

# Sciences

## Subject Group Overview

Year 1: Physical Science	Key Concept Related Concept(s) and Global Context	Statement of Inquiry	Inquiry Questions	ATL Skill(s)	Summative Assessment	MYP Objective	Content MN State Standards
<b>Unit 1: Scientific Method</b>	Systems Evidence Patterns Scientific and Technical Innovation	The scientific method is an organized system in which to collect evidence and develop patterns seen in the observable world.	<p>Factual— How do you write a hypothesis as a testable question? What factors need to be included in the steps of an experiment?</p> <p>Conceptual— What is the difference between a dependent and independent variable? What is the difference between the variables and the control?</p> <p>Debatable— When is a hypothesis correct? How do you improve/change an experiment in the future?</p>	<p>Communication: make inferences and draw conclusions.</p> <p>Communication: delegate and share responsibility for decision-making.</p> <p>Research: collect and analyze data to identify solutions and make informed decisions.</p>	Students will collect data and determine if they run faster on concrete or in the grass. They will then write up a lab report completing each element of the scientific method as it connects to their running activity.	Criterion A Knowing and Understanding III, Criterion B Inquiring and designing I and II	<p>6.1.3.4.2 Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.</p> <p>6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.</p>
<b>Unit 2: Forces and Motion</b>	Change Movement Orientation in space and time	Humans manipulate the interaction and balance of forces to control movement.	<p>Factual—How do Newton's three law describe the relationship between forces and motion?</p> <p>Conceptual—How can human beings manipulate forces to control the motion?</p> <p>Debatable—Since gravity and friction force are unavoidable,</p>	Critical Thinking Skills: Consider ideas from multiple perspectives.	Newton's Law slide presentation or Video Project	Criterion A Knowing and Understanding all strands Criterion D Reflecting on the impact of science ii. and iii.	6.2.2.2.1 Recognize that when the forces acting on an object are balanced, the object remains at rest or continues to move at a constant speed in a straight line, and that unbalanced forces cause a change in the speed or direction of the motion of an object.

			can human beings really control motion?				6.2.2.2.2 Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object.
<b>Unit 3: Energy</b>	Change Transformation Energy Scientific and Technical Innovation	The changes and transformations of energy between objects helps us understand how the world works.	Factual Question - What is potential energy? What is kinetic energy? What are the main forms of energy within transformations?  Conceptual Question- How does potential and kinetic energy transfer between each other? How do we see forms of energy in the real world?  Debatable Question- Is energy created or destroyed during transformations?	Thinking: Critical Thinking: make inferences and draw conclusions.  Thinking: Transfer Skills: apply skills and knowledge in unfamiliar situations.	Test: Students have to show knowledge on definitions of all forms of energy, how to rank varying levels of potential and kinetic energy, and how one energy transfers to another	Criterion A, Knowing and Understanding Strands i, ii, and iii	6.2.3.2.1 Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.  6.2.3.2.2 Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
<b>Unit 4: Waves (Science and Design Unit)</b>	Relationships Function, Development, Patterns, Evidence Personal and cultural expression	We can study the properties of sound and light waves to determine patterns and understand how they travel.	Factual—How do waves transfer energy? What is refraction and reflection of light?  Conceptual—How do speed, wavelength, frequency, and amplitude relate to waves? How do waves determine how we interpret light and sound?  Debatable—What are the most important factors to consider in a sound wave when constructing a musical instrument?	Critical Thinking: practice observing carefully in order to recognize problems.  Critical Thinking: test generalizations and conclusions.  Thinking: Transfer skills: combine knowledge, understanding, and skills to create products or solutions.	Students will design and construct a musical instrument that can play different notes. They will have to analyze how and why their instrument can make different sounds. To assess the Science Criteria, students will take a formal test that assesses their knowledge of the light properties.	Design Criteria - all strands A Inquiring and Analyzing B Developing Ideas C Creating the Solution and D Evaluating	6.2.3.1.1 Describe properties of waves, including speed, wavelength, frequency and amplitude. 6.2.3.1.2 Explain how the vibration of particles in air and other materials results in the transfer of energy through sound waves. 6.2.3.1.3 Use wave properties of light to explain reflection, refraction and the color spectrum. 6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans.  6.1.2.1.2 Recognize that there

