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# Montana Science Model Curriculum Guide by Grade Level: Grades 6-8 Earth and Space Science

September 2016

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Resources	Three Dimensions		
	<a href="#">Disciplinary Core Ideas (DCI's)</a>	<a href="#">Science and Engineering Practices (SEP's)</a>	<a href="#">Crosscutting Concepts (CCC's)</a>
<p><a href="#">Paul Anderson Videos</a>: Details on each component of the standards</p> <p><a href="#">Next Generation Science Standards (NGSS) at National Science Teachers Association (NSTA) Hub</a>: Detailed explanations of the three dimensions, videos of what it looks like in the classroom, curriculum guidance, and classroom resources</p> <p><a href="#">Evidence Statements</a>: Observations of what students should know and be able to do when they perform the standard. Helpful for formative and summative assessments</p> <p><a href="#">The Framework</a>: The framework for Montana Science Standards and for the Next Generation Science Standards</p> <p><a href="#">NGSS Storylines</a>: These storylines explain questions that students should investigating and how by grade level; they paint the big picture of the big ideas</p> <p><a href="#">STEM Teacher Tools</a>: This site has every resource necessary to implement the new standards</p> <p><i>Read more about the three dimensions in the NRC Framework online <a href="#">here (NGSS for States, By States)</a></i></p>	<p>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:</p> <ul style="list-style-type: none"> <li>• Have broad importance across multiple sciences or engineering disciplines or be a key organizing concept of a single discipline;</li> <li>• Provide a key tool for understanding or investigating more complex ideas and solving problems;</li> <li>• Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge;</li> <li>• Be teachable and learnable over multiple grades at increasing levels of depth and sophistication.</li> </ul> <p>Disciplinary ideas are grouped in four domains: the <a href="#">physical sciences</a>; the <a href="#">life sciences</a>; the <a href="#">earth and space sciences</a>; and <a href="#">engineering, technology and applications of science</a>.</p>	<p>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.</p> <p>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. (<a href="#">NGSS for States, By States</a>).</p>	<p>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. (<a href="#">NGSS for States, By States</a>).</p>

## Grade 6-8 Earth and Space Science

Montana Standard <i>Students must know and be able to:</i>	<a href="#">Disciplinary Core Ideas (DCI's)</a>	<a href="#">Science and Engineering Practices (SEP's)</a>	<a href="#">Crosscutting Concepts (CCC's)</a>
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 <a href="#">MS-ESS1-1</a> . NGSS Identifier	ESS1.A ESS1.B	<a href="#">developing and using models</a>	<a href="#">patterns</a>
develop and use a model to describe the role of gravity in the motions within galaxies and the solar system <a href="#">MS-ESS1-2</a> . NGSS Identifier	ESS1.A Ess1.B	<a href="#">developing and using models</a>	<a href="#">system and system models</a>
analyze and interpret data to determine scale properties of objects in the solar system <a href="#">MS-ESS1-3</a> . NGSS Identifier	ESS1.B	<a href="#">analyze and interpret data</a>	<a href="#">scale proportion and quantity</a>
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 <a href="#">MS-ESS1-4</a> . NGSS Identifier	ESS1.C	<a href="#">construct explanations and design solutions</a>	<a href="#">scale proportion and quantity</a>
construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time scales and spatial scales <a href="#">MS-ESS2-2</a> . NGSS Identifier	ESS2.A ESS2.C	<a href="#">construct explanations and design solutions</a>	<a href="#">scale proportion and quantity</a>
analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions <a href="#">MS-ESS2-3</a> . NGSS Identifier	ESS1.A ESS1.B	<a href="#">analyze and interpret data</a>	<a href="#">patterns</a>

develop a model to describe the cycling of earth's materials and the flow of energy that drives this process <a href="#">MS-ESS2-1</a> . NGSS Identifier	ESS2.A	<a href="#">developing and using models</a>	<a href="#">stability and change</a>
develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity <a href="#">MS-ESS2-4</a> . NGSS Identifier	ESS2.C	<a href="#">developing and using models</a>	<a href="#">energy and matter: flows, cycles and conservation</a>
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 <a href="#">MS-ESS3-1</a> . NGSS Identifier	ESS3.A	<a href="#">construct explanations and design solutions</a>	<a href="#">cause and effect</a>
collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions <a href="#">MS-ESS2-5</a> . NGSS Identifier	ESS2.C ESS2.D	<a href="#">planning and carrying out investigations</a>	<a href="#">cause and effect</a>
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 <a href="#">MS-ESS2-6</a> . NGSS Identifier	ESS2.C ESS2.D	<a href="#">developing and using models</a>	<a href="#">system and system models</a>
ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century <a href="#">MS-ESS3-5</a> . NGSS Identifier	ESS3.D	<a href="#">asking questions and defining problems</a>	<a href="#">stability and change</a>

<p>analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects <a href="#">MS-ESS3-2</a>. NGSS Identifier</p>	<p>ESS3.B</p>	<p><a href="#">analyze and interpret data</a></p>	<p><a href="#">patterns</a></p>
<p>apply scientific principles to design a method for monitoring and minimizing a human impact on the environment <a href="#">MS-ESS3-3</a>. NGSS Identifier</p>	<p>ESS3.C</p>	<p><a href="#">construct explanations and design solutions</a></p>	<p><a href="#">cause and effect</a></p>
<p>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 <a href="#">MS-ESS3-4</a>. NGSS Identifier</p>	<p>ESS3.C</p>	<p><a href="#">engaging in argument from evidence</a></p>	<p><a href="#">cause and effect</a></p>