

Identifier	Poplar - Grade 8 - Science		Introduced	Completed
8 S 1	PHYSICAL SCIENCE			
8 S 1.1.01	Forces and Motion	Investigate and describe that multiple forces acting on an object along a straight line affect the motion of an object.		
8 S 1.1.02	Forces and Motion	Describe the force (gravity) which makes objects fall and planets move in their orbits.		
8 S 1.1.03	Forces and Motion	Investigate and describe that certain physical principles are used in the design and function of simple machines.		
8 S 1.1.04	Forces and Motion	Investigate and describe that buoyancy changes the apparent weight of an object immersed in a fluid.		
8 S 1.1.05	Forces and Motion	Investigate and explain that electric current produces magnetic forces, and moving magnets produce electric forces in conductors.		
8 S 1.2.01	Structure and Properties of Matter	Use simple models to explain observed properties of matter (e.g., use a particle model to account for the states of matter).		
8 S 1.2.02	Structure and Properties of Matter	Separate substances based on their physical and chemical properties (e.g., color, solubility, chemical reactivity, melting point, boiling point).		
8 S 1.2.03	Structure and Properties of Matter	Use models or drawings to explain how atoms may join together to form molecules or large groups of molecules.		
8 S 1.2.04	Structure and Properties of Matter	Explain that all atoms are made up of protons, neutrons, and electrons.		
8 S 1.2.05	Structure and Properties of Matter	Explain that liquids, solids, and gases are systems of particles.		
8 S 1.2.06	Structure and Properties of Matter	Explain that various elements combine in a multitude of ways to produce all known living and nonliving substances.		
8 S 1.3.01	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how heat moves from one object to another at different rates, depending on what the objects are made of and whether they are touching each other.		
8 S 1.3.02	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how all phase changes are accompanied by changes in energy.		
8 S 1.3.03	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how waves transfer energy and move at different speeds in different materials.		
8 S 1.3.04	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate, create, and describe parallel, series, and combination circuits.		
8 S 1.3.05	Energy and Matter - Interactions and Forms	Interactions and Forms: Investigate and describe how energy may be transferred into or out of a system or object in many ways and readily changes forms.		
8 S 1.3.06	Energy and Matter - Interactions and Forms	Interactions and Forms: Identify the energy involved in a particular process as potential (energy of position and stored chemical energy) or kinetic (energy of motion).		
8 S 1.4.01	Chemical Reaction	Investigate and describe how in chemical reactions, the total mass is conserved and the elements involved do not change into other elements.		
8 S 1.4.02	Chemical Reaction	Investigate and describe how the rate of a chemical reaction can be influenced by variables such as temperature, pH, and light.		
8 S 1.4.03	Chemical Reaction	Investigate and describe how materials may give off heat or light when they react chemically with each other.		
8 S 1.4.04	Chemical Reaction	Predict common properties of elements using the periodic table.		
8 S 1.5.01	Nuclear Energy and Electromagnetic Energy	Investigate and describe how light interacts with matter by moving through the matter, being absorbed by matter, or being scattered by the matter.		
8 S 1.5.02	Nuclear Energy and Electromagnetic Energy	Describe some applications of radioactive isotopes including using nuclear energy to produce heat.		
8 S 1.5.03	Nuclear Energy and Electromagnetic Energy	Compare and contrast between high and low level nuclear wastes and their associated hazards.		
8 S 1.5.04	Nuclear Energy and Electromagnetic Energy	Investigate and describe how the sun produces energy in a range of wavelengths within the electromagnetic spectrum.		
8 S 1.5.05	Nuclear Energy and Electromagnetic Energy	Compare and contrast the nuclear processes that occur in the sun and stars as well as in nuclear reactors.		
8 S 1.5.06	Nuclear Energy and Electromagnetic Energy	Explain how nuclear reactions convert small amounts of matter into a relatively large amount of energy.		
8 S 2	LIFE SCIENCE			
8 S 2.1.01	Structure and Function	Explain how disease is a breakdown in structures or functions of an organism due to intrinsic system failures or damage caused by infection.		
8 S 2.1.02	Structure and Function	Investigate and describe how multicellular living things have tissues, organs, and organ systems that are specialized to perform life functions.		
8 S 2.1.03	Structure and Function	Investigate and describe how cells, grow, divide, and take in nutrients, which they use to provide energy for cellular functions.		