							<p>is no perfect design and that new technologies have consequences that may increase some risks and decrease others.</p> <p>6.1.2.1.3 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.</p> <p>6.1.2.1.4 Explain the importance of learning from past failures, in order to inform future designs of similar products or systems. For example: Space shuttle or bridge design.</p> <p>6.1.2.2.1 Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the design as needed to construct a product or system to solve a problem.</p>
<b>Unit 5: The Nature of Science - Engineering</b>	Systems Function and Development Globalization and Sustainability	Engineers create, develop and manufacture machines, structures, processes and systems that impact society.	<p>Factual: What is the engineering design cycle?</p> <p>Conceptual: What are the trade-offs in using manufactured products in terms of features, performance, durability and cost?</p> <p>Debatable: What are imperfections among student designs and new</p>	<p>Thinking: Critical Thinking skills: troubleshoot systems and applications.</p> <p>Research-Information Literacy skills: access information</p>	Bridge design summative.	<p>Design Criteria - all strands</p> <p>A Inquiring and Analyzing</p> <p>B Developing Ideas</p> <p>C Creating the Solution</p> <p>and D Evaluating</p>	<p>6.1.2.1.1 Identify a common engineered system and evaluate its impact on the daily life of humans.</p> <p>6.1.2.1.2 Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others.</p>

			technologies and discuss the consequences that specific details in the design process have?	to be informed and inform others.			<p>6.1.2.1.3 Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.</p> <p>6.1.2.1.4 Explain the importance of learning from past failures, in order to inform future designs of similar products or systems. For example: Space shuttle or bridge design.</p> <p>6.1.2.2.1 Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the design as needed to construct a product or system to solve a problem.</p>
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<b>Year 2: Life Science</b>	<b>Key Concept Related Concept(s) and Global Context</b>	<b>Statement of Inquiry</b>	<b>Inquiry Questions</b>	<b>ATL Skill(s)</b>	<b>Summative Assessment</b>	<b>MYP Objective</b>	<b>Content MN State Standards</b>
<b>Unit 1: Scientific Method</b>	Systems Evidence Patterns Scientific and Technical Innovation	The scientific method is an organized system in which to collect evidence and develop patterns seen in the observable world.	Factual— How do you write a hypothesis as a testable question? What factors need to be included in the steps of an experiment? Conceptual— What is the difference between a dependent and independent variable? What is the	Communication: make inferences and draw conclusions.  Research: collect and analyze data to identify solutions and	At Home Experiment: Students will be going through the steps of the scientific method and detailing a science experiment. They will come up with a problem/question to investigate, design an	Criterion B	7.1.1.2.2 Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables, ensuring that one variable is systematically manipulated, the other is measured and recorded, and any other variables are

			<p>difference between the variables and the control?          Debatable— When is a hypothesis correct? How do you improve/change an experiment in the future?</p>	<p>make informed decisions</p>	<p>experiment to find out more information, carry out the experiment, collect data, and write a conclusion detailing what they learned.</p>		<p>kept the same (controlled). For example: The effect of various factors on the production of carbon dioxide by plants.          7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).           7.1.1.1.2 Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required. For example: Use mean and range to analyze the reliability of experimental results</p>
<p><b>Unit 2: Cells</b></p>	<p>Relationships          Function          Identities and relationships</p>	<p>The relationships between parts of cells and how they function together forms the basis of life.</p>	<p>Factual— What are the parts of the cell? What is each part of the cell's job?          Conceptual— What is the difference between a plant and animal cell? How similar/different do they function?          Debatable— What is the most important part/function of the cell?</p>	<p>Communication:          take effective notes in class           Communication:          use memory techniques to develop long-term memory</p>	<p>Cells Analogy Project          You will make a map of your cell city on a sheet of paper. You will relate the different cell organelles and their function to places in a real city. It should include labels for all cell organelles and their corresponding city structure.          Cells Summative Vocab Test          Students will answer a multiple choice test that identifies and compares the functions</p>	<p>Criterion A:          Knowing and Understanding           Criterion D:          Reflecting on the impact of science</p>	<p>7.4.2 All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.          7.4.1.1.1 Recognize that all cells do not look alike and that specialized cells in multicellular organisms are organized into tissues and organs that perform specialized functions. For example : Nerve cells and skin cells do not look the same because they are part of different organs and have different functions.</p>

