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9 S 1	**PHYSICAL SCIENCE**			
9 S 1.1.01	Forces and Motion	Investigate and describe how changes in motion are based on the laws of motion.		
9 S 1.1.02	Forces and Motion	Explain that the force of attraction that exists between two masses is inversely proportional to the square of the distance between them.		
9 S 1.1.03	Forces and Motion	Investigate and describe that the usefulness of a simple machine such as a wheel or axle is based on its function, mechanical advantage, and efficiency.		
9 S 1.1.04	Forces and Motion	Investigate and describe the relationship that exists between force, pressure, and area in general, and between pressure and depth in liquids.		
9 S 1.1.05	Forces and Motion	Investigate and explain that magnetic forces are related to electric forces and can be thought of as different aspects of a single electromagnetic force (e.g., electric motors, generators, radios).		
9 S 1.2.01	Structure and Properties of Matter	Investigate and describe intrinsic (color, odor, density) and extrinsic (e.g., size, mass, volume) physical properties of matter.		
9 S 1.2.02	Structure and Properties of Matter	Explain that substances can be identified on the basis of specific energies given off or taken in by that substance.		
9 S 1.2.03	Structure and Properties of Matter	Explain how atoms may bond with one another by transferring or sharing electrons that are farthest from the nucleus.		
9 S 1.2.04	Structure and Properties of Matter	Explain that the electromagnetic force between the nucleus and electrons holds the atom together.		
9 S 1.2.05	Structure and Properties of Matter	Explain the properties of phases of matter in terms of the kinetic molecular theory and forces of attraction between particles.		
9 S 1.2.06	Structure and Properties of Matter	Explain that carbon atoms can bond to one another to form a large variety of structures, including the molecules essential to life.		
9 S 1.3.01	Energy and Matter - Interactions and Forms	Interactions and Forms: Explain that the transformation of energy usually results in some energy in the form of heat, which spreads by radiation, conduction, and sometimes convection into cooler places.		
9 S 1.3.02	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how pressure may affect changes of state.		
9 S 1.3.03	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how waves can superimpose on one another, bend around corners, reflect off surfaces, be absorbed by materials they enter, and change direction when entering a new material.		
9 S 1.3.04	Energy and Matter - Interactions and Forms	Interactions and Forms: Describe the properties of electrical circuits in terms of moving electrons, conductivity, resistance, and electrical potential energy.		
9 S 1.3.05	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how matter and energy may be changed and energy can be transferred in many ways, but the entire mass-energy budget of the universe remains constant.		
9 S 1.3.06	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how systems tend to become less ordered over time.		
9 S 1.4.01	Chemical Reaction	Investigate and describe how, in chemical reactions, elements combine in predictable ratios, and the numbers of atoms of each element do not change.		
9 S 1.4.02	Chemical Reaction	Investigate and describe how chemical reaction rates depend on conditions in the reacting system, the properties of reacting materials, and the presence of certain rate-regulating chemicals.		
9 S 1.4.03	Chemical Reaction	Investigate and describe how chemical reactions may release or consume energy.		
9 S 1.4.04	Chemical Reaction	Relate the chemical properties of an element to the outermost electrons of an element.		
9 S 1.5.01	Nuclear Energy and Electromagnetic Energy	Predict how light interacts with matter (e.g., reflection and refraction).		
9 S 1.5.02	Nuclear Energy and Electromagnetic Energy	Simulate how the predictable rates of nuclear reactions can be used to estimate the age of some materials.		
9 S 1.5.03	Nuclear Energy and Electromagnetic Energy	Describe the different disposal techniques used for high and low level nuclear wastes.		
9 S 1.5.04	Nuclear Energy and Electromagnetic Energy	Describe electromagnetic waves including a wide range of forms and varying wavelengths.		
9 S 1.5.05	Nuclear Energy and Electromagnetic Energy	Explain how the forces that hold the nucleus of an atom together are usually stronger than other forces that could make the nucleus fly apart.		
9 S 1.5.06	Nuclear Energy and Electromagnetic Energy	Explain how energy is released when the nuclei of very heavy atoms (e.g., uranium or plutonium) split into middleweight ones, or when very light nuclei (e.g., hydrogen and helium) combine into heavier ones.		
9 S 2	**LIFE SCIENCE**			
9 S 2.1.01	Structure and Function	Explain how disease disrupts the equilibrium that exists in a healthy organism.		
9 S 2.1.02	Structure and Function	Explain how the human body has a specialized anatomy and physiology composed of an hierarchical arrangement of differentiated cells.		
9 S 2.1.03	Structure and Function	Investigate and describe how food molecules are broken down through a series of chemical reactions to provide energy and the material to make new molecules.		

