Lake Mills School District

Year at a Glance Scope and Sequence for Science

Overarching Goal of the Curricular Area: To use the scientific method emphasizing inquiry and critical thinking skills to understand and navigate the physical and biological world we live in.

Kindergarten

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Five Senses	Students will be able to independently name the five senses and the parts of the body used for each sense.	*The five senses are used to learn about the world. *Parts of the body are connected to the five senses and send messages to the brain.	*How do the five senses help people? *Which of the five senses is the most important?
Plants	Students will be able to independently use their learning to name the different parts of plants and what plants need to live.	*Plants are living things that come from seeds and need water, air, soil, and sunlight to grow. *Plants have different parts to help them grow.	*How can we help take care of plants? *Why is it important to take care of plants?
Our Bodies	Students will be able to independently name different parts of the body and what the parts are responsible for. Students will know how to take care of the body by identifying foods from My Plate, and the importance of sleep and exercise.	*The body has many important parts that are responsible for different bodily functions. *There are things we do to take care of the body. *Food is sorted into different categories into the food pyramid.	*How do different parts of the body work together? *Why is it important to take care of the body? *Why is it important to eat a healthy diet?

The Sky and Space	Students will be able to independently name different things found in the day and night sky. Students will understand the sun is a star and what the sun does for the Earth.	*Different things are observed in the day sky vs. the night sky. *The sun is the closest star to the Earth. It provides heat and light to the Earth and is our most basic energy source. *Weather is the combination of sunlight, wind, snow or rain, and temperature.	*How do the objects in the sky seem to move and change? *How does weather impact our lives?
Habitats	Students will be able to independently name different types of habitats and the different plants and animals that live in each.	*Different weather causes areas to have different plants and animals. *Living things need water, air, and food. They find these resources in the habitats they live in.	*How can living things be so different and so alike? *How do plants and animals use their environments to survive?
Seasons	Students will be able to independently name the four seasons and the changes that occur in each.	*Seasons change as the Earth moves around the sun. *Daily and seasonal weather conditions affect what we do, what we wear, and how we feel.	*What happens when the seasons change? *How do people adapt to season changes?
Environmental	Students will be able to independently identify the 4 “R’s” (Reduce, reuse, recycle, rot).	*People need to take care of the environment. *Trash can be sorted to reduce the amount of items placed in landfills.	*How do the choices people make affect the environment? *Why is it important to sort trash?

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First Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Energy Cycles (Life Cycles)	Students will be able to: -explain the lifecycles of butterflies, chickens, frogs, and plants	Students will understand that exploring systems, order, and organizations in our natural world are integral to understanding the scientific disciplines and their interdependence. The offspring of some organisms look much like their parents when they are born and as they grow, other organisms go through a sequence of distinct stages in a process called metamorphosis.	Why do animals change over time? How can living things be so different yet so alike?
Plants and Trees	Students will be able to: -describe that there are many different kinds of plants -describe how plants and trees help people and animals	Students will understand that exploring systems, order, and organizations in our natural world are integral to understanding the scientific disciplines and their interdependence. Different types of plants have different characteristics.	Why is energy needed to keep things alive?
Animals	Students will be able to: -sort animals by classification -explore how food webs/chains sustain life	Students will understand that exploring systems, order, and organizations in our natural world are integral to understanding the scientific disciplines and their interdependence. Systems interact and influence each other. Classification is based on common characteristics which aid in	Why do animals change over time? How can living things be so different yet so alike? How is life interdependent on Earth's conditions or other life? How connected are all living things?