					of different parts of the cell.		7.4.1.2.1 Recognize that cells carry out life functions, and that these functions are carried out in a similar way in all organisms, including, animals, plants, fungi, bacteria and protists. 7.4.1.2.3 Use the presence of the cell wall and chloroplasts to distinguish between plant and animal cells. For example: Compare microscopic views of plant cells and animal cells.
<b>Unit 3: Cell Processes</b>	Systems Interaction Transformation Energy Globalization and Sustainability	The systems in living organisms show an interaction between plants and animals and transforms energy that maintains the global environment.	Factual— What is the formula for photosynthesis and respiration? Conceptual— How do materials move within cells? Debatable— What happens if there isn't enough oxygen in the atmosphere?	Organization: create plans to prepare for summative assessments  Organization: use appropriate strategies for organizing complex information  Self-Management: Reflective skills: consider the content that they learned about in class each day	Photosynthesis Comic Strip You will be creating a children's book or comic strip that explains the steps of photosynthesis, respiration, and how they work together. You will create your book in three distinctive phases/chapters that explains each and how they work together.  Your book should explain in detail how the processes work and have pictures that help support your explanation of the processes taking place. You will be scored based upon these ideas and the level of detail included and not your artistic abilities.	Criterion A: Knowing and Understanding  Criterion D: Reflecting on the impact of science	7.4.1.2.1 Recognize that cells carry out life functions, and that these functions are carried out in a similar way in all organisms, including, animals, plants, fungi, bacteria and protists.  7.4.2.2.1 Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.

					<p>Cell Processes Vocab Test</p> <p>Students will answer a multiple choice test that identifies and compares the functions of different parts of the cell.</p>		
<p><b>Unit 4: Cellular Reproduction</b></p>	<p>Relationships Consequences, Interaction Scientific and technical innovation</p>	<p>We will explore the relationships between cells, their interaction with the cell cycle, consequences that can lead to cancer, and how advancements in medicine are fighting to cure it.</p>	<p>Factual— What are the stages in the cycle? What happens during mitosis? What is cancer? Conceptual— How does the cell cycle relate to the development of cancers? How do scientists develop cures for cancer? Debatable— What is the best treatment for cancer?</p>	<p>Thinking: Creative thinking skills: combine knowledge, understanding and skills to create products or solutions.</p>	<p>Students will create a presentation that outlines the stages of the cell cycle. Students will also explore what cancer is, causes, how it relates to the cell cycle, and how scientists go about researching and developing cures for cancer.</p>	<p>Criterion D: Reflecting on the impact of science</p>	<p>7.4.1.2.2 Recognize that cells repeatedly divide to make more cells for growth and repair. 7.4.3.1.2 Recognize that in asexually reproducing organisms all the genes come from a single parent, and that in sexually reproducing organisms about half of the genes come from each parent. 7.4.4.2.4 Recognize that the human immune system protects against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise from within.</p>
<p><b>Unit 5: Human Body Systems</b></p>	<p>Systems Function, Interaction Identities and Relationships</p>	<p>We will explore the systems of the human body to determine their functions, and look at how the interactions between different systems are vital to life.</p>	<p>Factual—What do the systems in the body do? Conceptual—Why do we have different body systems? Why do systems in the body have to work together? Debatable— Which is the most important system in the human body?</p>	<p>Thinking: Critical thinking skills: analyze complex concepts and projects into their constituent parts and synthesize them to create new understanding</p>	<p>Body system flyer Students will create a flyer for a specific human body system and will describe how it interacts with each of the other systems to keep a person functioning correctly. They will also examine an illness of that system and how it affects the</p>	<p>Criterion C Processing and evaluating</p>	<p>7.4.1.1.2 Describe how the organs in the respiratory, circulatory, digestive, nervous, skin and urinary systems interact to serve the needs of vertebrate organisms. 7.4.1.1.1 Recognize that all cells do not look alike and that specialized cells in multicellular organisms are organized into tissues and</p>

					body when it is not functioning properly.		organs that perform specialized functions.
<b>Unit 6: Coming Soon!</b>							