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9 S 2.1.04	Structure and Function	Investigate and describe how every cell is covered by a cell membrane and most cells also have specialized parts for the transport of materials, energy, transfer, protein building, waste disposal, information feedback, and movement.		
9 S 2.1.05	Structure and Function	In photosynthesis, plants and many microorganisms use solar energy to combine molecules of carbon dioxide and water to form energy rich compounds and oxygen.		
9 S 2.2.01	Internal and External Influences on Organisms	Investigate and describe how some broad patterns of behavior exhibited by animals have evolved to ensure survival of the species.		
9 S 2.2.02	Internal and External Influences on Organisms	Investigate and describe how plant and animals have mechanisms that allow them to respond to changes in their environment.		
9 S 2.2.03	Internal and External Influences on Organisms	Investigate and describe how multicellular animals have nervous systems that receive input through sensory organs and generate behavioral responses.		
9 S 2.2.04	Internal and External Influences on Organisms	Explain how certain viral diseases make the body vulnerable to multiple infectious agents and cancerous cells by destroying critical cells of the immune system.		
9 S 2.3.01	Heredity and Diversity	Explain how all body cells in an organism are developed from a single cell and contain essentially identical genetic instructions. Explain how different parts of the instruction are used in different kinds of cells.		
9 S 2.3.02	Heredity and Diversity	Explain how relatedness among organisms can be estimated from the similarity of their DNA sequences.		
9 S 2.3.03	Heredity and Diversity	Investigate and describe how sorting and recombination of genes in sexual reproduction results in a great variety of possible gene combinations.		
9 S 2.3.04	Heredity and Diversity	Explain how genetic information from parents is encoded in DNA molecules and provides instruction for assembling protein molecules.		
9 S 2.3.05	Heredity and Diversity	Investigate and describe how patterns of inheritance are described by laws of segregation and independent assortment.		
9 S 2.3.06	Heredity and Diversity	Explain how diversity of species and variation among organisms within a species increase the chances for survival of life when large changes occur in the environment.		
9 S 2.3.07	Heredity and Diversity	Explain how gene mutations may be caused by a variety of influences, when mutations occur in sex cells, they can be passed on to offspring.		
9 S 2.4.01	Evolution - Process of Biological Change	Investigate and describe the basic idea of the theory of biological evolution is that through genetic and/or environmental influences Earth's present-day species developed from earlier, distinctly different, but common ancestors.		
9 S 2.4.02	Evolution - Process of Biological Change	Explain the fossil record of ancient life forms by applying the idea of natural selection and its evolutionary consequences.		
9 S 2.4.03	Evolution - Process of Biological Change	Simulate and explain how the adaptation of a species can occur over many generations because of the unique characteristics that favor those individuals in an environment.		
9 S 2.4.04	Evolution - Process of Biological Change	Explain how the classification of species is based on similarities (e.g., structural, genetic, molecular) which indicate evolutionary relationships.		
9 S 2.4.05	Evolution - Process of Biological Change	Explain how the extinction of species is a common occurrence and fossil records indicate that most species that have lived on Earth no longer exist.		
9 S 2.4.06	Evolution - Process of Biological Change	Investigate and describe how the process of evolution is driven by genetic and environmental influences.		
9 S 2.4.07	Evolution - Process of Biological Change	Explain how there is evidence that at least a billion years ago, cells with nuclei existed allowing the evolution of increasingly complex multicellular organisms.		
9 S 3	**EARTH AND SPACE SCIENCES**			
9 S 3.1.01	Earth Structures and Composition	Investigate and describe how rocks and minerals have different characteristics that reflect their origins and use.		
9 S 3.1.02	Earth Structures and Composition	Investigate and describe how landforms are the result of a combination of constructive and destructive forces resulting from weathering, erosion, and the movement of lithosphere plates.		
9 S 3.1.03	Earth Structures and Composition	Explain how there is a relationship between the relative densities and states (phases) of Earth materials and the layering on, in, and above Earth.		
9 S 3.1.04	Earth Structures and Composition	Investigate and describe how soil is derived from weathered rocks and decomposed organic material, and is found in layers.		
9 S 3.1.05	Earth Structures and Composition	Explain how the composition of Earth's atmosphere has changed in the past and continues to change.		
9 S 3.1.06	Earth Structures and Composition	Compare and contrast the geologic features of Montana and local geological features.		
9 S 3.2.01	Earth Models	Investigate, design, and use contour maps.		
9 S 3.2.02	Earth Models	Define location on Earth in terms of latitude, longitude, and time zones.		
9 S 3.3.01	Earth History	Explain how catastrophic events have occurred and greatly influenced Earth's history.		
9 S 3.3.02	Earth History	Simulate and explain how relative geologic time can be estimated by observing rock sequences and using fossils to correlate the sequences at various locations.		
9 S 3.3.03	Earth History	Compare and contrast the variety of methods by which geologic time is determined, including radioactive dating.		