8 S 2.1.04	Structure and Function	Investigate and describe how most organisms are composed of a single cell and others are multicellular.		
8 S 2.1.05	Structure and Function	Investigate and describe how plants have specialized structures and systems for a variety of functions.		
8 S 2.1.06	Structure and Function	Explain how information used to guide cellular functions is stored in DNA.		

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8 S 2.2.01	Internal and External Influences on Organisms	Explain how behavior may be innate or learned.		
8 S 2.2.02	Internal and External Influences on Organisms	Explain how an organism's behavior is based on experience and on the species' evolutionary history.		
8 S 2.2.03	Internal and External Influences on Organisms	Investigate and describe how behavior is one kind of response an organism can make to an internal or environmental stimulus.		
8 S 2.2.04	Internal and External Influences on Organisms	Explain how various viruses, bacteria, fungi, and parasites may infect the human body and interfere with normal body functions.		
8 S 2.3.01	Heredity and Diversity	Explain how heredity is the passage of genetic instructions from one generation to another.		
8 S 2.3.02	Heredity and Diversity	Classify organisms on the basis of similar characteristics, and explain the basis for such a classification system.		
8 S 2.3.03	Heredity and Diversity	Explain how new varieties of cultivated plants and domestic animals have resulted from selective breeding for particular traits.		
8 S 2.3.04	Heredity and Diversity	Explain how genetic information coded in DNA is passed through sexual or asexual reproduction.		
8 S 2.3.05	Heredity and Diversity	Explain how some patterns of inheritance can be explained by pairs of genes that separate when sex cells are formed.		
8 S 2.3.06	Heredity and Diversity	Identify that the basic level of biological classification is the species, which comprises all organisms that can mate with each other and produce fertile offspring.		
8 S 2.3.07	Heredity and Diversity	Explain how changes in the genes of sex cells can affect offspring.		
8 S 2.4.01	Evolution - Process of Biological Change	Explain that millions of species of animals, plants, and microorganisms are alive today.		
8 S 2.4.02	Evolution - Process of Biological Change	Investigate and describe how biological evolution provides a scientific explanation for the differences and many similarities between species.		
8 S 2.4.03	Evolution - Process of Biological Change	Investigate and describe how biological adaptations include changes that enhance survival and reproductive success in a particular environment.		
8 S 2.4.04	Evolution - Process of Biological Change	Investigate and describe how unity among organisms is found in similarities of internal structures, chemical processes, and modern evidence of common ancestry.		
8 S 2.4.05	Evolution - Process of Biological Change	Explain how extinction of a species occurs when the adaptive characteristics of a species are insufficient to allow it to survive environmental change.		
8 S 3	EARTH AND SPACE SCIENCES			
8 S 3.1.01	Earth Structures and Composition	Investigate and describe how rocks and minerals have different properties and characteristics.		
8 S 3.1.02	Earth Structures and Composition	Investigate and describe how the combination of constructive and destructive forces result in the formation of landforms.		
8 S 3.1.03	Earth Structures and Composition	Explain, using models, how Earth is layered with a crust, both continental and oceanic; hot, convecting mantle; and dense, metallic core.		
8 S 3.1.04	Earth Structures and Composition	Investigate and describe how soils have properties of color, texture, and capacity to retain water and provide nutrients for life.		
8 S 3.1.05	Earth Structures and Composition	Explain how the atmosphere is a mixture of particular gases, whose properties vary with elevation.		
8 S 3.1.06	Earth Structures and Composition	Explain that earthquakes, landslides, volcanoes, and floods are geologic phenomena.		
8 S 3.2.01	Earth Models	Describe how positions on Earth's surface can be located using latitude and longitude.		
8 S 3.2.02	Earth Models	Compare a variety of map types, and locate Montana and Montana features on each.		
8 S 3.2.03	Earth Models	Use a color-coded map to compare and contrast various geological features such as temperature, population density, geology, or precipitation.		
8 S 3.2.04	Earth Models	Identify the time of day in various places throughout the world, given the local time of day.		
8 S 3.3.01	Earth History	Explain how some changes on Earth's surface are due to slow processes and others due to rapid processes.		
8 S 3.3.02	Earth History	Investigate and describe how fossils provide important evidence of how life and environmental conditions have changed throughout geologic time.		