<b>Year 3: Earth Science</b>	<b>Key Concept Related Concept(s) and Global Context</b>	<b>Statement of Inquiry</b>	<b>Inquiry Questions</b>	<b>ATL Skill(s)</b>	<b>Summative Assessment</b>	<b>MYP Objective</b>	<b>Content MN State Standards</b>
<b>Unit 1: Measurement and Properties</b>	Relationships Form, Patterns Identities and Relationships	We can observe patterns in the metric system, the relationships that exist between physical and chemical properties, and how changes in form and state of matter reflect the identity of a substance.	<p>Factual—What physical and chemical properties do various materials have? How do we measure using the metric system?</p> <p>Conceptual— Why do different materials have different physical and chemical properties? What happens to molecular motion when substances are heated or cooled and how would that affect the state of matter that it exists in?</p> <p>Debatable— What is the best way to use the physical properties of substances to construct a container that will prevent a change in state of matter in a substance? (keep</p>	Thinking, Creative thinking skills: apply existing knowledge to generate new ideas, products or processes	Students will inquire about the debatable question, What is the best way to use the physical properties of substances to construct a container that will prevent a change in state of matter in a substance? And design an ice house that will protect an ice cube from melting.	Criterion B: Inquiring and designing	<p>8.1.3.4.2 Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.</p> <p>8.2.1.1.1 Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances.</p> <p>8.2.1.1.2 Use physical properties to distinguish</p>

			an ice cube from melting in this unit)				between metals and nonmetals. 8.2.1.2.1 Identify evidence of chemical changes, including color change, gas evolution, solid formation and temperature change. 8.2.1.2.2 Distinguish between chemical and physical changes in matter.
<b>Unit 2: Earth's structure and History</b>	Relationships Models, Evidence Orientation in space and time	We will explore the relationships between Earth's structural layers through labs and models, and look at the relationships between a variety of evidence that explores the age and history of Earth.	<p>Factual— What are the different layers of Earth, physically and compositionally? How were the layers of Earth discovered and studied? How can rocks be dated?</p> <p>Conceptual— How can we use radiometric and relative dating to determine the ages of rock in an area? Why do layers of Earth differ physically?</p> <p>Debatable— Do you believe that Earth can be 4.5 billion years old and how can you justify that?</p>	Thinking: Creative thinking skills: consider multiple alternatives, including those that might be unlikely or impossible.	Students will create a model of Earth describing its physical layers, and explaining the characteristics that lead to those classifications.	Criterion D: Reflecting on the impact of science	<p>8.3.1.1.1 Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core.</p> <p>8.3.1.3.1 Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.</p> <p>8.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts.</p> <p>8.1.3.3.2 Understand that scientific knowledge is always changing as new technologies and information enhance</p>

							observations and analysis of data
<b>Unit 3: Weathering and Erosion</b>	Change Environment, Transformation Globalization and Sustainability	Students will be exploring the landforms of Earth and the forces and process that continuously transform them, both locally and globally.	<p>Factual—What is chemical weathering? What is mechanical weathering? What is erosion? How do weathering and erosion take place?</p> <p>Conceptual—How do weathering and erosion work together to constantly change Earth? How do weathering and erosion have an impact on the processes of each other?</p> <p>Debatable— Is weathering or erosion a more important factor in changing Earth’s surface.</p>	Thinking: Critical thinking skills: recognize and evaluate propositions.	Students will create a presentation that will identify different landforms that are caused by weathering and erosion and describe the processes that lead to the creation of each landform.	Criterion C: Processing and evaluating	<p>8.3.1.2.1 Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.</p> <p>8.3.1.2.2 Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.</p> <p>8.2.1.2.4 Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.</p>
<b>Unit 4: Rocks and Minerals</b>	Relationships Pattern, Form, Environment Orientation in time and space	We will explore the relationships between rocks and minerals and explore the patterns that arise in their form, based upon the environment in which they develop.	<p>Factual— How do you determine streak, hardness, and luster? How do different types of rocks form?</p> <p>Conceptual— How can we identify igneous, sedimentary, and metamorphic rocks using different properties? How are minerals identified by their properties?</p> <p>Debatable— Can rocks can be identified by the minerals that make them up?</p>	Thinking: Critical thinking skills: gather and organize relevant information to formulate a hypothesis.	Students will take a knowledge test where they will have to apply their scientific knowledge and understanding to solve the problems. Students will be taking a lab test where they will have to accurately interpret data that they collect from rock and mineral samples and interpret the results using correct scientific	<p>Criterion A: Knowledge and Understanding</p> <p>Criterion C: Processing and evaluating</p>	<p>8.3.1.3.2 Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.</p> <p>8.3.1.3.3 Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.</p> <p>8.1.1.2.1 Use logical reasoning and imagination</p>