9 S 3.4.01	Cycles of Matter and Energy	Explain how Earth systems have two major internal sources of energy (decay of radioactive isotopes and the gravitational energy from Earth's original formation) and one major external sources (the sun), all of which create heat.		

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9 S 3.4.02	Cycles of Matter and Energy	Explain how uneven heating of Earth's surface by the sun forms convection currents within the atmosphere and ocean, producing wind and ocean currents that are modified by Earth's rotation.		
9 S 3.4.03	Cycles of Matter and Energy	Investigate and describe how water is a solvent (e.g., how it dissolves minerals and gases as it passes through the water cycle and carries them to oceans and lakes).		
9 S 3.4.04	Cycles of Matter and Energy	Simulate and describe how global climate is determined primarily by energy transfer from the sun at and near Earth's surface, and fluctuations in solar output may have contributed to large changes in Earth's climate in the past.		
9 S 3.4.05	Cycles of Matter and Energy	Explain how large-scale, long-term equilibrium can accommodate small-scale changes.		
9 S 3.4.06	Cycles of Matter and Energy	Investigate and describe how elements necessary for life on Earth pass through both living and nonliving cycles in a series of changes that form a global system.		
9 S 3.4.07	Cycles of Matter and Energy	Compare and contrast the relationships between the greenhouse effect and the idea of global warming.		
9 S 3.4.08	Cycles of Matter and Energy	Model and explain how the energy that propels Earth's lithosphere plates is dominantly a result of nuclear processes deep in Earth.		
9 S 3.5.01	Solar System and Universe	Investigate and describe how Earth's atmosphere, water, temperature, and composition compare with conditions on other planets.		
9 S 3.5.02	Solar System and Universe	Explain how most objects in the solar system are in regular and predictable motion which explains such phenomena as the day, the year, phases of the moon, and eclipses.		
9 S 3.5.03	Solar System and Universe	Explain how stars produce energy and elements heavier than hydrogen from nuclear reactions.		
9 S 3.5.04	Solar System and Universe	Explain that on the basis of scientific evidence, the universe is estimated to be about ten billion years old.		
9 S 3.5.05	Solar System and Universe	Describe how increasingly sophisticated technology (e.g., mathematical models and computer simulations) is used to learn about the universe.		
9 S 3.5.06	Solar System and Universe	Explain that the physical laws, such as laws of Newton, Kepler, thermodynamics, relativity, and quantum physics, appear to apply to all bodies in the universe.		
9 S 4	**ENVIRONMENTAL SCIENCES**			
9 S 4.1.01	Ecosystems	Investigate and describe how changes in an ecosystem can affect biodiversity and biodiversity contributes to an ecosystem's stability.		
9 S 4.1.02	Ecosystems	Investigate and describe how ecosystems change or remain the same in response to different kinds of influences.		
9 S 4.1.03	Ecosystems	Investigate and describe how materials and energy are cycled and recycled through ecosystems via pathways known as food webs.		
9 S 4.1.04	Ecosystems	Describe the unique geologic, hydrologic, climatic, and biological characteristics of Montana's bioregions.		
9 S 4.2.01	Natural Resources	Evaluate the consequences of changing patterns of resources use.		
9 S 4.2.02	Natural Resources	Investigate and describe the various processes involved in obtaining, using, and recycling materials such as wood products, minerals, food, and manufactured objects.		
9 S 4.2.03	Natural Resources	Investigate and describe the career opportunities associated with the study, exploration, extraction, utilization, protection, and restoration of natural resources.		
9 S 4.2.04	Natural Resources	Analyze and describe the limitations of the Earth's ability to respond to stresses produced by human or natural activities.		
9 S 4.2.05	Natural Resources	Analyze and evaluate the effects that increases in human populations can cause (e.g., resource depletion and environmental degradation).		
9 S 4.3.01	Conservation	Analyze and evaluate how consumption patterns, conservation efforts, and cultural or social practices in countries have varying environmental impacts.		
9 S 4.3.02	Conservation	Investigate and describe how human actions may impact the dynamic equilibrium of global systems (e.g., global warming, ozone depletion).		
9 S 4.3.03	Conservation	Explain that there is scientific uncertainty regarding many environmental issues.		
9 S 4.3.04	Conservation	Evaluate and describe actions which affect the global environment in terms of trade-offs that may have effects on local environments or economics.		
9 S 5	**THE NATURE AND HISTORY OF SCIENCE**			
9 S 5.1.01	Scientific, Historical, and Technological Perspectives	Explain that the scientific way of knowing uses a critique and consensus process (e.g., peer review, openness to criticism, logical argument, skepticism).		
9 S 5.1.02	Scientific, Historical, and Technological Perspectives	Investigate and explain how research emphasis is influenced by economic and public policy.		
