

MSAD #56

SCIENCE CURRICULUM

K-12

Board Approved
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MSAD #56 SCIENCE CURRICULUM COMMITTEE

This curriculum was based on the work of the MSAD #56 District Science Curriculum Committee who spent two years reviewing, aligning, and identifying the Essential Learnings, Content, and Skills/Processes for each grade level.

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Science Kits K-5

Grade	Life	Earth	Physical
K	Myself & Others	A Star is a Sun	Construction
1	Organisms	Weather	Sound
2	New Plants	Soils	Changes *
3		Rocks & Minerals	Light Electric Circuits
4	Animal Studies	Our Solar System	Motion & Design
5	Micro Worlds	Watery Earth	Floating & Sinking

Science Overview 6-12

Grade	Life	Earth	Physical
6		<ul style="list-style-type: none"> • Earth's Structure • Fossils • Plate Tectonics • Rocks & Minerals • Soils • Volcanoes & Earthquakes • Atmosphere – Weather & Climate • Solar System 	
7	<ul style="list-style-type: none"> • Ecology • Classifying Life <ul style="list-style-type: none"> ➤ Monera ➤ Protists ➤ Fungi • Plants & Animals • Cell Energy • Information is inherited through the cell 		

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Science Overview 6-12

Grade	Life	Earth	Physical
8			<ul style="list-style-type: none"> • Properties of Matter • Energy • Forces & Motion • Simple Machines
9		Environmental & Space Science <ul style="list-style-type: none"> • Ecology • Food for the Table • Changes through Science & Technology • Atmosphere and Pollution • Water – The Essential Fluid • Energy – Past, Present, & Future • Moon • Earth & the Nature of Science • Solar Systems, Stars & Galaxies, & Space Exploration 	
10	Biology <ul style="list-style-type: none"> • Science Inquiry/Scientific Method • Classification of Life • Characteristics of Life • Chemistry • Structure and Function of the Cell • Continuity • Differentiation • Diversity 		Physical Science <ul style="list-style-type: none"> • Numbers in Science • Newton’s First Law • Newton’s Second Law • Newton’s Third Law • Energy – Potential & Kinetic
11			Chemistry <ul style="list-style-type: none"> • Matter • Atomic Structure • Chemical Changes – energy • Kinetic and Equilibrium/Acids & Bases • Gas Laws

(Continued)

Science Overview 6-12

Grade	Life	Earth	Physical
12			Physics <ul style="list-style-type: none"> • Energy – Elec., Magnetism, Electromagnetic, Induction, Waves, & Light & Optics • Mechanics • Momentum • Work and Energy

Grade Kindergarten – A Star is a Sun

A Star is a Sun	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will learn the sun is a star and is different from other objects in the solar system.</p>	<p>How does the sun affect the Earth and people who live here?</p> <p>[Note to teachers: Make connection to Native American Literature & Technology]</p>	<p>The sun is one of many stars in the universe. The sun warms the land, air, and water. The sun is the closest star to the earth.</p> <p>Current MLR – M1 G3 E1</p>	<ul style="list-style-type: none"> • Emphasize – never to look directly at the sun. • Making predictions as a scientist. • Conducting experiments • How to make meaningful observations • Comparing results – drawing conclusions 	<p>Class discussions Story retellings Class debate Open responses Journal entries 2-Performance Task Assessment</p>

Grade Kindergarten – Myself & Others

Myself & Others	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will compare the characteristics of living things.</p>	<p>What are the similarities and differences between myself and others?</p> <p>How does your body grow and develop?</p>	<p>Body parts – sketch themselves</p> <p>What are similarities? What are differences? Comparison to themselves as they grow. Comparison with others.</p>	<p>Observation – describe/draw what you see.</p> <p>Organization – classifying: sequencing (time patterns), grouping, categorizing common characteristics</p> <p>Communications – verbal, written, drawing, graphing (EM)</p>	<p>Teacher observations Anecdotal records Portfolio of student work Checklists Interviewing Pretest Oral Presentation</p>

Grade **Kindergarten** – **Construction**

Construction	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will design and build structures using different materials.</p>	<ul style="list-style-type: none"> • How do smaller pieces go together to make larger objects? • What are some properties of good building materials? 	<ul style="list-style-type: none"> • Physical properties of building materials and know their attributes for building. • Design and build a variety of structures from a range of materials. • Plan and design structures with tools and adapt to constraints such as limited space and materials. • Construction of model buildings that are comprised of interdependent parts. • Describe shapes and patterns in buildings and explore the functions of different shapes and patterns in architecture and construction. 	<ul style="list-style-type: none"> • Use of trial and error • Problem solving • Experimentation • Close observations • Collaboration • Sharing results • Sequential drawings that connect the parts to the whole, plans, etc. • Communication – orally <p><u>Current MLR</u> E1, E2, E3 J1, J2, J3, J4 L1, L4, L6</p>	

Grade 1 - **Organisms**

Organisms	Essential Learnings	Content	Skills/Processes	Assessment
<p>In this unit, students explore the similarities and differences between plants and animals.</p>	<p>How do plants and animals meet their basic needs?</p>	<p>We use our senses to observe the world around us.</p>	<p>Observing and describing the characteristics of seeds and the plants that grow from them.</p>	<p>Record sheets Planting cards</p>
	<p>How are plants and animals similar and different?</p>	<p>Lessons 2-16</p>	<p>Lessons 2-6 (Record sheets and Class language experience story)</p>	<p>Class language experience story (ELA) Teacher’s observations</p>
	<p>Organisms have basic needs, such as food, water, air, space, and shelter.</p>	<p>Lessons 1-16</p>	<p>Planting seeds and observing and recording their growth. Lessons 3-6 (Planting cards, Class Language experience story, and Teacher’s observations)</p>	<p>Record sheets Class language experience story (ELA) Venn diagrams (EM)</p>
	<p>Each type of organism has specific needs, such as type of food, amount of water, amount of light, amount of space, and type of shelter.</p>	<p>Lessons 1-16</p>	<p>Observing and describing the characteristics of a variety of plants and animals in woodland and freshwater environments. Lessons 4-16 (Records sheets, Journal sheets, Venn diagrams)</p>	<p>Record sheets Class language experience story (ELA) Venn diagrams (EM)</p>
	<p>There is a wide diversity of living things on earth.</p>	<p>Lessons 1-16</p>	<p>Recording observations in words and drawings. Lessons 2-16 (Record sheets, Journal sheets, Venn diagrams, and Student writing)</p>	<p>Record sheets</p>
	<p>Organisms grow, change, and die over time.</p>	<p>Lessons 1, 3-16</p>	<p>Making comparisons among a variety of plants and animals. Lessons 4-6, 8, 10, 11-16 (Venn diagrams)</p>	<p>Record sheets Planting cards Class language experience story (ELA) Venn diagrams (EM)</p>
	<p>Some plants grow from seeds. The roots grow first and then the stem.</p>	<p>Lessons 2-6</p>	<p>Communicating ideas through writing, drawing, and discussion. Lessons 1-16 (Record sheets, planting cards, Journal sheets, Class language experience story, Student writing, and Teacher’s observations)</p>	<p>Planting cards Class language experience story (ELA)</p>

Grade 1 - **Organisms**

Organisms	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Plants and animals have similarities, such as basic needs, ability to grow and change, and death. Lessons 1, 4-5, 11-16</p>	<p>Maintaining plants and animals outside their natural environments. Lessons 3-16</p>	<p>Record sheets Class language experience story (ELA) Venn diagrams (EM)</p>
		<p>Humans are similar to other organisms. Humans have basic needs and also grow, change, and die. Lesson 16</p>	<p>Reading to enhance understanding of the basic needs of organisms and the diversity of life. Lessons 13, 15 (Teacher’s observations)</p>	<p>Record sheets Venn diagrams (EM)</p>
		<p>Plants have similarities, such as the ability to grow and the need for water, light, space, and air. Lessons 1-16</p>	<p>Applying what students have learned about plants and animals to what students know about themselves. Lesson 1, 16 (Venn diagrams and Student writing)</p>	<p>Record sheets Venn diagrams (EM)</p>
		<p>Animals have similarities, such as the ability to move and the need for food, water, space, and shelter. Lessons 1, 6-16</p>		<p>Venn diagrams (EM) Student writing</p>

