S.1.2. Students demonstrate the connections between natural selection and survival.</p>

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<p>4. <u>Interdependence of Organisms</u>: Students investigate the inter-relationships and interdependence of organisms, including the ecosystem concept, energy flow, competition for resources, and human effects on the environment.</p> <p>5. <u>Matter, Energy, and Organization in Living Systems</u>: Students describe the need of living systems for a continuous input of energy to maintain chemical and physical stability. They explain the unidirectional flow of energy and organic matter through a series of trophic levels in living systems. Students investigate the distribution and abundance of organisms in ecosystems, which are limited by the availability of matter and energy and the ability of the living system to recycle materials.</p>	<p>Key concepts include the flow of matter and energy through different levels of organization within living systems, between living systems and the physical environment, and the ability of living systems to recycle and recombine chemical elements in different ways.</p>	<p>11.A.S.1.3 Students demonstrate the inter-relationships of organisms and the ecosystem (including the ecosystem concept and competition for resources).</p>
<p>7. <u>Geochemical Cycles</u>: Students describe the Earth as a closed system and demonstrate a conceptual understanding of the following systems: geosphere, hydrosphere, atmosphere, and biosphere. Students explain the role of energy in each of these systems, such as weather patterns, global climate, weathering, and plate tectonics.</p>	<p>Key concepts include heat and energy transfer in and out of the atmosphere; weather and climate, and the factors that influence environmental quality.</p>	<p>Earth and Space Systems</p> <p>11.A.S.1.4 Students describe a model of Earth as a closed system.</p>
<p>8. <u>Origin and Evolution of the Earth</u>: Students investigate geologic time through comparing rock sequences, the fossil record, and decay rates of radioactive isotopes.</p> <p>9. <u>Origin and Evolution of the Universe</u>: Students examine evidence for the Big Bang Theory and recognize the immense time scale involved in comparison to human-perceived time. They describe the process of star and planet formation, planetary and stellar evolution including the fusion process, element formation, and dispersion.</p>	<p>Key concepts are the ongoing processes involved in star formation and destruction.</p>	<p>11.A.S.1.5 Students recognize the time scale involved in the gradual changes which occur during planetary evolution.</p>

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<p>10. <u>Structure and Properties of Matter</u>: Students describe the atomic structure of matter including subatomic particles, their properties, and interactions. They recognize that elements are organized into groups in the periodic table based on their outermost electrons and these groups have similar properties. They explain chemical bonding in terms of the transfer or sharing of electrons between atoms. Students describe physical states of matter and phase changes. Students differentiate between chemical and physical properties, and chemical and physical changes.</p> <p>11. <u>Chemical Reactions</u>: Students recognize that chemical reactions take place all around us. They realize that chemical reactions may release or consume energy, occur at different rates, and result in the formation of different substances. They identify the factors that affect reaction rates.</p> <p>12. <u>Conservation of Energy and Increase in Disorder</u>: Students will demonstrate an understanding of the laws of conservation of mass and energy within the context of physical and chemical changes. They realize the tendency for systems to increase in disorder.</p>	Key concepts are the separation of substances by their physical and chemical properties	Physical System
		11.A.S.1.6 Students distinguish between chemical and physical changes.
13. <u>Energy and Matter</u> : Students demonstrate an understanding of types of energy, energy transfer and transformations, and the relationship between energy and matter.	Key concepts are the distinction between kinetic and potential energy and the conversion of one form of energy to another.	11.A.S.1.7 Students describe an object in motion in terms of distance and time.
14. <u>Force and Motion</u> : Students develop a conceptual understanding of Newton's Laws of Motion, gravity, electricity, and magnetism.	Key concepts include the description and measure of an object's motion in terms of position, displacement, time, and the derived quantities of velocity and acceleration.	

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Grade 8 Content Standard: Concepts and Processes		
Benchmark	Key Concept	Academic
1. <u>Levels of Organization in Living Systems</u> : Students model the cell as the basic unit of a living system. They realize that all functions that sustain life act within a single cell and cells differentiate into specialized cells, tissues, organs, and organ systems.	Key concepts include multicellular organisms and how a variety of specialized cells, tissues, organs, and organ systems perform specialized functions.	Life System
		8.A.S.1.1 Students relate different organ systems with their specialized function.
2. <u>Reproduction and Heredity</u> : Students describe reproduction as a characteristic of all living systems, which is essential to the continuation of species, and identify and interpret traits, patterns of inheritance, and the interaction between genetics and environment.	Key concepts include the use of the basic laws of Mendelian genetics to solve simple monohybrid crosses and using a Punnett square to interpret traits and patterns of inheritance.	8.A.S.1.2 Students describe the traits offspring inherit from their parents.
3. <u>Evolution as a Theory</u> : Students explain evolution as a theory and apply the theory to the diversity of species, which results from natural selection and the acquisition of unique characteristics through biological adaptation.		
4. <u>Diversity of Organisms</u> : Students investigate the interconnectedness of organisms, identifying similarity and diversity of organisms through a classification system of hierarchical relationships and structural homologies.	Key concepts include the factors that affect the number and types of organisms an ecosystem can support and how matter is recycled within ecosystems.	8.A.S.1.3 Students describe interconnectedness of diverse organisms within an ecosystem.
5. <u>Behavior and Adaptation</u> : Students recognize behavior as a response of an organism to an internal or environmental stimulus and connect the characteristics and behaviors of an organism to biological adaptation.		
6. <u>Interrelationships of Populations and Ecosystems</u> : Students illustrate populations of organisms and their interconnection within an ecosystem, identifying relationships among producers, consumers, and decomposers.		