					reasoning to identify the given sample.		to develop descriptions, explanations, predictions and models based on evidence.
<b>Unit 5: Interdisciplinary Unit with Global Studies Plate Tectonics</b>	systems, perspective Identities and Relationships & Scientific and Technical Innovation	Cultural identities and perspective are influenced by Earth's systems and can impact the response to a natural event.	<p>Factual: What drives tectonic plate movement? Where are mountains formed? How are volcanoes created? What is a cultural region?</p> <p>Conceptual: How do physical, climatic and human factors impact how geographers define a region? How does the movement of plates relate to the creation of landforms and natural disasters?</p> <p>Debatable: What is the best way for a region to recover after a natural disaster?</p>	<p>Thinking: Transfer skills: inquire in different contexts to gain a different perspective.</p> <p>Communication skills: find information for disciplinary and interdisciplinary inquiries, using a variety of sources</p>	Students will be writing an opinion news article that incorporates several perspectives about a natural disaster: a volcanic explosion caused by an earthquake. The students will have several tasks in their article. First, they will write a scientific description of the Earth's processes that cause the tragic event. Then, they will describe the event from the point of view of the perspective of either an economist, politician, human rights activist or religious leader. Third, they will interview another student who has a different perspective to compare and contrast to their own. Finally, they will write their practical solution to alleviate the disastrous impacts of the seismic event on the region.	<p>Interdisciplinary Criteria</p> <p>A: Disciplinary Grounding</p> <p>B: Synthesizing</p> <p>C: Communicating</p> <p>D: Reflecting</p>	<p>8.1.3.4.1 Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. For example: Use data or satellite images to identify locations of earthquakes and volcanoes, ocean surface temperatures, or weather patterns.</p> <p>8.2.3.1.1 Explain how seismic waves transfer energy through the layers of the Earth and across its surface.</p> <p>8.3.1.1.2 Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity.</p> <p>8.3.1.1.3 Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.</p> <p>8.3.1.2.1 Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering,</p>

							erosion and deposition of sediment.
<b>Unit 6: Coming Soon!</b>							

<b>Year 4: Physical Science</b>	<b>Key Concept Related Concept(s) and Global Context</b>	<b>Statement of Inquiry</b>	<b>Inquiry Questions</b>	<b>ATL Skill(s)</b>	<b>Summative Assessment</b>	<b>MYP Objective</b>	<b>Content MN State Standards</b>
<b>Unit 1: Motion in One Dimension</b>	Change Movement Orientation in space and time	Humans study the change of movement in order to control movement.	Factual— What do we need to know in order to describe motion?  Conceptual— How can humans describe the motion in different ways?  Debatable— Can humans predict an object's motion?	Communication: use and interpret a range of discipline-specific terms and symbols and understand and use mathematical notation	Build a car that can travel down a ramp. Students will test it and analyze position vs time and velocity vs time graph, and compile and analyze the data in a google slides presentation.	Criterion B: Inquiring and designing  Criterion C: Processing and evaluating	9P.2.2.2.2  Explain and calculate the acceleration of an object subjected to a set of forces in one dimension.
<b>Unit 2: Energy</b>	Systems Transformation, interaction Scientific and technical innovation	Humans use the transformation of energy in a system to interact with their environment.	Factual—What is energy? How does energy transform between different forms?  Conceptual—How can human beings use energy more efficiently?  Debatable—Do humans use energy in a right way?	Communication: use and interpret a range of discipline-specific terms and symbols Thinking: Critical Thinking skills: identify obstacles and challenges	Design and Build a Roller Coaster, test it, analyze and present data in google slides presentation.	Criterion B: Inquiring and designing  Criterion C: Processing and evaluating	9.2.3.2.1 Identify the energy forms and explain the transfers of energy involved in the operation of common devices.  9.2.3.2.2 Calculate and explain the energy, work and power involved in energy