Grade 1 - **Weather**

Weather	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students' observations and activities expand their awareness of weather, its features, and its effects on their daily lives.</p>	<p>How does weather affect people? How do people predict weather?</p>	<p>Weather changes from day to day and week to week. Lessons 1-16</p>	<p>Observing the weather by using the senses. Lessons 1, 2, 3 (Pre and post unit assessments, class lists and charts, class discussions, teacher's observations)</p>	<p>Pre and post unit assessments Class lists and charts Class discussions Record sheets</p>
		<p>Features of weather include cloud cover, precipitation, wind, and temperature. Lessons 3-7, 10, 13-16</p>	<p>Discussing and recording information about weather features. Lessons 1-16 (Pre and post unit assessments, weather calendar data, temperature graph data, class charts, lists, and graphs, record sheets, class discussions, teacher observations)</p>	<p>Pre and post unit assessments Class lists and discussions Teacher's observations Weather Calendar data Class web on clouds Record sheets</p>
		<p>Tools used to measure different features of weather include wind scales, thermometers, and rain gauges. Lessons 4-7, 10</p>	<p>Using simple tools to estimate wind speed and measure temperature and rainfall. Lessons 4-7, 10 (Student products; wind flag, model thermometer, and rain gauge, record sheets, class discussions, teacher's observations)</p>	<p>Student products: wind flag, model thermometer, rain gauge Record sheets Class discussions Teacher's observations</p>
		<p>Meteorologists are scientist who study, observe, and record information about the weather and who use that information to forecast the weather. Lessons 2, 4, 14, 15</p>	<p>Observing differences in types of clouds. Lessons 13, 14 (Pre and post unit assessments, class web on clouds, student products: cloud pictures and individual drawings, class lists and charts, class discussions, oral presentations)</p>	<p>Class discussions Oral presentations Individual drawings</p>

Grade 1 - **Weather**

Weather	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Weather affects the decisions people make about the clothing they will wear and about their outside activities. Lessons 1, 4-6, 9, 11, 12, 15</p>	<p>Conducting experiments and drawing conclusions about appropriate clothing for different types of weather. Lessons 9, 12 (Teacher’s observations, record sheets, class discussions, oral presentations)</p>	<p>Pre and post unit assessments Class lists and discussions Student experiments Record sheets Teacher’s observations Oral presentations Individual drawings</p>
			<p>Organizing weather data on graphs and long –term data collection charts. Lessons 3-16 (Weather calendar data, temperature graph data, record sheets, class discussions, teacher’s observations)</p>	
			<p>Interpreting and summarizing long-term weather data. Lessons 3-5, 16 (Class discussions, record sheets, teacher’s observations)</p>	

Grade 1 - **Sound**

Sound	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will learn the sources of sound and what produces sound.</p>	<ul style="list-style-type: none"> • What makes sound? • How does sound travel? 	<ul style="list-style-type: none"> • Sounds are produced by sources all around us. • You can describe sounds in a variety of ways. All sounds are made by vibrations. • Sound travels through air and other materials. • Sound travels through some materials better than others. • Sound travels by causing vibrations in the air and in other materials. 	<ul style="list-style-type: none"> • Make detail descriptions • Conduct tests • Demonstrate vibrations • Experimenting • Communicate by written and orally • Observations of vibrations 	

GT materials available
 Integration with Language Arts, Art, Music, Social Studies

Grade 2 - **Soils**

Soils	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students investigate the properties of three soil components- sand, clay, and humus-as well as their own local soil. They also explore the relationship between soil, roots, and plants.</p>	<p>What is the role of soil and how is it beneficial to the earth?</p>	<p>Soil contains particles of different sizes. Lessons 1, 3-8, 12, 14-16</p>	<p>Performing simple tests to describe and identify soil components. Lessons 1-8, 11, 12, 14-16 (Record sheets, Science journals, and Individual student conferences)</p>	<p>Record sheets Science journals Individual student conferences</p>
		<p>Soil may contain animals, plants, and their remains. Lessons 1-16</p>	<p>Observing, recording, and organizing test results. Lessons 1-16 (Teacher’s observations, Record sheets and plant logbooks, Science journals, and Individual student conferences)</p>	<p>Teacher’s observations Record sheets Science journals Individual student conferences</p>
		<p>Over time, dead plants become part of soil. Lessons 1, 2, 7, 10, 13-16</p>	<p>Interpreting test results to draw conclusions about soil composition. Lessons 1, 3-8, 13-16 (Record sheets and Science journals)</p>	<p>Record sheets Science journals Teacher’s observations Individual student conferences</p>
		<p>Composting-especially with worms-is an effective way to recycle old plants and other discarded organic matter. Lessons 2, 7, 10, 13</p>	<p>Reflecting on test results to predict how plants will grow in different soils. Lessons 9-12, 14, 15 (Science journals)</p>	<p>Record sheets Science journals Teacher’s observations Individual student conferences</p>
		<p>Sand, clay, and humus are three of the basic components in soil. Lessons 1, 3-16</p>	<p>Assembling and handling equipment for soil experiments. Lessons 1-12, 14, 15 (Teacher’s observations and Science journals)</p>	<p>Record sheets Individual student conferences</p>

Grade 2 - **Soils**

Soils	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Every soil component has unique properties that can be identified using simple tests. Lessons 3-8, 11, 12, 14-16</p>	<p>Communicating results and ideas through writing, drawing, and discussion. Lessons 1-16 (Teacher’s observations, Record sheets and plant logbooks, Science journals, and Individual student conferences)</p>	<p>Record sheets Science journals Individual student conferences</p>
		<p>Different soils absorb water at different rates. Lessons 9-12, 14-16</p>	<p>Applying previously learned concepts and skills to analyze unfamiliar soil samples. Lessons 8, 14-16</p>	<p>Record sheets Science journals Individual student conferences</p>
		<p>Many factors, including soil, affect plant and root growth. Lessons 9-16</p>		<p>Plant logbooks Science journals Individual student conferences</p>

Grade 2 - **Changes**

Changes	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students expand their understanding of solids, liquids, and gases and how they change.</p>	<p>What changes occur all the time in the world around us?</p> <p>What changes happen quickly, and what changes take place over a period of time?</p>	<p>Substances can be classified as solids, liquids, or gases. Lessons 1-16</p>	<p>Observing and describing changes that occur in everyday experiences. Lessons 1-16 (Pre and post unit assessments, class discussions, teacher observations, and reading selections)</p>	<p>Pre and post unit assessments Class discussions Student investigations Record sheets Student drawings Reading selections</p>
		<p>Solids, liquids, and gases can be described by their properties. These properties include color, size, shape, odor, texture, and weight. Lessons 1-16</p>	<p>Observing and describing the properties of solids, liquids, and gases. Lessons 1-16 (Pre and post unit assessments, class discussions, student investigations, records sheets, student drawings, teacher observations, and student presentations)</p>	<p>Pre and post unit assessments Class discussions Student investigations Record sheets Student drawings Teacher observations Student presentations</p>
		<p>Water can freeze into a solid and then melt into a liquid again. Lessons 1-3</p>	<p>Observing and describing changes that result from mixing substances. Lessons 1, 4-9 and 12-16 (Pre and post unit assessments, class discussions, student investigations, record sheets, student drawings, teacher observations, student presentations, and reading selections)</p>	<p>Class discussions Student investigations Records sheets Student drawings Teacher observations Student presentations Reading selections</p>
		<p>Water can evaporate into a gas and then condense into a liquid again. Lessons 2-3, 5-9, and 11</p>	<p>Observing and describing water as it freezes, melts, evaporates, and condenses. Lessons 2-3 and 6-9 (Class discussions, student investigations, record sheets, student drawings, reading selections, and teacher observations)</p>	<p>Class discussions Student investigations Record sheets Student drawings Teacher observations Reading selections</p>

Grade 2 - **Changes**

Changes	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Mixtures can be made by combining solids, liquids, or gases, or a combination of these. Lessons 4-11</p>	<p>Comparing mixtures. Lessons 5-10 (Class discussions, student investigations, record sheets, student drawings, reading selections, and teacher observations)</p>	<p>Class discussions Student investigations Record sheets Student drawings</p>
		<p>A substance can change in appearance yet remain the same substance. Lessons 2-11</p>	<p>Separating mixtures with a sieve, a filter, and the processes of evaporation and chromatography. Lessons 4, 6, and 9-12 (Class discussions, student investigations, and teacher observations)</p>	<p>Class discussions Student investigations Record sheets</p>
		<p>Some mixtures can be separated using a sieve, a filter, or the processes of evaporation and chromatography. Lessons 4, 6, and 9-11</p>	<p>Performing tests to investigate a mystery mixture. Lesson 11 (Student investigations, record sheets, student drawings, and teacher observations)</p>	<p>Student investigations Record sheets Student drawings Teacher observations</p>
		<p>When some solids-such as salt and sugar-are added to water, they dissolve and seem to disappear. Lessons 1 and 5-11</p>	<p>Communicating ideas, observations, and experiences through writing, drawing, discussion, and presentation. Lessons 1-16 (Pre and post unit assessments, class discussions, student investigations, record sheets, student drawings, teacher observations, and student presentations)</p>	<p>Pre and post unit assessments Class discussions Student investigations Record sheets Student drawings Teacher observations</p>

Grade 2 - **Changes**

Changes	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Some dissolved solids can be recovered as crystals through evaporation. Lessons 6-9 and 11</p>	<p>Predicting, observing, classifying, and recording results in a journal and on record sheets, class charts, and brainstorming lists. Lessons 1-16 (Pre and post unit assessments, class discussions, student investigations, record sheets, student drawings, teacher observations, and student presentations)</p>	<p>Class discussions Student investigations Record sheets Student drawings Teacher observations</p>
		<p>When a solid is dissolving in a liquid, the size of the solid particles, the temperature of the liquid, and stirring can affect the speed at which the solid dissolves. Lessons 5-11</p>	<p>Designing and testing a recipe in which substances are mixed to create a chemical reaction. Lessons 15-16 (Pre and post unit assessments student investigations record sheets student drawings, teacher observations, and student presentations)</p>	<p>Class discussions Student investigations Record sheets Student drawings Teacher observations</p>
		<p>When two or more substances are mixed, a chemical reaction may occur. Indicators of a chemical reaction can include a change in color, a change in temperature, or the production of a new substance, such as rust or gas. Lessons 1 and 12-16</p>		<p>Pre and post unit assessments Class discussions Student investigations Record sheets Student drawings Teacher observations Student presentations Reading selections</p>