		understanding relationships.	
Matter	Students will be able to: -classify items as solid, liquid, or gas -define matter as taking up space and having weight	Water can exist as water vapor, liquid or solid. Energy can be transferred and can be transformed into various forms. Solids tend to maintain their own shapes, while liquids tend to assume the shapes of their containers, and gases fully fill their containers.	Why is it important to people that matter can change? What is needed to make up our world? How can properties of matter be observed and measured?
Weather	Students will be able to: -describe different kinds of weather and how weather changes with seasons -describe the water cycle	Precipitation is water that falls from the clouds in different forms. Weather changes occur during different seasons.	What is weather and how does it affect daily life? Why is it important for water to be recycled on Earth?
Heart	Students will be able to: -ways to keep the heart healthy -recall the different parts of the circulatory system	Current and future personal wellness is dependent upon applying health-related concepts and skills in everyday lifestyle behaviors. A strong heart is important.	What are the consequences of our choices if we don't take care of our heart? Is it worth it to keep yourself healthy?
Ecology and Waste Management	Students will be able to: -explain why we observe Earth Day -explain ways that Earth (land, air, water) becomes polluted and how pollution is harmful to Earth - Describe why the 4 R's (reduce, reuse, recycle, and rot) are important -understand that prevention of pollution is a	Recycling is important. Our natural resources are limited or finite so we need to conserve them. We need the earth for survival, so taking care of it is essential.	How can we be a part of nature, and not apart from it? What have humans done to change the earth? Why do we recycle? What could happen if we don't recycle?

	personal responsibility -understand that water is a finite resource		
Earth and Sky	Students will be able to: -explore how the sun is needed (heat/light) for life on Earth, including how sun exposure is beneficial to human health -identify that Earth and the other planets orbit the sun and identify the planet names	The sun is our most important source of light and heat. Each planet is different and Earth is the only one known to have life. The moon has a predictable pattern of shapes each month.	Why do we need to know about the solar system and planets? What would happen if the sun stopped acting as an energy source of living and nonliving things?
Science Inquiry (Science writing)	Students will be able to: -use observations to pose questions about liquids -use the inquiry process to find answers to questions -act as scientists to collect, measure, analyze, and organize their data as part of the scientific process -communicate and collaborate with others in an attempt to build knowledge and understanding	Scientific inquiry includes the ability of students to formulate a testable question and explanation, and to select appropriate investigative methods in order to obtain evidence relevant to the explanation.	How can I investigate my ideas about liquids? How do we use scientific investigations to find answers to questions and to ask new questions? Should we record and share our discoveries?

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Second Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Habitats	Students will be able to independently describe what a habitat is.	Students will understand that habitats provide basic needs for organisms.(plants and animals) Students will understand the habits of American Desert, Ocean, and Wisconsin Forests.	How does life on Earth exist? How is it interconnected among all living things?
Waste Management (Repurpose)	Students will create a useful item out of repurposed materials and present to their peers.	Students will understand that items can be repurposed Students will identify materials that they use that are repurposed.	Students will keep considering what would happen to our earth if we did not repurpose materials?
Weather	Students will be able to identify different types of weather. Students will be able to identify cirrus, stratus and cumulus clouds. Students will be able to explain the water cycle.	Students will understand weather conditions that occur on the Earth at all times and its changes.	What can you predict about the weather? Why is it important for water to be recycled on Earth?
Water Conservation	Students will identify how I use and conserve water in our school and their daily lives	Students will understand that we must protect the water on Earth by keeping it clean and conserving it.	How do your personal choices change the water quality on earth?
Health	Students will identify that the body parts work together. Students will identify the purpose of the digestive and circulatory systems. Students will identify	Students will understand that current and future wellness is dependent upon applying health related concepts and skills in everyday life behaviors.	What are the consequences of our choices if we don't take care of our bodies?

	the importance of a healthy diet and an overall awareness of their personal nutrition.		
Scientific Process through Energy	Students will be able to independently use the scientific process to learn about forces and motion.	Scientific Inquiry includes the ability of students to formulate a testable question and explanation and to select appropriate investigative methods in order to obtain evidence relevant to the explanation.	How can I investigate my ideas? How do we use scientific investigations to find answers to questions and to ask new questions? How do we record and share our discoveries?

