Montana Science Model Curriculum Guide by Grade Level: Grade 5

September 2016

Montana
Office of Public Instruction
opi.mt.gov Elsie Arntzen, Superintendent

Contents

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 5 Physical 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 a model to communicate that matter is made of particles too small to be seen 5-PS1-1. NGSS Identifier	PS1.A	Developing and Using Models	Scale proportion and quantity
measure and graph quantities to provide evidence that the total mass of matter is conserved regardless of the type of change that occurs when heating, cooling, or mixing substances 5-PS1-2. NGSS Identifier	PS1.A	Using mathematics & Computational Thinking	Scale proportion and quantity
observe and record qualitative and quantitative evidence to support identification of materials based on their properties 5-PS1-3. NGSS Identifier	PS1.A	Planning and carrying out investigations	Scale proportion and quantity
conduct an investigation that produces quantitative and qualitative data to analyze whether the mixing of two or more substances results in new substances 5-PS1-4. NGSS Identifier	PS1.B	Planning and carrying out investigations	Cause and effect
use models to describe that energy in animals' food was once energy from the sun 5-PS3-1. NGSS Identifier	PS3.D	Developing and Using Models	Energy and Matter: Flows, Cycles and Conservation
support an argument that the gravitational force exerted by Earth on objects is directed toward the center of the Earth 5- PS2-1. NGSS Identifier	PS2.B	Engaging in argument from evidence	Cause and effect

Grade 5 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)
support an argument that plants get the materials they need for growth chiefly from air and water 5-LS1-1. NGSS Identifier	LS1.C	Engaging in argument from evidence	Energy and Matter: Flows, Cycles and Conservation
develop and critique a model to describe the movement of matter among plants, animals, decomposers, and the environment 5-LS2-1. NGSS Identifier	LS2.A	Developing and Using Models	System and System Models

Grade 5 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 a model using an example to describe ways the geosphere, biosphere, hydrosphere, or atmosphere interact 5-ESS2-1. NGSS Identifier	ESS2.A	Developing and Using Models	System and System Models
graph and explain the proportion and quantities of water and fresh water in various natural and human-made reservoirs to provide evidence about the distribution of water on Earth 5-ESS2-2. NGSS Identifier	ESS2.C	Using mathematics & Computational Thinking	Scale proportion and quantity

obtain and combine information from various sources about ways individual communities use science ideas to protect the Earth's resources, environment, and systems and describe examples of how American Indians use scientific knowledge and practices to maintain relationships with the natural world 5-ESS3-1. NGSS Identifier	ESS3.C	Obtaining, Evaluating, and Communicating Information	System and System Models
use evidence or models to support the claim that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth 5-ESS1-1. NGSS Identifier	ESS1.A	Engaging in argument from evidence	Scale proportion and quantity
graph the daily changes in the length, shape, and direction of shadows; lengths of day and night; and the seasonal appearance of select stars to communicate the patterns of the Earth's movement and describe how astronomical knowledge is used by American Indians 5-ESS1-2. NGSS Identifier	ESS1.B	Analyze and Interpret data	Patterns