Montana Science Model Curriculum Guide by Grade Level: Grade 4

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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)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 4 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)
use evidence to describe the relationship between the speed of an object and the energy of that object 4- PS3-1. NGSS Identifier	PS3.A	Construct explanations and Design Solutions	Energy and Matter: Flows, Cycles and Conservation
make observations to provide evidence of transfer of energy from place to place by sound, light, heat, and electric currents 4- PS3-2. NGSS Identifier	PS3.A	Planning and carrying out investigations	Energy and Matter: Flows, Cycles and Conservation
ask questions and predict outcomes about the changes in energy that occur when objects collide 4- PS3-3. NGSS Identifier	PS3.A	Asking questions and defining problems	Energy and Matter: Flows, Cycles and Conservation
apply scientific ideas to design, test, and refine a device that converts energy from one form to another 4- PS3-4. NGSS Identifier	PS3.B	Construct explanations and Design Solutions	Energy and Matter: Flows, Cycles and Conservation
develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move 4- PS4-1. NGSS Identifier	PS4.A	Developing and Using Models	Patterns
develop a model communicating that light reflected from objects into the eye allows objects to be seen 4- PS4-2. NGSS Identifier	PS4.B	Developing and Using Models	Cause and effect
generate and compare multiple solutions that use patterns to transfer information 4- PS4-3. NGSS Identifier	PS4.C	Construct explanations and Design Solutions	Patterns

Grade 4 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)
construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction 4- LS1-1. NGSS Identifier	LS1.A	Engaging in argument from evidence	System and System Models
use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways 4- LS1-2. NGSS Identifier	LS1.D	Engaging in argument from evidence	System and System Models

Grade 4 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)
obtain and combine information from a variety of sources to communicate that energy and fuels are derived from natural resources and their uses affect the environment 4- ESS3-1. NGSS Identifier	ESS3.A	Obtaining, Evaluating, and Communicating Information	Cause and effect
identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time 4- ESS1-1. NGSS Identifier	ESS1.C	Construct explanations and Design Solutions	Patterns

make observations or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation 4- ESS2-1. NGSS Identifier	ESS2.A	Planning and carrying out investigations	Cause and effect
analyze and interpret data from maps as evidence to make a claim about patterns of Earth's features 4- ESS2-2. NGSS Identifier	ESS2.B	Analyze and Interpret data	Patterns
generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans 4- E SS3-2. NGSS Identifier	ESS3.B	Engaging in argument from evidence	Cause and effect