Grade 2 – **New Plants**

New Plants	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will investigate plants.</p>	<p>How are plants living things? How are plants different from animals?</p>	<p>Structures of a plant</p>	<p>Observation – critical attributes Organization of data on a calendar Journal writing</p>	<p>Teacher observations Assessment Chart (Pg. 6)</p>
		<p>How to propagate new plants from elder ones? (seeds, bulbs, roots, cuttings)</p>	<p>Compare change over time in different kinds of plants</p>	
		<p>Describe the changes that occur as plants grow and develop.</p>	<p>Organize and communicate observations through drawing and writing.</p>	
		<p>Develop a curiosity and interest in plants as living things</p>	<p>Acquire the vocabulary associated with the structures of plants.</p>	
		<p>Experience some of the diversity of forms in the plant kingdom.</p>	<p>Gain early experiences that will contribute to their understanding of several pervasive themes that relate one scientific idea to another: Structure and Change.</p>	
		<p>Observe and describe the changes that occur as plants grow and develop.</p>		
		<p>Become familiar with the structures of flowering plants (root, stem, leaf, bud, flower, seed)</p>		
		<p>Discover various ways that new plants can develop from mature plants.</p>		

Grade 3 – **Rocks & Minerals**

Rocks & Minerals	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students investigate rocks and minerals.</p>	<p>How do rocks & minerals differ?</p> <p>How do people use rocks & minerals?</p>	<p>Rocks are aggregates of minerals, and they may also contain organic matter. Lessons 1-4, 16</p>	<p>Using senses to observe and describe rocks and minerals. Lessons 1-16 (Record sheets, Mineral profile sheets, and Venn diagram-EM)</p>	<p>Record sheets Oral reports Venn diagram (EM)</p>
		<p>Different rocks have different properties. Lessons 1-4, 16</p>	<p>Recording and discussing observations of rocks and minerals. Lessons 1-16 (Record sheets and Mineral profile sheets)</p>	<p>Record sheets</p>
		<p>The properties of rocks reflect the way they were formed and the minerals in them. Lessons 3,4, 16</p>	<p>Sorting minerals on the basis of similarities and differences in identified properties. Lessons 6-14 (Teacher’s observations and Mineral profile sheets)</p>	<p>Oral reports</p>
		<p>Each mineral is composed of only one substance, and that substance is the same in all samples of the mineral. Lessons 5-15</p>	<p>Performing and interpreting results of the following tests on minerals: streak, transparency, luster, hardness, and magnetism. Lessons 7-15 (Teacher’s observations and Mineral profile sheets)</p>	<p>Mineral profile sheets Oral and written reports Venn diagrams (EM)</p>
		<p>Minerals differ in color, texture, smell, luster, transparency, hardness, shape, and reaction to magnets. Lessons 6-15</p>	<p>Recording and discussing results of tests on minerals. Lessons 7-15 (Mineral profile sheets)</p>	<p>Mineral profile sheets</p>
		<p>The properties of rocks and minerals determine how they are used. Lessons 7-16</p>	<p>Reading for more information on minerals and rocks. Lessons 3, 5-16 (Oral and written reports)</p>	<p>Oral and written reports</p>

Grade 3 – **Rocks & Minerals**

Rocks & Minerals	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>			<p>Communicating observations and test results through writing and discussion. Lessons 1-16 (Record sheets and Mineral profile sheets)</p>	
			<p>Reflecting on experiences through writing and discussion. Lessons 2-16 (Notebooks and Oral and written reports)</p>	
			<p>Applying previously learned concepts and skills to solve a problem. Lessons 13, 14 (Teacher’s observations and Small-group discussions)</p>	

*Notebooks may work as same type of log or record which we may be able to assess.

Grade 3 – **Electric Circuits**

Electric Circuits	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students expand their understanding of electricity through investigations with wires, batteries, bulbs, and switches.</p>	<p>What effect does electricity have on people’s lives?</p>	<p>A complete electric circuit is required for electricity to light a bulb.</p>	<p>Wiring simple electric circuits.</p>	
		<p>A complete circuit can be constructed in more than one way using the same materials.</p>	<p>Predicting, observing, describing, and recording results of experiments with electricity.</p>	
		<p>Different types of electric circuits show different characteristics.</p>	<p>Drawing conclusions about circuits from the results of experiments.</p>	
		<p>A switch can be used to complete or interrupt a circuit.</p>	<p>Building and using a simple circuit tester.</p>	
		<p>Some materials conduct electricity; these are called conductors.</p>	<p>Using symbols to represent the different parts of an electric circuit.</p>	
		<p>Some materials do not conduct electricity; these are called insulators.</p>	<p>Building a simple switch.</p>	
		<p>Electricity can produce light and heat.</p>	<p>Applying troubleshooting strategies to complete an incomplete circuit.</p>	
		<p>A diode conducts electricity in one direction only.</p>	<p>Applying information about eclectic circuits to design and build a flashlight.</p>	
			<p>Applying information about electric circuits to design and wire a house.</p>	
			<p>Reading to learn more about electricity.</p>	
	<p>Communicating results and ideas through writing, drawing, and discussion.</p>			

Grade 3 - **Light**

Light	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will examine the properties of light.</p>	<ul style="list-style-type: none"> • How is light produced? • How does light travel? • How does light affect humans? 	<ul style="list-style-type: none"> • If you can see something, then light must be present. • Light travels in straight lines. It moves outward in all directions from a source until it hits something. • Light bounces off many materials . • Light can bounce directly back (mirror-like reflection) or in many directions (scatter). • We see because light bounces off objects and into the eye. • The more light there is, the easier it is to see things. • Transparent, translucent and opaque materials let different amounts of light pass through them. • Translucent materials allow some light to pass through them. • Opaque materials do not allow any light to pass through them. The light is either absorbed, reflected, or a combination of both. • Transparent materials allow most light to pass through them. • Light can change direction as it passes through transparent materials. • Light travels in straight lines. It moves outward in all directions from a source until it hits something. • When light hits something, one or more of three things can happen: the light can bounce off it, go through it, or be absorbed by it. • You see when light comes into your eye. 	<ul style="list-style-type: none"> • Examine sources of light • Draw models • Create models • Investigate what happens to light • Observations and record • Compare materials • Construct a periscope • Generating lists • Role play scenarios about lights behavior • Science lab reports 	

GT materials available

Integration with Language Arts, Art, Music, Social Studies

Grade 4 – **Animal Studies**

Animal Studies Life Science	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students explore the relationship between an animal and its habitat, as well as some of the ways animal behaviorists study animals.</p>	<p>What, if any, is the relationship between an animal & its habitat?</p>	<p>All the living and nonliving elements that surround an animal-such as other animals, plants, climate, water, air, and location-affect the life of that animal. Lessons 2, 9, 10, 11, 13</p>	<p>Observing and describing structural characteristics and behaviors of the dwarf African frog, fiddler crab, and land snail. Lessons 3-16 (Record sheets, Logs, Class table -EM, and Teacher’s observations-diagnostic)</p>	<p>Class Venn diagrams (EM)</p>
	<p>What is the affect of human changes on all habitats?</p>	<p>One way scientists learn about animals is through close observation over an extended period of time. Lessons 3-16</p>	<p>Recording observations in an animal log. Lessons 4-16 (Logs, Log checklist, Record sheets, and Teacher’s observations-diagnostic)</p>	<p>Record sheets (diagnostic)</p>
	<p></p>	<p>When conducting animal behavior research, scientists follow guidelines to ensure the accuracy of results. Lessons 5, 12-16</p>	<p>Developing questions and answering them through behavioral observation and research. Lessons 4-16 (Class list-EM, Record sheets, and Teacher’s observations-diagnostic)</p>	<p>Record sheets Oral presentations</p>
	<p></p>	<p>A habitat is the place where an animal finds the resources-food, water, shelter, and space-necessary to survive and reproduce. Lessons 2-16</p>	<p>Comparing and contrasting the dwarf African frog, fiddler crab, land snail, and human. Lessons 1-16 (Class table-EM, Class lists-EM, and Teacher’s observations)</p>	<p>Class table (EM) Class Venn diagrams (EM) Record sheets</p>
	<p></p>	<p>Each type of animal has specific needs, such as type of food, amount of water, and range of temperature. Lessons 1-16</p>	<p>Collecting, analyzing, and drawing conclusions from data. Lessons 4-16 (Record sheets and Oral presentations)</p>	<p>Record sheets</p>

