

Enduring Understanding # 1: Scientific inquiry affords all learners opportunities to make observations, pose questions, develop hypotheses, design and conduct investigations, and analyze data to draw conclusions.

### Grade Seven Benchmarks

Students will understand	Essential Questions	Students will know the/that	Students will be able to	Notes
<p><b>1.1 Questioning:</b> Scientists use observations to pose questions about the world around them.</p>	<p>-How are the generated problem, knowledge and content relevant to me? -What do I need to inquire about? -What questions do my observations generate? -How do we move from observation to generating questions?</p>	<p>-Questions begin investigations. -Good questions are many and varied and should be edited as a common practice. -Questioning begins with observation and then generates research.</p>	<p>-Question for a purpose based on their observations. -Hypothesize reasonable outcomes based on observations. -Use Hypotheses to guide the investigation toward reasonable outcomes. -Classify, infer, analyze, &amp; Generalize.</p>	<p>-Inquiry is a process that progresses from teacher-directed to learner self-directed. -Inquiry teamed with other practices results in a better understanding of science.</p>
<p><b>1.2 Investigating:</b> Scientists use an inquiry process to find answers to questions.</p>	<p>-Why is this investigation important? What is in it for me? -What can I do with this knowledge? -What steps do I need to create new information</p>	<p>-Inquiry is an iterative process.</p>	<p>-Observe purposefully and independently in order to help design their own investigations. -Base their results and conclusions on their own data and observations.</p>	
<p><b>1.3 Data Collection &amp; Analyzing:</b> Scientists collect, measure, analyze, and organize their data in logical ways as part of a scientific process.</p>	<p>-How do I assess what I know and what I need to find out? -What resources are applicable to answering the question?</p>	<p>-An answer leads to more questions. -Resources are available to help answer questions.</p>	<p>-Determine which information is relevant. -Evaluate resources. -Infer, analyze and interpret data to draw conclusions. -Measure and record accurate data. -Use appropriate measurement tools, tables, graphs, and charts</p>	
<p><b>1.4 Communicating:</b> Scientists routinely communicate and collaborate with others in an attempt to build knowledge and understanding.</p>	<p>-How do I collaborate with others? -What information is relevant to share with others?</p>	<p>-Collaboration takes place in all steps of the inquiry process. -Listening, thinking and sharing takes place in collaboration.</p>	<p>-Compare findings collaboratively. -Present findings in a variety of formats. -Accept suggestions from peers to improve investigations.</p>	

Enduring Understanding # 2: Exploring systems, order, and organizations in our natural and designed world are integral to understanding the scientific disciplines and their interdependence.

**Grade Seven Benchmarks**

Students will understand	Essential Questions	Students will know the/that	Students will be able to	Notes
<b>Strand 1: Metric System of Measurement and Safety</b>				
2.1 The standard system of measurement in the scientific world is the metric system.	-How can we measure matter using the metric system?	-Prefixes used in the metric system. -Basic units of measurement in the metric system.	-Linear measure with meter stick. -Measure volume using graduated cylinders. -Measure mass using a balance. -Calculate volume by displacement. -Convert between units of measure. -Calculate density.	
<b>Strand 2: Biology - Cells: Structure and Function</b>				
2.2 Cells are the basic unit of structure.	-How does one determine if something is living or nonliving? -How are prokaryotic and eukaryotic cells similar and different?	-Characteristics of living things. -Components of the cell theory.	-Identify the characteristics of living things.	
2.3 Plant and animal cells have distinct differences.	-How are plant and animals cells similar and different?	- Organelles in cells including: Nucleus, Mitochondria, Ribosomes, Endoplasmic Reticulum, Vacuoles, Centrioles, Lysosomes, Chloroplast, Cell Membrane, Plasma Membrane.	-Locate and name cell organelles. -Distinguish between plant and animal cells using a compound microscope.	
2.4 Living things are systematically classified	-What is the importance of classification?	-Classification systems consist of kingdoms or domains. -Kingdoms consist of Moneran, Protists, Fungi, Plant, and Animal.	-Identify and classify protists using a microscope. -Draw and label protists viewed under the microscope. -Use and construct a Dichotomous key.	
2.5 Cells are the basic unit of function.	-Why is cellular function essential to life?	-Osmosis, diffusion, respiration, cellular reproduction. -Mitosis & meiosis.	-Explain the function of the organelles by observing its structure.	

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### Strand 3: Force, Motion, and Energy

2.6 Matter moves in predictable ways.	-What is motion? -How do Newton's laws of motion apply to our everyday lives?	-The difference between a motion and force. -Newton's Laws of Motion -Balanced and unbalanced forces.	-Calculate and/or graph speed, acceleration, & force of an object. -Give real life examples for Newton's laws of motion.	
2.7 There is a relationship between force and motion using simple machines.	-Can a machine increase both force and distance? Why or why not? -What is the advantage of using a simple machine?	-Machines make work easier by changing force, distance and/or direction. -Machines do not change the amount of work being done.	-Calculate mechanical advantages of varied simple machines. -Design and/or build a compound machine. -Identify types of simple machines. -Measure input and output forces with a spring scale.	
2.8 Energy comes in many forms and allows work to be done.	-How are energy and work related? -How can energy be transformed from one form to another?	-Energy is ability to do work. -Law of conservation of energy. -Some forms: mechanical, electromagnetic, chemical, thermal, potential and kinetic. -Heat is transferred via conduction, convection, and radiation.	-Trace and identify the flow of energy through a system. -Graph changes in temperature over time. -Give real live examples of energy transfer.	