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Third Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Rocks and Minerals	Students will explore the properties of rocks. Students will explore the three types of rocks: igneous, sedimentary, and metamorphic. Students will explore that rocks are made of minerals. Students will explore the rock cycle. Students will explore the components of soil.	Rocks and minerals have different physical properties. We need and use rocks and minerals every day of our lives. Rocks change over time. Soil is made up of different components and properties that make it useful in different ways.	How are rocks and minerals the same and different? How do rocks and minerals affect our lives?
Lakes. Ponds, Rivers, and Streams	Students will explore the different water sources on Earth. Students will explore the idea that water is a finite resource. Students will explore how rivers and ponds form and flow across a	The Earth is made up of 71% water. Water is constantly being recycled. Water is a limited valuable resource on Earth. Water formations are created in different ways. Reducing, reusing, recycling, and rot is important to preserve our water systems	How has water been recycled over the years? How can we protect our water resource? Is it important to reduce, reuse, recycle, and compost to preserve our water systems?

	watershed. Students will explore the idea that it is important to preserve our water resources.		
Life Cycles	Students will describe the life cycle of the frog. Students will describe how the food chain works and how a food web is formed.	Frogs are formed through a metamorphic process. Food chains combine to make a food web. Each organism can be classified as a producer or consumer; animals may be predators as well as prey. Decomposers are important consumers in food chains and webs.	Why has the frog adapted to their environment? What is the impact when one part of the food chain is disrupted?
System in the Sky	Students will describe how the Earth moves. Students will explore eclipses. Students will explore the sizes and distance of the sun and moon. Students will explore the perspective of looking at something far away Students will explore the idea that the sun is a renewable energy source.	There are observable, predictable patterns of movement in the Sun, Earth, and Moon system that account for day/night. The relationship of the sun, moon and earth causes the phases of the moon as well as the eclipses. The moon appears larger or smaller depending upon the angular distance it is from the sun. Solar and lunar eclipses do not occur every month due to the tilt of the moon's orbit (about 5 degrees) relative to the Earth's orbit around the sun.	How do the Earth, Sun, and moon interact in our solar system? What does our perspective tell us about the sizes of the moon, sun, and planets? Why is it important that buildings, such as the Lake Mills Elementary School, build in an environmentally friendly way?
Simple Machines	Students will describe the six types of simple machines. Students will explore the concepts of push and pull. Students will	Simple machines make work easier. Inclined planes and pulleys are used to change the amount of force to move an object. Newton's Laws help predict and describe motion.	What are simple machines? How do simple machines help us do work? What are forces that do work? Why are simple machines useful?

	describe inertia and friction. Students will describe gravity. Students will describe Newton's Laws.		

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Fourth Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Classification of living things	Understand the history and purpose of classification. Identify the major characteristics of each of the six kingdoms. Differentiate between vertebrates and invertebrates, and their habits.	Living things are grouped, or classified, based on similarities and differences.	How and why do scientists classify living things? What do scientists do when something doesn't fit into the classification system?
Major Food Groups & Nutrition	Identify the 5 major food groups and use My Plate. Understand how good nutrition affects learning and behavior. Identify how nutrition, exercise, and hygiene are lifelong health habits. Identify how nutrition affects wellness and	Proper nutrition is essential to growth and development. Nutrients provide energy for daily living. There are many short and long term health benefits and risks associated with nutritional choices.	What makes a food healthy? How do you determine what would be considered a "healthy meal"? How would you describe a healthy habit?

