Montana Science Model Curriculum Guide by Grade Level: Grades 6-8 Life Science

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Resources	Three Dimensions		
	Disciplinary Core Ideas (DCI's)	Science and Engineering Practices (SEP's)	Crosscutting Concepts (CCC's)
Paul Anderson Videos: Details on each component of the standards Next Generation Science Standards (NGSS) at National Science Teachers Association (NSTA) Hub: Detailed explanations of the three dimensions, videos of what it looks like in the classroom, curriculum guidance, and classroom resources Evidence Statements: Observations of what students should know and be able to do when they perform the standard. Helpful for formative and summative assessments The Framework: The framework for Montana Science Standards and for the Next Generation Science Standards NGSS Storylines: These storylines explain questions that students should investigating and how by grade level; they paint the big picture of the big ideas STEM Teacher Tools: This site has every resource necessary to implement the new standards *Read more about the three dimensions in the NRC Framework online here (NGSS for States, By States)*	Disciplinary core ideas have the power to focus K–12 science curriculum, instruction and assessments on the most important aspects of science. To be considered core, the ideas should meet at least two of the following criteria and ideally all four: • Have broad importance across multiple sciences or engineering disciplines or be a key organizing concept of a single discipline; • Provide a key tool for understanding or investigating more complex ideas and solving problems; • Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge; • Be teachable and learnable over multiple grades at increasing levels of depth and sophistication. Disciplinary ideas are grouped in four domains: the physical sciences; the life sciences; the earth and space sciences; and engineering, technology and applications of science.	The practices describe behaviors that scientists engage in as they investigate and build models and theories about the natural world and the key set of engineering practices that engineers use as they design and build models and systems. The National Research Council (NRC) uses the term practices instead of a term like "skills" to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Part of the NRC's intent is to better explain and extend what is meant by "inquiry" in science and the range of cognitive, social, and physical practices that it requires. Although engineering design is similar to scientific inquiry, there are significant differences. For example, scientific inquiry involves the formulation of a question that can be answered through investigation, while engineering design involves the formulation of a problem that can be solved through design. Strengthening the engineering aspects of the Next Generation Science Standards will clarify for students the relevance of science, technology, engineering and mathematics (the four STEM fields) to everyday life. (NGSS for States, By States).	Crosscutting concepts have application across all domains of science. As such, they are a way of linking the different domains of science. They include: Patterns, similarity, and diversity; Cause and effect; Scale, proportion and quantity; Systems and system models; Energy and matter; Structure and function; Stability and change. The Framework emphasizes that these concepts need to be made explicit for students because they provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically-based view of the world. (NGSS for States, By States).

Grade 6-8 Life Science

Montana Standard *Students must know and be able to:*	Disciplinary Core Ideas (DCI's)	Science and Engineering Practices (SEP's)	Crosscutting Concepts (CCC's)
conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells MS-LS1-1. NGSS Identifier	LS1.A	planning and carrying out investigations	scale proportion and quantity
develop and use a model to describe the structure and function of a cell as a whole and ways parts of cells contribute to the function MS-LS1-2. NGSS Identifier	LS1.A	developing and using models	structure and function
use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells MS-LS1-3. NGSS Identifier	LS1.A	engaging in argument from evidence	system and system models
construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms MS-LS1-6. NGSS Identifier	LS1.C PS3.D	construct explanations and design solutions	energy and matter: flows, cycles and conservation
develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth, release energy, or both, as this matter moves through an organism MS-LS1-7. NGSS Identifier	LS1.C PS3.D	developing and using models	energy and matter: flows, cycles and conservation
analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem and analyze scientific concepts used by American Indians to maintain healthy relationships with environmental sources MS-LS2-1. NGSS Identifier	LS2.A	analyze and interpret data	cause and effect

develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem MS-LS2-3. NGSS Identifier	LS2.B	developing and using models	energy and matter: flows, cycles and conservation
construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems MS-LS2-2. NGSS Identifier	LS2.A	construct explanations and design solutions	patterns
evaluate competing design solutions for maintaining biodiversity and ecosystem services MS-LS2-5. NGSS Identifier	LS2.C LS4.D ETS1.B	engaging in argument from evidence	stability and change
use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively MS-LS1-4. NGSS Identifier	LS1.B	engaging in argument from evidence	cause and effect
construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth and development of organisms MS-LS1-5. NGSS Identifier	LS1.B	construct explanations and design solutions	cause and effect
develop and use a model to describe why structural changes to genes, such as mutations, may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism MS-LS3-1. NGSS Identifier	LS3.A LS3.B	developing and using models	structure and function
develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation MS-LS3-2. NGSS Identifier	LS1.B LS3.A LS3.B	developing and using models	cause and effect

gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms MS-LS4-5. NGSS Identifier	LS4.B	obtaining, evaluating, and communicating information	cause and effect
analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past MS-LS4-1. NGSS Identifier	LS4.A	analyze and interpret data	patterns
apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships MS-LS4-2. NGSS Identifier	LS4.A	construct explanations and design solutions	patterns
analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy MS-LS4-3. NGSS Identifier	LS4.A	analyze and interpret data	patterns
construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment MS-LS4-4. NGSS Identifier	LS4.B	construct explanations and design solutions	cause and effect
use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time MS-LS4-6. NGSS Identifier	LS4.C	using mathematics & computational thinking	cause and effect