8 S 3.3.03	Earth History	Explain how Earth's processes we observe today are similar to those that occurred in the past.		
8 S 3.4.01	Cycles of Matter and Energy	Investigate and describe how the sun is the major source of energy for phenomena on Earth's surface (e.g., growth of plants, winds, ocean currents, and the water cycle).		
8 S 3.4.02	Cycles of Matter and Energy	Explain how global patterns of atmospheric movement, topography, and proximity to bodies of water influence local weather, and seasons are caused by variations in the amount of the sun's energy hitting the surface due to the tilt of Earth's axis.		
8 S 3.4.03	Cycles of Matter and Energy	Explain how water, which covers the majority of Earth's surface, circulates through the crust, oceans, and atmosphere.		

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8 S 3.4.04	Cycles of Matter and Energy	Simulate and describe how clouds, latitude, altitude, topographical features, and proximity to large bodies of water affect weather and climate.		
8 S 3.4.05	Cycles of Matter and Energy	Investigate and describe some changes that are reversible and others that are not.		
8 S 3.4.06	Cycles of Matter and Energy	Explain that the energy that Earth receives over geologic time approximately equals the energy that it loses.		
8 S 3.4.07	Cycles of Matter and Energy	Describe the relationships among geothermal and tectonic processes.		
8 S 3.5.01	Solar System and Universe	Investigate and describe the size, composition, and surface features of the planets in our solar system.		
8 S 3.5.02	Solar System and Universe	Investigate and describe how seasons, eclipses, moon phases, and tides are caused by the effects of relative motion and positions of the sun, Earth, and moon.		
8 S 3.5.03	Solar System and Universe	Explain that billions of galaxies form most of the visible mass in the universe.		
8 S 3.5.04	Solar System and Universe	Explain how various tools (e.g., optical and radio telescopes, unmanned robotic spacecraft) allow us to investigate objects in the sky that are too distant, faint, or bright to observe directly from Earth.		
8 S 3.5.05	Solar System and Universe	Investigate and describe the laws of motion and gravity and their development.		
8 S 4	ENVIRONMENTAL SCIENCES			
8 S 4.1.01	Ecosystems	Investigate and describe how living and nonliving components of ecosystems interact in various ways.		
8 S 4.1.02	Ecosystems	Characterize organisms in any ecosystems by their function.		
8 S 4.1.03	Ecosystems	Investigate and describe how the major energy source in most ecosystems is sunlight which is converted by producers into chemical energy.		
8 S 4.1.04	Ecosystems	Describe how geographically distinct ecosystems on Earth have similarities and differences.		
8 S 4.2.01	Natural Resources	Investigate and describe the identifying characteristics of renewable and nonrenewable resources.		
8 S 4.2.02	Natural Resources	Explain how some natural resources are limited in their abundance and/or accessible location (e.g., water in the desert).		
8 S 4.2.03	Natural Resources	Investigate and describe the location and distribution of various natural resources.		
8 S 4.2.04	Natural Resources	Investigate and describe how organisms alter their local environment through their use of natural resources.		
8 S 4.2.05	Natural Resources	Describe how unintended consequences of technologies can cause resource depletion and environmental degradation, but technology can also increase resource availability, mitigate environmental degradation, and make new resources economical.		
8 S 4.3.01	Conservation	Analyze different conservation options for Montana's resources.		
8 S 4.3.02	Conservation	Investigate and describe how in some ecosystems, populations of organisms are in dynamic equilibrium, and in other ecosystems they are not.		
8 S 4.3.03	Conservation	Evaluate how changes in environments can be beneficial or harmful.		
8 S 4.3.04	Conservation	Investigate and describe how actions which might affect Montana's environment can be evaluated in terms of trade-offs that may have regional, national, or global effects.		
8 S 5	THE NATURE AND HISTORY OF SCIENCE			
8 S 5.1.01	Scientific, Historical, and Technological Perspectives	Explain that scientific investigations involve the use of logic, respect for the rules of evidence, openness to criticism, and public reporting of methods and procedures.		
8 S 5.1.02	Scientific, Historical, and Technological Perspectives	Explain that scientific inquiry done in a school setting is similar to what scientists do.		
8 S 5.1.03	Scientific, Historical, and Technological Perspectives	Explain, using examples, that ancient peoples provided knowledge about the natural world that is still regarded as valid today, even though that knowledge may not have originated by scientific methods.		