	disease prevention.		
Plants	Recognize and explain a variety of uses for plants. Understand the impact of plants in daily life. Identify the function of plant parts. Understand plant reproduction, knowing the parts of the plants.	Flowering plants have a life cycle that involves changes in growth and structure that ensures production of new plants. -Other living things depend on plant reproduction to supply the food they need.	Why is it important to take care of our Earth? How can you reuse materials to help take care of our Earth?
Oceans	Identify and explain characteristics of the ocean layers. Identify characteristics of life forms in each layer. Identify factors that make ocean water move. Understand ocean currents and tides. Identify features of the ocean floor.	The Earth's Oceans are complex environments. The majority of the Earth's surface is covered with water. Ocean currents can be caused by factors such as wind, salinity, and temperature. The moon's gravitational pull and the spinning of the Earth cause ocean water to bulge, producing tides. Ocean currents flow in predictable patterns around the world. Underneath the ocean, the Earth has plains, mountains, and valleys-which are also larger than the ones on land.	Why is the study of the oceans important? How does the movement of the ocean impact our lives?
Weather	Identify characteristics of air. Identify layers of the atmosphere. Explain the greenhouse	Climate is regulated by complex interactions among components of the Earth system. Life on Earth depends on, is shaped by, and affects climate.	How does climate affect people? How do people affect climate? What will happen to the Earth's climate if humans continue their present habits?

	effect. Identify causes of different kinds of storms. Describe wind movements. Review the water cycle. Identify 3 basic kinds of climate. Identify instruments and their purposes.		
Body Systems, Digestive System and Excretory System	Identify the 6 major body systems and their functions. Explain how the digestive system uses and digests food. Describe how teeth, tongue, and saliva help to digest food. Explain what happens to food in the stomach, small intestine, and large intestine. Explain what kinds of wastes are produced by cells in the body. Identify how the kidneys remove wastes. Describe how the skin and	The human body is a system made up of integrated subsystems that coordinate and perform a variety of operations. Living organisms have body systems for specific functions.	Why is it important to know the systems in the body? How do these body systems contribute to how the body works?

	lungs help to excrete wastes.		
Environmental Education	Understand the process of composting and demonstrate the process. Explain and demonstrate how to consume and conserve energy. Explain some ways Wisconsin uses water and conservation of water.	Everyday items can be reused/repurposed in order to create a healthy planet.	How can you reduce the materials and energy you use? How can you reuse materials and energy? How can you repurpose materials?

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Fifth Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Energy, Electricity, Forces, Motion, and Magnetism	Students will understand Newton's laws Identify the properties of magnets that make them attract & repel. Create temporary magnets. Identify the properties of a closed and open circuit. Compare how parallel and series circuits work. Recognize and identify conductors and nonconductor/insulators Explain how magnets can make objects move without direct contact between the object and the magnet.	Energy can be transferred into light, heat, sound, and magnetic effects. Electricity in circuits can be transformed into light, heat, sound and magnetic effects. Energy occurs in different forms and is necessary to do work or to cause change. Magnets can make objects move without direct contact between the object and the magnet.	How are electrical, magnetic, sound and light energies transferred and transformed? How and why do objects move? What are the patterns of movement that affect our world? What must be known about a force to predict how it will change an object's motion? How does applying a force affect the way an object moves? How do an object's properties affect how the object will move when a force is applied? How does energy interact with matter to cause change and do work?
Circulatory, Respiratory, Skeletal, and Nervous Systems	Know the parts and describe the functions and interactions of human body systems (circulatory, respiratory, nervous, skeletal)	The human body is a system made up of integrated subsystems that coordinate and perform a variety of operations. Each human body system is made up of several organs that work	What are the functions of the bones in the skeletal system? How do body parts work together to complete a task?