9 S 5.1.03	Scientific, Historical, and Technological Perspectives	Investigate and explain how scientific innovations that were originally challenged are now widely accepted.		
9 S 5.1.04	Scientific, Historical, and Technological Perspectives	Explain that scientists work with others to resolve differences in interpretation of observations.		

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9 S 5.1.05	Scientific, Historical, and Technological Perspectives	Explain that technological problems create a demand for new scientific knowledge and new technologies which make it possible for scientists to extend their research in new ways or to undertake entirely new lines of research.		
9 S 5.1.06	Scientific, Historical, and Technological Perspectives	Explain that scientific knowledge builds on previous information, and rarely are entire theories completely discarded in favor of new ones.		
9 S 5.1.07	Scientific, Historical, and Technological Perspectives	Explain that scientists have ethical procedures, violations of which have consequences.		
9 S 5.2.01	Reasoning and Critical Response Skills	Identify and determine the credibility of sources of information based on the techniques used to gather that information.		
9 S 5.2.02	Reasoning and Critical Response Skills	Apply cost benefit and risk analyses in decision-making processes.		
9 S 5.2.03	Reasoning and Critical Response Skills	Recognize and describe situations in which a system is qualitatively different from the parts which comprise it (e.g., how a population differs from an individual).		
9 S 5.2.04	Reasoning and Critical Response Skills	Distinguish among hypotheses, laws, theories, and rules, and explain the level of their limitations.		
9 S 5.2.05	Reasoning and Critical Response Skills	Determine the limits of generalizations, assumptions, analogies, and models.		
9 S 6	**SCIENTIFIC INQUIRY: PROCESSES AND SKILLS**			
9 S 6.1.01	Systems, Models, Risk, and Predictions	Use mathematical symbols and formulas to express relationships that behave in the same ways as the objects or processes under investigation.		
9 S 6.1.02	Systems, Models, Risk, and Predictions	Use models to identify and predict cause-effect relationships (e.g., effect of temperature on gas volume, effect of carbon dioxide level on the greenhouse effect).		
9 S 6.1.03	Systems, Models, Risk, and Predictions	Identify and describe how systems are often different from their components (e.g., aquaria or automobiles).		
9 S 6.1.04	Systems, Models, Risk, and Predictions	Compare groups of data, taking into account both percentages and actual numbers.		
9 S 6.1.05	Systems, Models, Risk, and Predictions	Identify the type of hazard, estimate the extent and consequences of exposure, and determine the options for reducing or eliminating risks.		
9 S 6.2.01	Scientific Values and Attitudes	Demonstrate curiosity, honesty, and skepticism in doing science.		
9 S 6.2.02	Scientific Values and Attitudes	Repeat experimentation for statistical analysis and to produce conclusions that are without bias.		
9 S 6.2.03	Scientific Values and Attitudes	Evaluate multiple explanations for the same evidence.		
9 S 6.3.01	Communication Skills	Analyze experimental procedures and suggest appropriate revisions for improvement.		
9 S 6.3.02	Communication Skills	Use tables, charts, and graphs in making arguments and claims in oral and written presentations.		
9 S 6.3.03	Communication Skills	Discuss scientific topics by restating or summarizing accurately what others have said; ask for clarifications or elaborations, and express alternative positions using available multimedia resources.		
9 S 6.4.01	Scientific Applications of Mathematics	Determine if the correlation between variables is high or low.		
9 S 6.4.02	Scientific Applications of Mathematics	Use algebraic equations when appropriate.		
9 S 6.4.03	Scientific Applications of Mathematics	Estimate answers to the correct order of magnitude.		
9 S 6.4.04	Scientific Applications of Mathematics	Use derived quantities, ratios, proportions, and constants.		
9 S 6.4.05	Scientific Applications of Mathematics	Trace the source of differences between an estimate and the calculated answer that exceeds agreed-upon standards for precision.		
9 S 6.4.06	Scientific Applications of Mathematics	Select samples by some random system to avoid bias.		
9 S 6.5.01	Laboratory Skills and Safety	Demonstrate personal responsibility for using safety equipment and observing all safety standards.		
9 S 6.5.02	Laboratory Skills and Safety	Use the information found in materials safety data sheets to handle, store, and dispose of chemicals properly.		
9 S 6.5.03	Laboratory Skills and Safety	Inspect, manipulate, and describe the functions of various parts of technical and scientific equipment.		
9 S 6.5.04	Laboratory Skills and Safety	Maintain a permanent record of procedures, data, analyses, decisions, and understandings of scientific investigations.		
9 S 6.5.05	Laboratory Skills and Safety	Write procedures for the investigation of delegated or original scientific problems.		
9 S 6.5.06	Laboratory Skills and Safety	Carry out an independent scientific investigation.		