8 S 5.1.04	Scientific, Historical, and Technological Perspectives	Explain that scientists may work in teams and some may work alone, but all communicate extensively with each other.		
8 S 5.1.05	Scientific, Historical, and Technological Perspectives	Explain that scientific inquiry and technological design have similarities and differences. Scientists propose explanations for questions about the natural world and engineers propose solutions relating to human problems, needs, and aspirations.		
8 S 5.1.06	Scientific, Historical, and Technological Perspectives	Explain that scientific knowledge is revised through a process of incorporating new evidence gained through continual investigation.		
8 S 5.1.07	Scientific, Historical, and Technological Perspectives	Identify and describe how science is subject to strengths and limitations related to other human social and intellectual activities.		
8 S 5.2.01	Reasoning and Critical Response Skills	Identify and evaluate critically the use of statistics, data, and graphs.		

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8 S 5.2.02	Reasoning and Critical Response Skills	Give examples of human activities with their associated benefits, costs, and risks.		
8 S 5.2.03	Reasoning and Critical Response Skills	Analyze and describe a system for efficiency, optimal function, and possible sources of malfunction.		
8 S 5.2.04	Reasoning and Critical Response Skills	Critically evaluate information to distinguish between fact and opinion when responding to information.		
8 S 6	SCIENTIFIC INQUIRY: PROCESSES AND SKILLS			
8 S 6.1.01	Systems, Models, Risk, and Predictions	Investigate and describe how different models can be used to demonstrate the same thing.		
8 S 6.1.02	Systems, Models, Risk, and Predictions	Use a model to predict change (e.g., stream table).		
8 S 6.1.03	Systems, Models, Risk, and Predictions	Identify and illustrate natural cycles within systems (e.g., water, planetary motion, climate, geological changes).		
8 S 6.1.04	Systems, Models, Risk, and Predictions	Analyze data from two groups, comparing both their middles and ranges.		
8 S 6.1.05	Systems, Models, Risk, and Predictions	Use a systematic approach to thinking critically about risks and benefits.		
8 S 6.2.01	Scientific Values and Attitudes	Explain why it is important to keep honest, clear, and accurate records.		
8 S 6.2.02	Scientific Values and Attitudes	Explain that hypotheses are valuable even if they turn out to be incorrect, if they lead to fruitful investigations.		
8 S 6.2.03	Scientific Values and Attitudes	Describe how different explanations can often be given for the same evidence, and it is not always possible to tell which one is correct.		
8 S 6.3.01	Communication Skills	Write clear, step-by-step instructions for a procedure.		
8 S 6.3.02	Communication Skills	Organize information in tables and graphs and describe the relationships they reveal.		
8 S 6.3.03	Communication Skills	Discuss scientific topics by paraphrasing, asking for clarification or elaboration, and expressing alternative positions using available multimedia resources.		
8 S 6.4.01	Scientific Applications of Mathematics	Explain that quantities can vary in proportion to one another (e.g., the ratio of mass to volume in the calculation of density).		
8 S 6.4.02	Scientific Applications of Mathematics	State the purpose of each step in a calculation.		
8 S 6.4.03	Scientific Applications of Mathematics	Estimate probabilities of outcomes in familiar situations.		
8 S 6.4.04	Scientific Applications of Mathematics	Select and use the appropriate SI unit for a particular measurement (e.g., meters for length, seconds for time, and kilograms for mass).		
8 S 6.4.05	Scientific Applications of Mathematics	Judge whether repeated measurements and computations of quantities are reasonably precise and accurate.		
8 S 6.4.06	Scientific Applications of Mathematics	Make predictions based on all known data from similar conditions.		
8 S 6.5.01	Laboratory Skills and Safety	Use instruments and laboratory safety equipment properly.		
8 S 6.5.02	Laboratory Skills and Safety	Handle and dispose of chemicals according to established standards.		
8 S 6.5.03	Laboratory Skills and Safety	Choose appropriate common materials for making and repairing simple mechanical constructions.		
8 S 6.5.04	Laboratory Skills and Safety	Keep an organized record of scientific investigations.		
8 S 6.5.05	Laboratory Skills and Safety	Use appropriate technology in laboratory procedures for measuring, recording, and analyzing data (e.g., computers, graphing calculators, and probes).		
8 S 6.5.06	Laboratory Skills and Safety	Design a controlled experiment.		