	Describe how the circulatory system transports oxygen and other nutrients to cells while removing carbon dioxide and other waste Describe how the nervous systems interpret information sent from sense organs	together to function. The systems of the human body work separately and together to keep the body functioning.	How does each body system contribute to supporting the life of the human body? How does the living body get what it needs to live and thrive? Why should I care about being alcohol, tobacco, and drug free? What is the difference between an organ and a system?
Classification of living things	Know and understand the history and purpose of classification Identify the major characteristics of each of the five kingdoms Differentiate between vertebrates and invertebrates, and their subcategories Use a microscope to view and classify microscopic organisms	Living things are grouped, or classified, based on similarities and differences All organisms share similar characteristics and basic needs, but they also have differences that allow people to identify, describe and classify them.	How and why do scientists classify living things What do scientists do when something doesn't fit into the classification system? How connected are all living things? What are the characteristics of life and how are living things classified? How do scientists organize living things? What are cells?
Matter	Classify objects based on properties Identify 3 states of matter Differentiate a physical change from a chemical change.	The states of matter are identifiable and comparable based on their structure and properties. Solids, liquids, and gases change from one state to another through varying factors. Matter interacts with one another and can cause change. Matter has physical properties that allow people to identify, describe, and classify it. When a new material is made by combining two or more materials, it has properties that are different from the original materials.	What can cause a change in the state of matter? How could this change depending on where you are? What makes up our world? What causes change in our physical world? How does energy interact with matter to cause change and do work? How do people describe changes in matter?

			How can the physical properties of matter be accurately measured?

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Sixth Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Scientific Method	Utilize the Scientific Method as a tool for problem solving	It is a method to define, research, and develop experimental strategies to solve an unknown question and/or problems	What defines a scientific problem? What makes a problem testable? Who has investigated similar questions? What does it mean when results don't match my hypothesis? How do I apply the Scientific Method to everyday life?
Matter	Explore the amazing universe we live in, the nature of matter and atoms	The whole universe is made up of matter (atoms) which has mass and takes up space	How can mixtures be separated using the properties of the substances from which they are made, such as density? How do the forms of matter affect humans? Is there a better way to arrange the atoms on the periodic table?
Meteorology	Distinguish the differences between weather and climate	There is a difference between weather and climate	What is the difference between weather and climate? How do temperature, pressure and water content in the atmosphere affect local weather?

			What are ways in which weather and climate affect our lives?
Astronomy	Explore our place in the universe	Earth is part of the solar system which is part of a galaxy called the milky way	How does the alignment and size of the planets affect the balance of the solar system? What is the relationship between the earth and our sun and moon? How is the Milky Way aligned with other galaxies in the universe?
Ecology	Explore Matter and Energy in Ecosystems	Ecosystems are composed of all populations that are living in a certain space and the physical factors with which they interact	How are populations in ecosystems affected by abiotic factors? How are populations affected by predator and prey relationships? What are some common food webs that connect to different ecosystems?
Biology	Explain how organisms are structured to ensure efficiency and survival	Many organisms including humans have specialized organ systems that interact with each other to maintain dynamic internal balance	What are the basic structures of an animal cell? How does the basic structure of a cell, such as a nucleus, cytoplasm, mitochondria and cell membrane, function to support life? How are organisms structured to ensure efficiency and survival?

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Seventh Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Earth's Surfaces	The students will be able to independently identify the ways in which our earth's surface changes and what forces contribute to ever changing surface of the earth.	Weathering and erosion are constantly changing the landscape of the world around us Natural forces (water, wind, ice) shape and form the earth's surface in various ways Daily activity of humans contributes to the ever changing surface of the earth	How has weathering and erosion changed the environment in which we live? How are we, as a human population speeding up the process of weathering and erosion? What natural forces shape and form earth's surface and how? How does the surface of the earth change over time?
Earth's Materials	The students will be able to independently explain how different materials that exist on earth are constantly in different states and combinations throughout our planet	Earth's materials can be broken down or combined in many different ways Materials on earth can exist in different states, such as solids, liquids, and gases Earth's materials can be classified based on their physical properties	How are earth's materials broken down? How are earth's materials combined? What are the different states in which matter can exist?
Chemistry	The students will be able to independently use their understanding that the universe is made up of different atoms and classify	All matter is composed of atoms Apply knowledge of the periodic table to understand and solve more complex problems involving various units of matter The periodic table is a working arrangement of elements based on the characteristics of those elements	How do elements/atoms and molecules/ compounds relate to one another? What characteristics do I look for when classifying atoms? How is it possible that all matter is composed of atoms?