Grade 4 – **Animal Studies**

Animal Studies Life Science	Essential Learning	Content	Skills/Processes	Assessment
Continued		Certain behaviors and body structures enable animals to survive in a particular habitat. Lessons 1, 13-16	Supporting conclusions with reasons that are based on observation and experience. Lessons 10, 14-16 (Record sheets and Oral presentations)	Class table (EM) Record sheets Oral presentations
		Humans are one of the only animals that can significantly change their behaviors to live in a variety of habitats. Lessons 6, 11, 13-15	Predicting, observing, and recording the results of a simple experiment to test an animal’s response to a sudden change in its habitat. Lessons 10, 16 (Record sheets and Teacher’s observations)	Class table (EM)
			Communicating ideas through writing and discussion. Lessons 1-16 (Teacher’s observations)	
			Reading to enhance understanding of the interaction between an animal and its habitat. Lessons 5, 13, 15	
			Developing proper laboratory techniques that ensure the safety of living things. Lessons 3-16 (Teacher’s observations and Self-assessments-Reflection)	
			Maintaining animals outside their natural habitats. Lessons 1-16 (Record sheets and Teacher’s observations)	

Grade 4 – **Solar System**

Solar System	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will explore the sun and the moon and their own ideas about them throughout the year.</p>	<ul style="list-style-type: none"> • How does the sun affect life here on Earth? • How does the moon’s path across the sky change the moon during its cycle? • How do astronomers explain what we see in the universe? 	<ul style="list-style-type: none"> • The sun’s path across the sky appears to change throughout the year in a predictable pattern. • The length of daylight changes throughout the year in a predictable pattern. • Earth’s orbit around the sun causes the changes in the length of daylight and changes in the apparent path of the sun. • Like the sun, the moon appears to move across the sky daily. Sometimes you can see the moon during the day. • Wondering about the world leads to scientific investigations and research. • The observable shape of the moon changes from day to day in a predictable pattern. • The moon’s shape seems to change from day to day because we see different views of the moon’s sun-lit portion as the moon orbits around the earth. • The moon’s cycle takes about a month, the time it takes for the moon to orbit Earth. • The sun is a star like all other stars. The sun is the center of our solar system, and Earth is one of nine planets that orbit it. 	<ul style="list-style-type: none"> • Keep daily observation journal for long periods of time both fall/spring • Construct models for scientific concepts. • Manipulating models to scientific concepts. • Compare data • Calculate elapsed time. • Look for patterns in data. • Analysis & graphing • Reflect on keeping accurate and honest data • Research 	

Grade 4 – **Solar System**

Solar System	Essential Learning	Content	Skills/Processes	Assessment
Continued		<ul style="list-style-type: none"> • Wondering about the world leads to scientific investigations and research. • Like the sun appears to move across a daytime sky, the stars appear to move across the nighttime sky because Earth rotates on its axis. • Nine planets orbit around our sun. Each planet has unique characteristics that distinguish it from other planets. • The sun appears to travel through the sky in a predictable daily pattern. • This pattern can be explained by the rotation of Earth. 		

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 Integration with Language Arts, Art, Music, Social Studies

Grade 4 – **Motion & Design**

Motion & Design	Essential Learning	Content	Skills/Processes	Assessment
<p>This unit provides students an opportunity to explore the physics of motion and to apply those concepts to technological design.</p>	<p>How are wind, propellers, and rubber bands used as different forms of energy/</p> <p>How does force change the speed and/or direction of an object?</p> <p>How do engineers use variables to improve design?</p>	<p>A force is any push or pull on an object. An unbalanced force is needed to make a resting object move, to bring a moving object to rest, or to change the direction of a moving object.</p> <p>Lessons 1, 3-8, 10-12, 14-16</p>	<p>Designing, building, testing, and modifying vehicles to meet design requirements.</p> <p>Lessons 1, 2, 5, 8, 9, 11-16 (Student investigations, Student drawings, Oral presentations, Teacher observations, Building vehicles, and Student self-assessment)</p>	<p>Student investigations Record sheets Oral presentations Student self-assessment</p>
		<p>A force can change the speed of an object, Greater forces can change the speed of an object faster than smaller forces.</p> <p>Lessons 1, 3, 5, 7, 12, 14-16</p>	<p>Building vehicles from technical two- and three- view drawings.</p> <p>Lessons 2, 11, 14-16 (Student drawings, Teacher observations, and Building vehicles)</p>	<p>Student investigations Record sheets Oral presentations Teacher observations Student self-assessment</p>
		<p>Friction is a force that occurs when two surfaces rub together. Friction opposes motion.</p> <p>Lessons 3, 7-10, 12, 14-16</p>	<p>Recording vehicle designs through drawing.</p> <p>Lessons 2, 5, 9, 14-16 (Student drawings and Teacher observations)</p>	<p>Student investigations Record sheets Oral presentations Teacher observations Building vehicles Student self-assessment</p>
		<p>If the same force is applied to a lighter vehicle and a heavier vehicle, the speed of the lighter vehicle will change more than the speed of the heavier vehicle.</p> <p>Lessons 4, 5, 10, 12, 14-16</p>	<p>Observing how an object moves and describing its motion and changes in motion.</p> <p>Lessons 1, 3-8, 10, 12, 13-16 (Student investigations, Record sheets, Oral presentations, and Teacher observations)</p>	<p>Class discussions and lists Student investigations Record sheets Oral presentations Teacher observations Student self-assessment</p>

Grade 4 – **Motion & Design**

Motion & Design	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Energy can be stored in a rubber band and released to turn an axle or spin a propeller to make a vehicle move. Lessons 6-16</p>	<p>Measuring the time it takes a vehicle to move a given distance. Lessons 1, 4, 5, 14-16 (Student investigations, Record sheets, Oral presentations, and Teacher observations)</p>	<p>Student investigations Record sheets Oral presentations Teacher observations Building vehicles Student self-assessment</p>
		<p>A spinning propeller exerts a force that pushes air back and moves a vehicle forward. Lessons 11-16</p>	<p>Collecting and recording data and analyzing it to determine representative values. Lessons 4, 5, 7, 10, 14-16 (Student investigations, Record sheets, Oral presentations, and Teacher observations)</p>	<p>Student investigations Record sheets Oral presentations Teacher observations Building vehicles Student self-assessment</p>
		<p>Friction must be considered when a vehicle is being designed. Lessons 1, 5, 8-12, 14-16</p>	<p>Predicting the effect of an applied force on how a vehicle moves. Lessons 1, 3-5, 7-10, 12, 14-16 (Student investigations, Record sheets, and Oral presentations)</p>	<p>Student investigations Record sheets Student drawings Oral presentations Teacher observations Building vehicles Student self-assessment</p>
		<p>Air resistance is a force that can slow the speed of a moving vehicle. Lesson 9, 10, 14-16</p>	<p>Recording and comparing distances a vehicle travels under various conditions. Lessons 1, 7, 12, 14-16 (Student investigations, Record sheets, and Oral presentations)</p>	<p>Student investigations Record sheets Student drawings Oral presentations Teacher observations Building vehicles Student self-assessment</p>

Grade 4 – **Motion & Design**

Motion & Design	Essential Learning	Content	Skills/Processes	Assessment
<p>Continued</p>		<p>Design requirements specify how a vehicle or other product must perform. Lessons 5, 6, 9, 14-16</p>	<p>Designing a vehicle that is propelled by stored energy. Lessons 6-16 (Student investigations, Record sheets, Student drawings, Oral presentations, Teacher observations, and Building vehicles)</p>	<p>Student investigations Record sheets Oral presentations Teacher observations Building vehicles</p>
		<p>Cost is often an important consideration in designing a product. Lessons 13-16</p>	<p>Solving design problems using previously collected data. Lessons 5, 10, 14-16 (Student investigations, Record sheets, Teacher observations, and Building vehicles)</p>	<p>Oral presentations Building vehicles</p>
		<p>Engineers develop, modify, and improve designs to meet specific requirements. Lessons 1, 2, 5, 8, 9, 11-16</p>	<p>Communicating results of an investigation through record sheets, written observations, drawings, and class discussions. Lessons 1-10, 12-16 (Student investigations, Record sheets, Student drawings, Oral presentations, Teacher observations, and Student self-assessment)</p>	<p>Student investigations Record sheets Student drawings Oral presentations Teacher observations Building vehicles Student self-assessment</p>