### Strand 4: Earth Science-Weather and Climate

2.9 Weather and climate affect all living things on earth.	-How do weather and climate affect life on Earth? -How does weather affect your community? -How can one climate region be distinguished from another?	-Weather affects life in different ways. -There are extreme patterns of weather that affect each community differently. -Three main regions are polar, tempera and tropical. -Characteristics of the five climate regions.	-Explain which types of storms usually occur in Montana. -Explain all types of storms (hurricane, tornadoes, floods, blizzards). -Interpret a map that illustrates the temperature regions on Earth. -Explain the important differences in each climate.	
2.10 Meteorologists collect and analyze and interpret weather conditions.	-How do meteorologists obtain and analyze data to predict weather?	-Thermometers, barometers, anemometers, psychometers, and weather vanes are scientific instruments. -Include: pressure, relative humidity, wind speed, and direction.	-Read a thermometer using Celsius. -Distinguish between and describe the use of weather vane and an anemometer. -Interpret the reading of a barometer by explaining the likely results of an increase or decrease of barometric pressure. -collect and analyze data using meteorologist's tools.	

**Enduring Understanding # 3: Both contemporary and historical scientific understandings inform technological, ethical, cultural and life decisions.**

#### Grade Seven Benchmarks

Students will understand	Essential Questions	Students will know the/that	Students will be able to	Notes
3.1 Scientific observations and interpretations are influenced by culture	-How does your cultural background affect the way you	-Ethnicity, religion and gender are a few factors that influence our perspectives.	-Listen and consider varying perspectives.	

and diversity.	interpret the world around you?			
3.2 Scientific knowledge and technological advances occur in response to natural inquiry.	-How have advances in technology led to a greater understanding of atomic theory and cell theory?	-Our understanding of atomic structure may continue to change. -Technology of the microscope has allowed us to observe and understand structure and function of cells.	-Create a historical time line of our understanding of structure of an atom. -Discuss the connection between improved technology, renewed models, and depth of understanding of cells.	
3.3 Past and present scientific discoveries have ethical implications.	-What ethical questions have surfaced as a result of advances in science?	-Why stem cell research, cloning, and genetic counseling have become controversial topics.	-Take a position on a controversial topic and support your position using scientific findings.	

Enduring Understanding # 1: Scientific inquiry affords all learners opportunities to make observations, pose questions, develop hypotheses, design and conduct investigations, and analyze data to draw conclusions.

### Grade Eight Benchmarks

Students will understand	Essential Questions	Students will know the/that	Students will be able to	Notes
<b>1.1 Questioning:</b> Scientists use observations to pose questions about the world around them.	-How are the generated problem, knowledge and content relevant to me? -What do I need to inquire about? -What questions do my observations generate? -How do we move from observation to generating questions?	-Questions begin investigations. -Good questions are many and varied and should be edited as a common practice. -Questioning begins with observation and then generates research.	-Question for a purpose based on their observations. -Hypothesize reasonable outcomes based on observations. -Use Hypotheses to guide the investigation toward reasonable outcomes. -Classify, infer, analyze & generalize.	
<b>1.2 Investigating:</b> Scientists use an inquiry process to find answers to questions.	-Why is this investigation important? What is in it for me? -What can I do with this knowledge? -What steps do I need to create new information	-Inquiry is an iterative process.	-Observe purposefully and independently in order to help design their own investigations. - Base their results and conclusions on their own data and observations.	
<b>1.3 Data Collection &amp; Analyzing:</b> Scientists collect, measure, analyze, and organize their data in	-How do I assess what I know and what I need to find out? -What resources are	-The answer leads to more questions. -Know which resources are available to help answer the	-Determine which information is relevant. -Evaluate resources. -Infer, analyze and interpret data to draw	

logical ways as part of a scientific process.	applicable to answering the question?	question.	conclusions. -Measure and record accurate data -Use appropriate measurement tools, tables, graphs, and charts	
<b>1.4 Communicating:</b> Scientists routinely communicate and collaborate with others in an attempt to build knowledge and understanding.	-How do I collaborate with others? -What information is relevant to share with others?	-Collaboration takes place in all steps of the inquiry process. -Listening, thinking and sharing takes place in collaboration.	-Compare findings collaboratively. -Present findings in a variety of formats. -Accept suggestions from peers to improve investigations.	

Enduring Understanding # 2: Exploring systems, order, and organizations in our natural and designed world are integral to understanding the scientific disciplines and their interdependence.