	atoms based on their characteristics.	Our complex universe is made up of various combinations of the 92 natural elements that exist in our universe	
Water/ Hydrosphere	The students will be able to independently understand that all facets of the physical universe go through the cycle of aging from birth to death/recycle and there are features to identify those stages of aging	Evaluate the significant characteristics of a river valley and be able to accurately estimate the relative age of the valley based on the composite of these characteristics. Be able to identify the different bodies of water based on their different characteristics Evaluate the affects that the human population are having on the various water environments	How do we know in relative terms where any facet of the physical universe is within the cycle of existence? How do we know something has aged? How do we know how one body of water differs from another?
Scientific Method	The students will be able to independently utilize the scientific method as a way of thinking inside and outside of the classroom.	The scientific method is a tool for testing, predicting, and gathering data across multiple settings.	What does it mean when the ***results*** of an experiment differ from the hypothesis? What defines a “scientific” problem? What makes a problem testable? Who has investigated similar problems? How do I apply the scientific method to everyday life?

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Eighth Grade

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Scientific Method	Utilize the scientific method as a way of thinking both in and out of the classroom	The scientific method is a tool for defining, researching, hypothesizing, testing, concluding, and reporting on problems and unanswered questions both scientific and non-scientific.	➢ What defines a "scientific" problem? ➢ What makes a problem testable? ➢ Is it a problem when my results don't match my hypothesis? ➢ How to I apply the scientific method to everyday life?
Energy Intro	The universe is energy and identify these different forms of energy. Engineering is the strategic manipulation of these forms of energy.	➢ The universe is energy. ➢ All the manifestations of energy can be boiled down to two forms (potential & kinetic) of nine basic types. ➢ These forms are constantly interacting and changing ➢ There is no loss of energy when they convert.	➢ Under what circumstances are these forms of energy observable? ➢ How do they convert from one form to another? ➢ How can engineers manipulate matter and energy?
Heat	Heat is one of the basic forms of energy, it is everywhere in the universe, and that it is fundamentally a measure of relative molecular movement.	➢ Heat is the movement of molecular kinetic energy from high energy to low energy. ➢ Heat can be transferred in three basic ways, conduction, convection, and radiation. ➢ Heat transfer and absorption is affected by a variety of conditions like surface area, specific heat, and mass of the interactions.	➢ Where do humans use conduction, convection, and radiation? ➢ How can humans affect and utilize heat transfer?
Waves	A wave is a vibration which transfers energy and has	➢ Waves are a vibration with measurable characteristics such as frequency, amplitude, and wavelength	➢ Why does understanding the dynamics of a pendulum allow me to understand a wave? ➢ What are "real-life" examples

	measurable characteristics. Waves come in two basic forms and seven categories of energy.	➢ The amount of energy carried by the wave affects the wavelength and frequency of the wave.	of waves? ➢ How have waves affected mankind and how do I utilize and observe waves everyday?
Sound	Sound is the physical transfer of a wave of energy through matter and has different properties and our hearing is the detection of those properties.	➢ Sound always begins with some sort of vibration of matter. ➢ Sound is a compressional wave which basically collides its way through matter. ➢ The quality of the sound is affected by its frequency and amplitude. ➢ Human hearing is the collection, transfer, and interpretation of sound vibrations.	➢ How do I hear differences in sound based on the material being vibrated? ➢ Why does the speed of sound change in different circumstances? ➢ How do different types and materials being vibrated lead to music? ➢ What characteristics of sound lead to the different elements and styles of music? ➢ What human behaviors have affected normal hearing and how are we dealing with basic types and causes of hearing loss? ➢ How does modern technology harness sound
Forces & Motion	To explore the effects of various contact and non-contact forces and understand that all motion in the universe can be explained by Newton's Three Laws of Motion	➢ A force is a push or pull due to the interaction of another object. It can occur with or without contact. ➢ Motion is created by a force. This motion is measurable. ➢ All motion is explained by Newton's Three Laws ➢ Make qualitative descriptions of the relationship between forces and motion will provide the foundation for quantitative applications of Newton's laws.	➢ What are the relationships between forces and motion? ➢ What are the variables that affect motion and force? ➢ How do Newton's Laws allow us to describe motion?
Intro to the Cell	Students will acquire and general understanding of the eukaryotic cell and its associated structures and their functions.	➢ Fundamental life processes depend on the physical structure of the cell, the basic unit of life. ➢ All living things are made from *cells* that carry on chemical reactions ➢ All cells are made up of parts that carry out specific functions.	➢ How is a cell and its parts similar to a factory? ➢ What would happen if an organelle didn't do its job? ➢ Are some organelles more important than others?