Grade 5 - **Microworlds**

Microworlds	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students investigate both living and nonliving specimens with a variety of magnifiers, including the microscope.</p>	<p>How do scientists use magnification to learn about microworlds and what is the impact on our daily lives?</p>	<p>In order to magnify, a lens must be transparent and curved.</p>	<p>Determining which of various objects can magnify.</p>	<p>Student investigations Record Sheets Class discussions Brainstorming</p>
		<p>Magnification is directly related to how much a lens is curved.</p>	<p>Using magnifiers, including hand lenses and microscopes, to observe living and nonliving specimens.</p>	<p>Student investigations Self –assessment Record Sheets Teacher observation Class discussions</p>
		<p>Higher magnification reveals more detail in a smaller area of a specimen being observed.</p>	<p>Using appropriate equipment and techniques to prepare microscope slides for viewing.</p>	<p>Student investigations Preparing slides Record Sheets Teacher observation</p>
		<p>In light microscopes, lenses are combined to focus light and increase magnification.</p>	<p>Using a microscope to observe basic cell structure.</p>	<p>Student investigations Student drawings Teacher observations Record Sheets</p>
		<p>Scientists designed and used early microscopes to extend their observational ability and to investigate their ideas.</p>	<p>Communicating detailed observations through writing, drawing, and discussion.</p>	<p>Class discussions Student drawings Oral presentations</p>
		<p>Some living organisms are too small to see without magnification.</p>	<p>Making measurements of small objects using hair-widths and millimeters.</p>	<p>Student investigations Record Sheets Teacher observations</p>
		<p>All living things are made of at least one cell.</p>	<p>Exploring ways to slow the movement of living microscopic specimens for closer observation.</p>	<p>Student investigations Student drawings Class discussions</p>
		<p>When magnified, all cells have observable structures.</p>		<p>Student investigations Student drawings</p>
		<p>Microorganisms are widespread in nature.</p>		<p>Class discussions Teacher observations</p>
		<p>Bacteria are partly responsible for the decomposition of organic material over time.</p>		<p>Class discussions Teacher observations</p>
<p>Some bacteria are eaten by other microorganisms.</p>		<p>Class discussions Teacher observations</p>		

Grade 5 - **Microworlds**

Microworlds	Essential Learning	Content	Skills/Processes	Assessment
Continued		Like all organisms, microorganisms grow and reproduce.		Class discussions Student drawings Teacher observations
		Microorganisms have structures that help them survive in specific environmental conditions.		Student investigations Class discussions Student drawings
		Changing environmental conditions promote the survival of some microorganisms over others and therefore change microbial communities.		Class discussions Teacher observations

Grade 5 – **Watery Earth**

Watery Earth	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students will experience water with fresh eyes.</p>	<ul style="list-style-type: none"> • How is water essential to life? • How do organisms use water? • Why is it important to conserve and preserve water? 	<ul style="list-style-type: none"> • A natural resource is something we get from our environment to meet our wants and needs. • Water is a natural resource that is essential for life. • Living things use and need water in different ways. • Humans have devised methods to access and clean water. • Most people in the United States use more water than they need to survive. • Water covers about two-thirds of Earth’s surface. • Nearly all of the world’s water is contained in the salty oceans. • Most of Earth’s fresh water is stored underground and in glaciers and polar ice caps; a tiny fraction is in the air. • A small fraction of Earth’s fresh water is accessible by humans. • Earth’s water circulates around the water cycle through these processes; evaporation, condensation, precipitation, and percolation. • Since there is a limited supply of water on Earth, we should conserve and protect it. • We can conserve water by using less of it and by using it more efficiently. • We can protect water by preventing pollutants from entering the water cycle, and by cleaning water that has been polluted. • Pollutants are often difficult to remove from water. • Water pollution can harm living organisms and their habitats. 	<ul style="list-style-type: none"> • Personal record/journal • Interview • Calculation on rate of water flow • Construct models & later “remodel” • Communications in small/whole groups on experiments and their finding • Making comparison • Examination of photos to compare and contrast • Categorizing and analyzing collected data • Computing data for problem solving • Application of concepts/knowledge to new case studies 	

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Integration with Language Arts, Art, Music, Social Studies

Grade 5 – **Floating & Sinking**

Floating & Sinking	Essential Learning	Content	Skills/Processes	Assessment
<p>In this unit, students investigate the phenomenon of buoyancy.</p>	<p>What are the variables that affect the buoyancy of an object?</p>		<p>Observing, recording, and organizing test results. Lessons 1-16 (Pre and post unit assessments, record sheets, notebook entries, and student-made record sheets)</p>	
	<p>What connection does buoyancy have on earth features?</p>	<p>Water pushes up on both floating and submerged objects with a buoyant force; objects push down on the water. Lessons 7-16</p>	<p>Applying previous experiences to make predictions. Lessons 1-16 (Pre and post unit assessments, Record sheets, notebook entries, and small-group and class discussions)</p>	<p>Record sheets Notebook entries Class discussions</p>
		<p>The buoyant force on large objects is greater than the buoyant force on smaller objects. Lessons 7-16</p>	<p>Creating and analyzing graphs. Lessons 3, 5, 11-12, 14 (Class and individual graphs, notebook entries, and class discussions)</p>	<p>Class discussions Notebook entries</p>
		<p>The amount of water an object displaces is directly related to the object’s volume. Lessons 9-16</p>	<p>Calibrating a spring scale and using it to measure the magnitude of a force. Lessons 4-6, 9-13, 16 (Observations of spring scales, record sheets, class graphs, and observations of investigations)</p>	<p>Record sheets Small-group and class discussions Notebook entries</p>
		<p>Because of buoyant force, objects appear to weigh less when they are submerged. Lessons 10-12, 15-16</p>	<p>Reading science materials for information. Lessons 8, 10, 15 (Class discussions, notebook entries, and student self-assessment)</p>	<p>Class discussions Notebook entries Record sheets</p>
		<p>Objects that weigh more than the same volume of water sink; objects that weigh less than the same volume of water float. Lessons 12, 14-16</p>	<p>Communicating results through writing and discussion. Lessons 1-16 (Pre and post unit assessments, record sheets, and notebook entries)</p>	<p>Class discussions Notebook entries</p>

Grade 5 – **Floating & Sinking**

Floating & Sinking	Essential Learning	Content	Skills/Processes	Assessment
Continued		Salt water weighs more than an equal amount of fresh water. Lessons 13-16	Solving a problem that requires the application of previously learned concepts and skills. Lessons 7-8, 16 (Notebook entries, observations of boats, record sheets, and notebook entries)	Record sheets Notebook entries
		The buoyancy of an object varies with the density of the liquid. Lessons 14-16		Pre and post unit assessments Class lists Notebook entries

Grade 6 – **Earth’s Structure & Processes**

Earth’s Structure & Processes	Essential Learning	Content	Skills/Processes	Assessment
<p>Earth’s systems can be broken down into individual components which have observable, measurable properties.</p>	<p>How does the structure of the Universe, motions, and characteristics define earth and its place in the Universe?</p>	<p><u>Earth’s Structure</u> Standards: F-3, F-4 (Current MLR)</p> <ul style="list-style-type: none"> • The Age of the Earth can be determined by their materials position in the rock layers. • The properties and composition of the following major layers of the earth: crust, mantle, and core. 	<ul style="list-style-type: none"> • Observations • Written and Oral Descriptions 	
	<p>What are the processes that shape the Earth?</p>	<p><u>Fossils-</u> Standards: D-1, D-2</p> <ul style="list-style-type: none"> • Fossils provide important evidence of how life and environmental conditions have changed over time. • Fossils can be used by scientist to trace the history of a species. • Scientists use fossils to prove that life forms, climate, environment, and geologic features in a certain location are not the same now as they were in the past. 	<ul style="list-style-type: none"> • Analyze models 	
	<p><u>Plate Tectonics</u> Standard: F-4</p> <ul style="list-style-type: none"> • Plate tectonics create certain geological features, materials, and hazards. • The hypothesis of continental drift led to plate tectonics. • Seafloor spreading 	<ul style="list-style-type: none"> • Compare and contrast • Define hypothesis • Verbal & written explanations 		

	How does the interior of the Earth affect us?	<p><u>Rocks & Minerals</u> Standards: F-5, F-6</p> <ul style="list-style-type: none"> • Rock and Minerals are different. • Rocks and minerals are classified by the following observable properties: grain, color, texture, hardness. • The different types of rocks and how they are formed: metamorphic, igneous, sedimentary • The rock cycle 	<ul style="list-style-type: none"> • Classifying 	
		<p><u>Weathering & Erosion</u> Standard: F-2</p> <ul style="list-style-type: none"> • Soil is formed from the weathering of rocks and organic activity. • Soils differ from one place to another 		
		<p><u>Volcanoes & Earthquakes</u> Standard: F-4</p> <ul style="list-style-type: none"> • The earth’s surface undergoes steady or sudden changes due to many forces. • Earthquakes result from the buildup of energy in rocks. • Earthquakes are measured. • Types of faults. • Conditions that cause volcanoes to form. • The relationship between volcanoes and earth’s moving plates. • Types of volcanoes. 	<ul style="list-style-type: none"> • Identifying • Distinguishing 	

	<p>How do earth and atmospheric processes affect people?</p>	<p><u>Atmosphere, Weather & Climate</u> Standard: F-4, F-7</p> <ul style="list-style-type: none"> • Weather and climate are different. • Climate and weather affect the way we live. • The basic features of the water cycle • What determines climate • The atmosphere is divided into five layers with different characteristics. • The properties and composition of the layers of the atmosphere • Various geographic features affect weather and climate 	<ul style="list-style-type: none"> • Collecting & analyzing data • Observe weather & climate conditions • Predict weather conditions based on an analysis of atmospheric data. • Distinguish between weather & climate 	
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Grade 6 – **The Universe**

