Montana Science Model Curriculum Guide by Grade Level: Grades 6-8 Earth and Space 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 Earth and Space 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)
develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons MS-ESS1-1. NGSS Identifier	ESS1.A ESS1.B	developing and using models	patterns
develop and use a model to describe the role of gravity in the motions within galaxies and the solar system MS-ESS1-2. NGSS Identifier	ESS1.A Ess1.B	developing and using models	system and system models
analyze and interpret data to determine scale properties of objects in the solar system MS-ESS1-3. NGSS Identifier	ESS1.B	analyze and interpret data	scale proportion and quantity
construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6 billion-year-old history MS-ESS1-4. NGSS Identifier	ESS1.C	construct explanations and design solutions	scale proportion and quantity
construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time scales and spatial scales MS-ESS2-2. NGSS Identifier	ESS2.A ESS2.C	construct explanations and design solutions	scale proportion and quantity
analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions MS-ESS2-3. NGSS Identifier	ESS1.A ESS1.B	analyze and interpret data	patterns

develop a model to describe the cycling of earth's materials and the flow of energy that drives this process MS-ESS2-1. NGSS Identifier	ESS2.A	developing and using models	stability and change
develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity MS-ESS2-4. NGSS Identifier	ESS2.C	developing and using models	energy and matter: flows, cycles and conservation
construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes MS-ESS3-1. NGSS Identifier	ESS3.A	construct explanations and design solutions	cause and effect
collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions MS-ESS2-5. NGSS Identifier	ESS2.C ESS2.D	planning and carrying out investigations	cause and effect
develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates MS-ESS2-6. NGSS Identifier	ESS2.C ESS2.D	developing and using models	system and system models
ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century MS-ESS3-5. NGSS Identifier	ESS3.D	asking questions and defining problems	stability and change

analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects MS-ESS3-2. NGSS Identifier	ESS3.B	analyze and interpret data	patterns
apply scientific principles to design a method for monitoring and minimizing a human impact on the environment MS-ESS3-3. NGSS Identifier	ESS3.C	construct explanations and design solutions	cause and effect
construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems including indigenous populations MS-ESS3-4. NGSS Identifier	ESS3.C	engaging in argument from evidence	cause and effect