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<b>Strand One: Electricity and Magnetism</b>				
2.1 Electricity and magnetism are caused by the behavior of atomic particles.	-How does the behavior of electrons produce different kinds of electricity? -How do we classify materials based on their ability to allow electron flow? -What do magnetic materials have in common? -How are electricity and magnetism related?	-Current is the flow of charges. -Magnetism is the alignment of atoms in material. -Electric current in a wire creates a magnetic field. -Moving a magnet in a coil of wire creates an electric current. -A compass depends on the Earth's magnetic field. -Difference between electric current and static electricity.	-Categorize materials as insulators or conductors. -Explain how a compass works and use it. -Illustrate a magnetic field.	
2.2 Electrons flow in a predictable path.	-How do electrons flow? -How can I use relationships between voltage, current, and resistance to make predictions?	-Current flows from high potential to low potential in a closed circuit. -A circuit can either be opened or closed. -Two types of circuits are series and parallel. -Resistance is a measure of the tendency to convert electrical energy to heat energy. -Amperes are units of current, volts are	-Indicate directions of electron flow on a circuit. -Explain how a battery produces current. -Construct the two types of circuits. -Use of Voltmeter to measure voltage. -Use an Ammeter to measure current. -Calculate current voltage and resistance. -Use the formula $V=IR$ , which explains Ohm's Law.	

		units of potential difference, and Ohm are units of resistance. -Voltage is constant.	-Identify factors affecting resistance.	
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<b>Strand Two: Chemistry</b>				
2.3 The atom is the fundamental unit of structure and function of matter.	-How do we know atoms exist?	-Atoms are composed of protons, neutrons, and electrons. -Atomic theory is ever changing as scientists have discovered new information about the atom. +ED#3	-Construct a model of an atom.	
2.4 Matter can be classified as an element, compound or mixture.	-How do I know the difference between an element, compound and mixture?	-Elements consist of one type of atom whereas compounds consist of two or more elements that are chemically combined. -A mixture is composed of two or more pure substances that are not chemically combined.	-Describe the difference between an element and a compound. -Identify an unknown substance. -Separate a simple mixture into its component substances.	
2.5 Matter exists in various states which are determined by the movement of the matter's particles.	-What causes the differences in states of matter? -What happens to the volume of a balloon that is taken outside on a cold winter day?	-Movement of molecules determine the state of matter (kinetic molecular theory) -Relationship between volume, temperature and pressure of a gas.	-Describe how energy is involved in changes of state. -Demonstrate and describe changing states of matter. -Apply gas laws (Boyle's and Charles) to real life situations.	
2.6 The Periodic Table of elements is a tool to show the relationships among elements.	-How is the Periodic Table organized? -How does the Periodic Table of Elements help us predict the behavior of atoms? -How do you know that a chemical reaction has occurred?	-Periodic Table is organized by increasing atomic numbers. -Periodic Table can be used to identify behaviors of metals, nonmetals, metalloids, groups, periods, and valence. -In a chemical change, a new substance is formed with different properties (i.e.: color change, temperature change, bubbling). -Know the Law of Conservation of Mass.	-Create an organizational system from a random set of objects. -Predict reactivity of elements based on atomic number and/or atomic mass. -Perform a variety of chemical reactions demonstrating that chemical reactions conserve mass.	
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<b>Strand Three: Biology-Human Body</b>				
2.7 Humans are composed of cells, tissues, organs, and organ <b>systems</b> .	-How are all the systems of the body interrelated and interdependent on each other? -What are common misconceptions about reproduction? -How does exercise affect cardiovascular	-Levels of cellular organization within a complex organism. -Importance of cellular communication within levels. -The interrelationship between blood and oxygen in the circulatory &	-Illustrate the path blood takes through the circulatory system. -Create a model of the lungs to demonstrate how breathing occurs. -Simulate the path of food through the digestive and excretory systems.	

	fitness? How are nutrients processed and waste removed from the body?	respiration systems. -The structure and function of the male and female reproductive systems. -How nutrients are utilized by the body and waste eliminated.		
2.8 Genetics is the study of how traits are passed on.	-How can you predict what your children may look like? -Are professional athletes genetically gifted or is their talent environmentally influenced?	-Traits are governed by dominant and recessive genes (Mendel #3). 0Mendel principles of heredity while studying pea plants + ED #3	-Use a Punnett square to determine specific characteristics such as color. -Provide support for nature vs. nurture.	
<b>Strand Four: Ecology</b>				
2.9 All living systems are interdependent and can be altered by natural events and cycles as well as human "footprints."	-How could you provide evidence for your position on whether global warming is impacted by human activity, earth's natural cycle, or a combination of both? -Why does the destruction of a native species or the introduction of a non-native species impact and ecosystem? -How does a forest fire affect an ecosystem, and how would the ecosystem repair itself? -How has the "Let it burn" policy affected Montana ecology?	-That biotic and a biotic factors affect an ecosystem and are interrelated. -The components of the water, nitrogen, and carbon cycles -How fire is beneficial to a forest.	-Relate how heating and cooling of ocean affects climate. -Predict the outcome of altering any part within the water, nitrogen, or carbon cycles. -Give support for or against the "Let it burn" policy.	
<b>Enduring Understanding # 3: Both contemporary and historical scientific understandings inform technological, ethical, cultural and life decisions.</b>				
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