The Universe	Essential Learning	Content	Skills/Processes	Assessment
<p>The Solar System consists of planets, moons, and other smaller objects including asteroids and comets that orbit the sun.</p>	<p>How does the structure of the Universe, motions, and characteristics define earth and its place in the Universe?</p>	<p>Earth’s tilt on its axis changes the length of daylight and creates the seasons. Standard: F- 1</p>	<p>Describe the relationship between the tilt of the Earth’s axis and its orbit around the sun produces days, years, and seasons.</p>	
		<p>The moon changes in a predictable cycle as it orbits Earth and as Earth rotates on its axis. Standard: G-5</p>	<p>Explain the phases of the moon in terms of the relative positions of the Earth, sun and moon during a month.</p>	
		<ul style="list-style-type: none"> • Stars form pictures in the sky called constellations understood by various cultures. • People have historically grouped stars in night sky. • The life cycle of a star. • How stars are classified. <p>Standard: G-1</p>	<ul style="list-style-type: none"> • Locate and identify stars that are grouped in patterns in the night sky. • Descriptions of science concepts 	
		<ul style="list-style-type: none"> • A galaxy consists of stars, gas, and dust held together by gravity. • Distinction among comets, meteoroids, and asteroids. <p>Standard: G-2</p>	<p>Describe numbers, distances, and composition of galaxies, and the location of the sun in our galaxy.</p>	
		<ul style="list-style-type: none"> • It takes time for light to travel. Gravity holds the planets in orbit. • Gravity holds planets in orbit around the Sun. • Determine the light-years <p>Standard: G-3</p>	<ul style="list-style-type: none"> • Create and use a star finder. • Calculation light year • Use a telescope to view objects in the sky. 	
		<p>Scientist can learn about the solar system by collecting data from satellites, probes, and other tools used in space exploration. Standard: G-4</p>	<p>Role play in a simulation</p>	

Grade 7 – **Cells**

Cells	Essential Learning	Content	Skills/Processes	Assessment
<p>There is a basic organization to a living system.</p>	<ul style="list-style-type: none"> • What are the basic structures and functions of a cell? • What is respiration? • What is photosynthesis? • How is information passed from parent cell to daughter cell 	<p><u>Cells</u> – E3 (Proposed MLR)</p> <ul style="list-style-type: none"> • The basic structure of cells are the nucleus, cytosol, organelles, and all membrane • Cells are the basic units of life. • There are basic functions carried by particular cell structures. • Respiration is the process of making chemical energy available to the cell. • Photosynthesis is using sunlight to make chemical energy. • There is genetic information in the cell passed from a parent cell to its daughter cell. 	<ul style="list-style-type: none"> • Use a microscope to identify • Distinguishing cell structures 	

Grade 7 – **Life Cycles**

Life Cycles	Essential Learning	Content	Skills/Processes	Assessment
<p>Life sciences will examine the characteristics and processes of living systems.</p>	<ul style="list-style-type: none"> • What is life? • How is energy transferred through a community of organisms? 	<p><u>Ecology</u></p> <ul style="list-style-type: none"> • Life is found nearly everywhere on earth. B2, B3 • The features of the environment that are alive or were once alive are called biotic factors. B5 • The non-living, physical features of the environment are called abiotic factors. B5 • The biotic and abiotic factors in the environment determine which kinds of organisms can live there. (proposed MLR E2) • Food molecules are produced and energy released through the process of photosynthesis and respiration (The carbon cycle). B1, B2, B4 	<ul style="list-style-type: none"> • Using the internet, reference materials or other sources of information to identify common biotic and abiotic factors. • Comparing and contrasting food webs and energy pyramids. • Reading science materials and taking notes to describe how energy flows through an ecosystem. • Designing an experiment that investigates a cycle of matter. 	
	<ul style="list-style-type: none"> • How do scientists classify living things? • How are organisms adapted for survival? 	<p><u>Classifying Life</u></p> <ul style="list-style-type: none"> • All living things are classified according to similar characteristics (proposed MLR E1, E3) • All living things use energy and raw materials to develop, grow and reproduce. A3 • Adaptations allow organisms to survive in a changing environment. A3 	<ul style="list-style-type: none"> • Creating a concept map to show the steps used to classify an unknown organism. • Interpreting scientific photos or illustrations to identify adaptations necessary for survival. • Reading scientific materials and taking notes to describe factors necessary for life on earth. 	
	<ul style="list-style-type: none"> • What are the characteristics of organisms in the kingdom monera? 	<p><u>Monera</u></p> <ul style="list-style-type: none"> • Monerans are tiny organisms that lack a nucleus and other cell structures. A1, A2 (proposed MLR E3) • Viruses are tiny particles that can invade living cells. D3 • Bacteria cause disease in a variety of ways. D3 • Bacteria are helpful to humans in the production of food, fuel, medicine and industrial products. D3 • Bacteria are an essential part of the food and energy relationships that link all life on earth. D3 	<ul style="list-style-type: none"> • Constructing a graph to predict and illustrate a scientific concept. • Conducting research and content. • Reading science material and taking notes to describe the essential scientific concepts. • Conducting research to create a 3-D or virtual model. 	

Grade 7

	Essential Learning	Content	Skills/Processes	Assessment
	<ul style="list-style-type: none"> What are the characteristics of organisms in the kingdom protista? 	<p><u>Protists</u></p> <ul style="list-style-type: none"> Protists are unicellular organisms that contain a nucleus. A1, A2, (proposed MLR E3) Protists are classified as plant-like or animal-like organisms. (proposed MLR E3) Protists vary greatly in appearance and the ways they carry out their life functions. (proposed MLR E3) 	<ul style="list-style-type: none"> Using a microscope to observe and draw the cellular structures found in protists. Creating a table to compare and contrast the characteristics shared by all protists. Reading science material and taking notes to explain why protists are difficult to classify. 	
	<ul style="list-style-type: none"> What are the characteristics of organisms in the kingdom fungi? 	<p><u>Fungi</u></p> <ul style="list-style-type: none"> Fungi are multi-cellular heterotrophs that are made up of thread like hyphae and reproduce with spores. A1, A2 (proposed MLR E3) All fungi obtain the energy and chemicals they need by growing on a source of food. (proposed MLR E3) Fungi are useful to humans in the production of food and medicine. D3 	<ul style="list-style-type: none"> Creating a chart to compare and contrast the characteristics shared by all fungi. Creating a field guide to identify and describe different types of fungi. Using the internet, reference materials or other sources of information to identify ways in which fungi are helpful and harmful to humans. 	
	<ul style="list-style-type: none"> What are the characteristics of organisms in the kingdom plantae? 	<p><u>Plants</u></p> <ul style="list-style-type: none"> Plants are multi-cellular organisms possessing cells which have a nucleus and other cellular structures which provide support and protection. A1, A2, (proposed MLR E3) Most plants contain chlorophyll which is used to make food in a process called photosynthesis. B1 Plants are adapted to life on land in a variety of ways. (proposed MLR E2) Plants are classified into two main groups: non-vascular (seedless) plants or vascular (seed) plants. (proposed MLR E1) Plants are useful to humans in the production of food, clothing, shelter, medicine and fuel. D4 	<ul style="list-style-type: none"> Using a microscope to observe and draw the cell structure of a vascular plant. Creating a table to compare and contrast the characteristics of vascular and non-vascular plants. Designing an experiment to determine the effect of light on photosynthesis. 	

Grade 7 - Continued

	Essential Learning	Content	Skills/Processes	Assessment
	<ul style="list-style-type: none"> What are the characteristics of organisms in the kingdom animalia? 	<p><u>Animals</u></p> <ul style="list-style-type: none"> Animals are multi-cellular organisms which depend on other living things in their environment for food. A3 Most animals have cells with a nucleus, digest their own food, move from place to place, and are capable of sexual or asexual reproduction. D4, (proposed MLR E4) Animals have many different physical, predatory and behavioral adaptations which help them meet their needs. (proposed MLR E5) Animals are classified into two large groups: vertebrates and invertebrates . A1, A2 	<ul style="list-style-type: none"> Creating a flow chart to classify animals based on their internal and external structures and behaviors. Comparing and contrasting characteristics shared by vertebrates and invertebrates. 	