							transfers in a mechanical system.
<b>Unit 3: Free Fall</b>	Change Patterns, Movement Orientation in space and time	Understanding the patterns of change of movement can help us understand the natural world.	Factual—What are the patterns of change of movement?  Conceptual—Why are there patterns of change of movement?  Debatable—Do the changes of movement always fit the same patterns?	Thinking: Critical Thinking skills: must propose and evaluate a variety of solutions	Calculate falling distance according time, calculate time according falling distance. Analyze graph. Design an experiment to figure out the Hang Time while a person jumps up.	Criterion A: Knowing and understanding Criterion B: Inquiring and designing	9.2.2.2.4 Use Newton’s universal law of gravitation to describe and calculate the attraction between massive objects based on the distance between them.
<b>Unit 4: Electricity Coming Soon!</b>							

<b>Year 5: Physics</b>	<b>Key Concept Related Concept(s) and Global Context</b>	<b>Statement of Inquiry</b>	<b>Inquiry Questions</b>	<b>ATL Skill(s)</b>	<b>Summative Assessment</b>	<b>MYP Objective</b>	<b>Content MN State Standards</b>
<b>Unit 1: Motion in One Dimension</b>	Change Movement Orientation in space and time	Humans study the change of movement in order to control movement.	Factual— What do we need to know in order to describe motion?  Conceptual— How can humans describe the motion in different ways?  Debatable— Can humans predict an object's motion?	Communication: use and interpret a range of discipline-specific terms and symbols and understand and use mathematical notation	Build a car that can travel down a ramp. Students will test it and analyze position vs time and velocity vs time graph, and compile and analyze the data in a google slides presentation.	Criterion B: Inquiring and designing  Criterion C: Processing and evaluating	9P.2.2.1.1 Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects

<b>Unit 2: Energy</b>	Systems Transformation, interaction Scientific and technical innovation	Humans use the transformation of energy in a system to interact with their environment.	Factual—What is energy? How does energy transform between different forms?  Conceptual—How can human beings use energy more efficiently?  Debatable—Do humans use energy in a right way?	Communication: use and interpret a range of discipline-specific terms and symbols Thinking: Critical Thinking skills: identify obstacles and challenges	Design and Build a Roller Coaster, test it, analyze and present data in google slides presentation.	Criterion B: Inquiring and designing  Criterion C: Processing and evaluating	9P.2.2.2.1 Explain and calculate the work, power, potential energy and kinetic energy involved in objects moving under the influence of gravity and other mechanical forces.
<b>Unit 3: Free Fall</b>	Change Patterns, Movement Orientation in space and time	Understanding the patterns of change of movement can help us understand the natural world.	Factual—What are the patterns of change of movement?  Conceptual—Why are there patterns of change of movement?  Debatable—Do the changes of movement always fit the same patterns?	Thinking: Critical Thinking skills: must propose and evaluate a variety of solutions	Calculate falling distance according time, calculate time according falling distance. Analyze graph. Design an experiment to figure out the Hang Time while a person jumps up.	Criterion A: Knowing and understanding  Criterion B: Inquiring and designing	9P.2.2.1.3  Use gravitational force to explain the motion of objects near Earth and in the universe.
<b>Unit 4: Projectile Motion</b>	Change Movement Orientation in space and time	Humans study the change of movement in order to control movement.	Factual— What force causes projectile motion?  Conceptual— How does a projectile move in horizontal and vertical direction?  Debatable— How does air resistance affect projectile motion?	Thinking: Critical Thinking skills: must draw reasonable conclusions and generalizations	Use photogate and projectile launcher to measure the initial speed of the marble with a given angle. Predict how high and how far the marble will reach by calculating with formulas.. Measure the real distance that the marble moves horizontally. Present and compare the data from calculation and experiment and	Criterion A: Knowing and understanding  Criterion B: Inquiring and designing  Criterion C: Processing and evaluating	9P .2.2.1.1 Use vectors and free-body diagrams to describe force, position, velocity and acceleration of objects in two-dimension motion.  9P .2.2.1.2 Apply Newton's three laws of motion to calculate and analyze the effect of forces and momentum on motion  9P .2.2.1.3

					explain results using scientific reasoning. Explain how to improve the experiment method in order to get the data that is closer to the experiment result.		Use gravitational force to explain the motion of objects near Earth and in the universe.
<b>Unit 5: Electricity Coming Soon!</b>							