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Grade 8 Content Standard: Concepts and Processes		
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7. <u>The Earth in the Solar System</u> : Students describe Earth as the third planet in the Solar System and understand the effects of the sun as a major source of energy, gravitational forces, and motions of objects in the Solar System. 8. <u>The Structure of the Earth System</u> : Students examine the structure of the Earth, identifying layers of the Earth, considering plate movement and its effect, and recognizing landforms resulting from constructive and destructive forces.	Key concepts include the characteristics and movement patterns of objects in the Solar System.	Earth and Space Systems
		8.A.S.1.4 Students describe Earth's features in relation to other objects in the Solar System.
9. <u>The Earth's History</u> : Students systematize the Earth's history in terms of geologic evidence, comparing past and present Earth processes and identifying catastrophic events and fossil evidence.	Key concepts include features on the Earth's surface and the combination of slow and rapid processes that constantly change those features.	8.A.S.1.5 Students demonstrate processes which are evidence of the formation and development of the Earth.
10. <u>The Structure and Properties of Matter</u> : Students identify characteristic properties of matter such as density, solubility, and boiling point and understand that elements are the basic components of matter. 11. <u>Physical and Chemical Changes in Matter</u> : Students evaluate chemical and physical changes, recognizing that chemical change forms compounds with different properties and that physical change alters the appearance but not the composition of a substance. 12. <u>Forms and Uses of Energy</u> : Students investigate energy as a property of substances in a variety of forms with a range of uses.	Key concepts include the conservation of matter in physical and chemical change and the nature of the physical and chemical properties of atoms, matter, molecules, elements, compounds, mixtures, and solutions according to their observable and measurable properties.	Physical System
		8.A.S.1.6 Students identify physical characteristics of a substance.
13. <u>The Conservation of Matter and Energy</u> : Students identify supporting evidence to explain conservation of matter and energy, indicating that matter or energy cannot be created or destroyed but is transferred from one object to another. 14. <u>Effects of Motions and Forces</u> : Students describe motion of an object by position, direction, and speed, and identify the effects of force and inertia on an object.	Key concepts include Newton's laws of motion	8.A.S.1.7 Students demonstrate that pushing and pulling can change the position, direction, and motion of objects.

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Grade 4 Content Standard: Concepts and Processes		
Grade Level Benchmark	Key Concept	Academic
1. <u>Characteristics of Organisms</u> : Students describe observable characteristics of living things, including structures that serve specific functions and everyday behaviors.	Key concepts include living organisms and distinguishing distinct structures and body systems that serve specific functions in growth, reproduction, and survival.	Life Systems
		4.E.S.1.1 Students demonstrate which features of living organisms serve specific functions.
2. <u>Life Cycles of Organisms</u> : Students sequence life cycles of living things, and recognize that plants and animals resemble their parents.	Key concepts include the process of how plants and animals progress through life cycles of birth, growth and development, reproduction and death; and the comparison of fossils to one another and to living organisms to observe their similarities and differences.	4.E.S.1.2 Students describe how plants and animals resemble their parents.
3. <u>Organisms and Their Environments</u> : Students show connections between living things, their basic needs, and the environments.	A key concept is how unique features of plants and animals help them live in different environments	4.E.S.1.3 Students demonstrate which features of living organisms serve specific functions in survival within different habitats.
4. <u>Properties of Earth Materials</u> : Students investigate water, air, rocks, and soils to compare basic properties of earth materials. 5. <u>Objects in the Sky</u> : Students describe observable objects in the sky and their patterns of movement.	Key concepts are the composition and properties of earth materials.	Earth and Space Systems
		4.E.S.1.4 Students describe and compare observable characteristics of water, air, rocks, and soil.
6. <u>Changes in Earth and Sky</u> : Students describe observable changes in earth and sky, including rapid and gradual changes to the earth's surface, and daily and seasonal changes in the weather.		4.E.S.1.5 Students describe gradual changes to the earth's surface.

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Grade 4 Content Standard: Concepts and Processes		
Grade Level Benchmark	Key Concept	Academic
7. <u>Properties of Objects</u> : Students classify objects by properties that can be observed, measured, and recorded, including color, shape, size, weight, volume, texture, and temperature. 8. <u>Changes in States of Matter</u> : Students demonstrate that the processes of heating and cooling can change matter from one state to another. 9. <u>Physical Phenomena</u> : Students investigate physical phenomena commonly encountered in daily life, including light, heat, electricity, sound, and magnetism.	Key concepts include the different states of matter and that each state has distinct physical properties; that some common materials, such as water, can be changed from one state to another by heating or cooling, and the classification of substances by their physical and chemical properties.	Physical Systems
		4.E.S.1.6 Students demonstrate that heating or cooling can change water between a solid or liquid by measuring and recording different observable physical properties.
10. <u>Position and Motion of Objects</u> : Students demonstrate that pushing and pulling can change the position and motion of objects.	Key concepts include sound produced by vibrating objects, which can be characterized by pitch and volume; and the change in the position and motion of an object resulting from pushing or pulling.	4.E.S.1.7 Students demonstrate that pushing or pulling can change the position of objects.