Grade 8 - Physical

Physical	Essential Learning	Content	Skills/Processes	Assessment
<p>These units examine matter and energy.</p>	<ul style="list-style-type: none"> • What is matter? • Why is the Periodic Table important? 	<p><u>Periodic Table</u> -Matter is anything which has mass and volume. -Matter is present in four known phases; solid, liquid, gas, and plasma. -Atoms are the smallest form of a chemical element that retains the chemical properties of that element -The model of the atom has been developed over a great period of time using the principles of the scientific method. Our understanding continues to grow as technology and research allows. -Atoms are made up of three principle subatomic particles; protons, neutrons, and electrons -The quantity and arrangement of subatomic particles that exist in an atom determine the properties of that atom. -The Periodic Table is an organizational tool that allows its users to make sound predictions on chemical properties and interactions based on our knowledge of the periodic nature of elements.</p>	<p><u>Periodic Table</u> -Describe the quantitative properties of matter and measure the appropriate property using the corresponding tool. [Essential Skill] -Compare and contrast the four phases of matter, utilizing the Kinetic Theory -Explain the role that the scientific method has played in the development of the atomic model by describing the evolution of the atomic model from Democritus to Bohr model. -Compare and contrast the three atomic sub-particles and correlate their presence in an atom to its particular chemical and physical properties -Make predictions on chemical properties and potential chemical interactions using the Periodic Table -Identifies elements on the Periodic Table based on their atomic symbol.</p>	
	<ul style="list-style-type: none"> • How do the characteristics, properties, and forms of energy affect its use? 	<p><u>Energy</u> -Energy is the property that matter has, allowing it to do work. -Energy comes in a variety of forms; gravitational (potential and kinetic), chemical, electrical,</p>	<p><u>Energy</u> -Discerning the various forms of energy -Quantitatively describes various energy levels using mathematical equations and</p>	

		<p>mechanical, heat/thermal, light sound.</p>	<p>appropriate experimental apparatus</p>	
	<ul style="list-style-type: none"> How do humans use the principles of force and motion in their daily lives? 	<ul style="list-style-type: none"> -Energy has the ability change forms between one another, following strictly the “Law of Conservation of Energy” -Energy travels in a system in a variety of ways; waves, conductions, convection, radiation -Energy, at the consumer level, has both renewable and nonrenewable sources 	<ul style="list-style-type: none"> -Analyzes and plans for the use of renewable and nonrenewable resources in today’s modern age -Conducting investigations & experiments 	
	<ul style="list-style-type: none"> How do humans use the principles of force and motion in their daily lives? 	<p><u>Forces and Motion</u></p> <ul style="list-style-type: none"> -Motion is the change of position relative to a reference point. -An object/mass/matter will stay at rest or in motion unless acted upon by an outside force -To every action/force applied, there is an equal but opposite reaction 	<p><u>Forces and Motion</u></p> <ul style="list-style-type: none"> -Diagrams all forces applied on a resting/moving object to account for its state of motion. -Mathematically calculates the velocity, distance, time, and acceleration of an object in motion using known formulas of motion. -Experimentally proves/describes Newton’s Laws 	
	<ul style="list-style-type: none"> How do machines help us live our lives? 	<p><u>Simple Machines</u></p> <ul style="list-style-type: none"> -Work is a measurement of force applied through a distance -An inclined plane is a planar surface set at an angle against a horizontal surface to reduce to the amount of force applied over a distance -A wedge is a combination of two inclined planes placed next to each other used to displace two objects or portions of one object by applying a force to the object perpendicular to the 	<p><u>Simple Machines</u></p> <ul style="list-style-type: none"> -Locate simple machines in every day objects and describes qualitatively how they reduce the work completed in a system. -Experimentally demonstrates the reduction in work of a system in the presences of simple machines. -Mathematically describes the force and work in a system for 	

		<p>wedge</p> <p>-A lever is a rigid object/arm that is used with a pivot/fulcrum to multiply the force applied to an object</p> <p>-The wheel and axle is a form of a lever where an axle acts as a pivot/fulcrum and the wheel acts as rigid object/arm</p> <p>-A pulley is a grooved wheel with a cable/rope running through it that is used to reduce the amount of force needed to move and object/mass over a distance</p> <p>-A screw is a helical inclined plane positioned on an axel used to apply a rotational force through torque and vice versa</p>	<p>each of the six types of simple machines.</p>	
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**Environmental and Space Science
Grade 9**

1. Units: Introduce to Ecology, Food for the Table-Changes through Science and Technology, The Atmosphere and Pollution, Water – The Essential Fluid, and Energy-Past, Present, and Future.

Essential Question: How do all living things depend upon living and their environment?

Standard/Content: B. students will understand how living things depend on one another and on nonliving aspects of the environment.

Skills/Processes:

- Analyze the interactions, cycles, and factors that affect short and long term ecosystem stability and change.
- Explain the concept of carrying capacity.
- Describe the flow of matter and energy in ecosystems.

2. Units: Introduce to Ecology, Food for the Table-Changes through Science and Technology, The Atmosphere and Pollution, Water – The Essential Fluid, and Energy-Past, Present, and Future and the Moon

Essential Question: What evidence do we have that demonstrates living/nonliving things change over time?

Standard: D. students will understand the basis for all life and that all living things change over time.

Content/Skills/Processes:

- Explain both the evidence used to develop the geologic time scale and why an awareness of geologic time is important to an understanding of the process of change in the universe as well as on earth.
- Describe and document the importance of relatively short term changes (one generation) on a species survival.

3. Units: Earth and the Nature of Science

Essential Question: How does the earth's surface change over time and what scientific evidence do we have to support this?

Standard: F. students will gain knowledge about the earth and the processes that change it.

Content/Skills/Processes:

- Examine the theory of plate tectonics and the evidence that supports it.
- Investigate erosion forces that change the surface of the earth
- Describe ways that scientists measure long periods of time and determine the age of very old objects.

4. Units: Solar Systems, Stars and Galaxies, and Space Exploration

Essential Question: How have humans learned about space?

Environmental and Space Science (continued)
Grade 9

Standard: G. Students will gain knowledge about the universe and how humans have learned about it and about the principles upon which it operates.

Content/Skills/Processes:

- Describe how scientists gather data about the universe.
- Investigate our solar system, stars, and galaxies.
- Discuss the Big Bang Theory.
- Simulate space exploration using computers and equipment provided at the Challenger Space Center

Standard: M. Students will understand the historical, social, economic, environmental and ethical implications of science and technology.

Content:

- Research a scientist who has contributed to science and technology and impacted our society
- Examine the impacts of political decisions on science and technology on society.
- Analyze the impacts of various scientific and technological developments.

Skills/Processes:

Standard: L. Students will communicate effectively in the application of science and technology.

- Use notebooks and self assessments to describe and analyze scientific and technological experiences and to reflect on problem solving processes.
- Use computers to organize data, generate models, and do research for problem solving.
- Engage in a debate on a scientific issue, where both points of view are based on the same set of information.
- Make and use appropriate symbols, pictures, diagrams, scaled drawings, and models to represent and simplify real life situations and solve problems,

Standard: J. Students will apply inquiry and problem -solving approaches in science and technology.

- Design and carry out experiments.
- Use various science tools appropriately for accurate measurements and to make accurate observations.
- Recognize there is more than one way to solve problems.

Standard: K. Students will learn to formulate and justify ideas and to make informed decisions.

- Participate in class discussions about environmental issues.
- Write persuasive paper, letter, or pamphlet.
- Support their conclusions with accurate data and be able to defend it.
- Analyze situations where more than one logical conclusion can be drawn.

Biology
Grade 10**1. Unit: The Living System**

Essential Questions: What are the requirements for, and characteristics of, life, whether single-cellular or multi-cellular? What is science? What is the scientific method?

Standard/Content: **MLR Science standard A:** Classifying life forms, characteristics of life.
All living systems can be characterized and classified.

Skills and Processes:

- MLR Standard J & K: Use of Inquiry, Scientific Method, and Scientific Reasoning in determining characteristics of a living system and strategies for a system's survival. Student will formulate a scientific question, experimental design, and conclusions based upon scientific evidence.
- MLR Standard L: Communication of science knowledge will be made in Lab Reports, a Lab Journal, and in succinct answers and explanations to classroom questions. (*These basic ideas will be explored through observations, lab investigations, and reading/discussion.*)

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2. Unit: Structure and Function of Life.

Essential Questions: What is the basic chemistry of life? What are the basic structures and functions of, and within a cell?

Standard/ Content:

- **MLR Standard C:** Students will demonstrate knowledge of the cell as the basic unit of life. Students will understand that the cell system has a membrane to help maintain and regulate its system; that it requires certain macronutrients, and communication with the its environment; that the cell has internal organelles that have specialized functions in maintaining and continuing life, both as a cell unit, and as a part of the whole organism.

Skills and Processes:

- MLR Standards J, K: Students will conduct experiments and observe demonstrations. The student will learn to formulate and justify ideas, explain and defend them with valid evidence, and from this, make informed decisions or conclusions.
- MLR Standard L: The student will write lab reports, draw and label diagrams, and create and informational visual of a living system.
- Students will study synthesis, transport, and communication within a cell; Structure and function of cell & organelles; Cell theory.

3. Unit: Energy of Life.

Essential Question: How does a cell obtain energy?

Standard/ Content:

- **MLR Standard A:** All living things use some form of Energy.
- **MLR Standard C:** As the basic unit of life, the cell obtains, uses and transfers energy for its specific functions. This energy is made available to the functioning of the organism.
- Photosynthesis and respiration will be studied using experimentation, lecture-notes, and diagrams.

Biology (continued)
Grade 10

Skills and Processes:

- **MLR Standards J, K:** Lab inquiry and scientific method is used to examine and solve questions about cell energy using reasoning and systematic method.
- **MLR Standard L:** Students will write a Lab report and a comparative diagram of cell processes.

4. Unit: Continuity of Life

Essential Questions : What are genes? How is genetic information inherited and expressed? And... How does life undergo genetic change?

Standard/Content:

- **MLR Standard C** “The Cell as the Basic Unit of Life”: The basis of genetic information (our traits) is molecular and is stored in and transmitted through our cells. We will learn about the cell cycle, genetics, and patterns of inheritance; Also, the double helix, gene regulation, and genetic engineering.
- **MLR Standard D** “The Basis for all Life is Molecular, and Living Things Change Over Time.
- The inheritance of genetic information is at the cellular level, and the appearance of traits will depend on variation and probability, and is due to chance and selective pressure.

Skills and Processes:

- MLR Standard J, K: Problem solving is used in examining patterns of inheritance, variation and probability of traits, and predicting outcomes of crosses. Also, Evidence of evolution is examined, and a history of scientific theories is researched. Reasoning throughout these processes reflects historical processes of reasoning throughout earlier times.
- MLR Standard L: The journal and Lab reports will be used to communicate investigations.
- MLR Standard M: Medical, Social, and Ethical considerations are explored in such topics as
- Stem Cells, Recombinant DNA, or Bioengineering of foods/livestock/medicine, population changes due to environmental change.

5. Unit: Diversity of Life.

Essential Question: What are the similarities and differences among and between living forms, and how do we know and organize these?

Standard/Content:

- **MLR Standard A:** Classifying Life Forms. There are similarities among groups of living forms, and differentiation across phylogenetic relationships. Modern classification is based on DNA sequencing, or the inheritance of traits at the molecular level.
- We will examine classification and phylogenetic relationships. We will look at similarities and differentiation between and among viruses and 6 kingdoms.

Biology (continued)
Grade 10

Skills and Processes:

- MLR Standard J, K Lab examination and analyses of similarities and differences among diverse organisms will allow students to discover structural relationships, and support functional comparisons.
- MLR Standard L: Lab dissections and diagrams will be used to deepen understanding.
- MLR Standard M: A research option will be offered related to phylogenetic relationships, DNA analyses, and other evidence of evolution.

6. Unit: Organization of Life..

Essential Question: How is life organized from the level of the cell to the level of the organism? *Specialization in development.*

Standard/Content:

MLR Standard A and C: Life functions of the individual are as life functions of the cell, and as a cell grows, multiplies and the organism becomes larger, cells differentiate. Each performs some of the life functions needed by the organism, while it derives benefit from other cells.

Skills and Processes:

- MLR Standards J, K: Lab dissection will be a tool to describe and relate development and interdependency in a living system.
- MLR Standard L: Lab journal drawings and reports will communicate this information.

Physical Science Syllabus
Grade 10

1. Units: Newton's First Law: Inertia, Newton's Second Law: Mass and Acceleration, Newton's Third Law: Action-Reaction, and Energy: Potential and Kinetic

Essential Question: How do forces change motion?

Standard: I - Students will understand the motion of objects and how forces can change that motion.

Content: Introduction of Newton's three Laws of Motion and how concepts of inertia, mass, acceleration and action- reactions determine the forces on and movement of objects.

2. Unit: Energy: Potential and Kinetic

Essential Question: How is kinetic energy changed into potential energy? How is potential energy changed into kinetic energy?

Standard: H - Students will understand concepts of energy.

Content: Introduction of the concepts of kinetic and potential energy, how they are different, and how to determine the amount of each type of energy present in a falling object.

3. Unit: Numbers in Science – Unit to strengthen skills on measurement and problem solving.

Processes:

- **Standard J: Students will apply inquiry and problem solving approaches in science and technology.** A major component of Physical science course will be solving problems that relate to forces that affect the motion of an object. Students will make accurate observations using appropriate tools and units of measurement.
- **Standard L: Students will communicate effectively in the application of science and technology.** In Physical science students will develop the appropriate tables, charts, & graphs to explain and interpret the results of their work. Lab reports will be required along with science journals.
- **Standard K: Students will learn to formulate and justify ideas and to make informed decisions.** Students will analyze research or other literature for accuracy in the design and findings of experiments.

Content: Standard M: Students will understand the historical, social, economic, environmental and ethical implications of science and technology. Students will analyze the impacts of various scientific and technological developments.

Chemistry
Grade 11

Unit: Structure of Matter

Essential Question: What is matter? What changes can matter undergo?

Standard: E: Students will understand the structure of matter and the changes it can undergo.

Content:

- **Matter:** The physical and chemical characteristics of different types of matter,
- **Matter, Gas Laws, and Thermochemistry:** how matter is affected by changes in temperature, pressure, and volume,
- **Atomic Structure and Chemical Bonds:** trace the development of models of the atom and use atomic structure to describe chemical bonding, and
- **Chemical Reactions:** study some basic types of chemical reactions and apply the Law of Conservation of Matter to them.

Unit: Energy

Essential Question: What energy is involved in Chemical changes?

Standard: H: Students will understand concepts of energy.

Content: Thermochemistry: the internal energy of matter, the changes that occur in matter when heat is transferred to or from it, and the analysis and quantifying the energy released or absorbed in chemical reactions.

Unit: Motion

Essential Question: How can motion of particles explain the behavior of matter?

Standard: I: Students will understand the motion of objects and how forces can change that motion.

Content: Gas Laws Unit: kinetic theory and be able to explain the behavior of matter in terms of the particle motion within the matter and how the forces between atoms, ions, molecules affect the behavior of matter.

Unit: Solutions

Essential Question: How do we measure the concentration of solutions?

Content: What effect does the solution have on the properties of the solvent, solution concentrations, different measures of concentration, and colligative properties (dissolution)

Chemistry (continued)
Grade 11

Unit: Kinetic Equilibrium /Acids and Bases

Essential Question: Kinetic Equilibrium: What are acids and bases and how do they react?
Acids and Bases: How can we control the rates of chemical reactions?

Content:

- Kinetic Equilibrium: Different factors that affect reaction rates.
- Acids and Bases: Acids and their characteristics, Bases and their characteristics, Measuring the strengths of acidity, and what products results from reacting acids and bases.

Skills and Processes:

- **INQUIRY AND PROBLEM SOLVING: Students will apply inquiry and problem-solving approaches in science and technology.** Students will use experimentation to learn chemistry. We will do a variety of different types of experiments, collecting both qualitative and quantitative data to draw conclusions. Students will also be expected to apply their knowledge of chemistry in problem solving and in lab challenges.
- **SCIENTIFIC REASONING: Students will learn to formulate and justify ideas and to make informed decisions.** Students will use both qualitative and quantitative data collected in experiments to draw conclusions and make generalizations. They will be expected to justify and defend their conclusions with data that is reliable and repeatable. Students are expected to identify sources of error in experiments, correcting them when possible.
- **COMMUNICATION: Students will communicate effectively in the application of science and technology.** Students will present their work in a manner appropriate to science. Written work will be clear and concise. Ideas will be presented using appropriate symbols, diagrams, drawing, and mathematical equations. Data will be presented in appropriately labeled tables and graphs. Students will keep lab books for recording data and writing lab reports.
- **IMPLICATIONS OF SCIENCE AND TECHNOLOGY:** Students will understand historical, social, economic, environmental, and ethical implications of science and technology. In Chemistry we will use our study of atomic models to see how scientific understanding changes over time. We will examine the social, economic, political, and technological influences on scientific discovery and the impact understanding the atom has had on society.

Physics
Grade 12

Unit: ENERGY: Work and Energy, Electrostatics, Electricity, Magnetism, Electromagnetic Induction, Waves, and Light and Optics

Essential Question: What are the difference types of energy? How can one form of energy be transformed into another?

Standard: H: Students will understand concepts of energy.

Content: Different types of energy including: kinetic; potential; light; electricity; and magnetism and the analysis of mechanical systems to study conservation of energy and the transfer of energy in doing work.

Unit: MOTION: Linear motion and problem solving, Vectors, Newton's Laws of Motion, forces, Momentum, Work and Energy, and Rotational motion

Standard: I: Students will understand the motion of objects and how forces can change that motion.

Content: Describe linear, 2-dimensional, and rotational motion, both qualitatively and quantitatively and the momentum of moving objects and how forces on objects effect their motion and momentum.

Skills and Processes:

- **INQUIRY AND PROBLEM SOLVING:** Students will apply inquiry and problem-solving approaches in science and technology. Students will use investigations and experimentation to learn physics. We will be using standard lab equipment, calculator-based sensors and digital meters to collect data. Data will be analyzed using graphing calculators and computers. Problem solving will be emphasized in both learning physics and demonstrating what has been learned. Students will design and build a matchbox car stunt to demonstrate their knowledge of motion and energy.
- **SCIENTIFIC REASONING:** Students will learn to formulate and justify ideas and to make informed decisions. Students will use data collected in investigations and experiments to draw conclusions and make generalizations. They will be expected to justify and defend their conclusions with data that is reliable and repeatable. Students are expected to determine the standard deviations in their data and identify sources of error, correcting them when possible.
- **COMMUNICATION:** Students will communicate effectively in the application of science and technology. Students will present their work in a manner appropriate to science. Written work will be clear and concise. Ideas will be presented using appropriate symbols, diagrams, drawing, and mathematical equations. Data will be presented in appropriately labeled tables and graphs.