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Biology

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Science of Biology	To explore biology as one of the sciences.	Students will understand that the scientific method is the basis for advancement of science, and characteristics of life to show what specific traits determine an organism's status as "living". Students will also understand that measurements and graphing are essential for accurately documenting and reporting scientific data.	1. How is science different from other forms of knowledge? 2. How has science changed and progressed over time?
Chemistry of Life	To understand the chemical basis for life.	Students will understand that a knowledge of atomic structure, bonding, carbon, the water molecule, and macromolecules are important for the concepts of the nature of all matter and the relationships of and between living organisms and how they maintain life.	1. What about water makes it essential to life? 2. How does chemistry play a fundamental role in biology?
Cell Biology and Transport	To explore the structure and function of living organisms.	Students will understand that cell structure and organelles (plant and animal cells) are the basic unit of life. Also, cell transport, cell respiration and photosynthesis, mitosis and meiosis, and cell specialization are essential in making connections of how cells are able to maintain life processes and functions. Students will also understand that microscope techniques are important to be able to observe and comprehend the scale and functioning of cells and cell structure.	1. Could mitosis be utilized in sexual reproduction? Why or why not? 2. Why is it necessary for cells to maintain a particular size?
Heredity and Genetics	To explore how genes and traits are passed from	Students will understand that the structure of nucleic acids, relationships between DNA, RNA, and protein synthesis provide the blueprints of life.	1. Why do individuals of the same species vary in how they look, function, and behave? 2. What connections can be drawn

	parent to offspring.	Additionally students will understand that the history of genetics, genetic crosses and Punnett squares, and pedigrees will provide essentials on the probabilities of genetic crosses and processes of evolution.	between genetics and heredity? 3. Which adaptations are most vital for survival within a given ecosystem?
Evolution	To realize that evolution is the central organizing principle of biology.	Students will understand evolution as change through time, the principles of natural selection, and the many examples of the evidence for evolution, as the way species form and change. Students will also understand that classification and taxonomy; and how the use of dichotomous keys, allows scientists to group and organize all the species on the planet.	1. How do scientists define and support evolution? 2. How do misconceptions about evolution and natural selection affect society's perception of life on earth? 3. Does life have to be carbon and water based?
Ecology and the Environment	To explore the relationships of organisms to their environments.	Students will understand that population dynamics, ecosystems, biomes, food chains/webs, succession influence and control the patterns and existence of life on earth.	1. How do changes within the ecosystem affect other parts of the ecosystem? 2. How do humans impact the diversity and stability of an ecosystem?

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Global Science (Grades 10 – 12)

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Astronomy	Use concepts of system analysis to identify major topics in astronomy and discuss their relationship to other fields of Earth and space science.	Students will understand that patterns, cycles and movement govern the universe.	1. What is the universe, and what is Earth's place in it? 2. How can recognizing and understanding feedback and patterns help you figure out what's going on in the Earth System?
Earth, Sun and Moon	Use concepts to discover how the Earth, Sun and Moon need each other for survival.	Students will understand that the relationship between the Earth, Moon and Sun creates changes over time encompassing the water cycle, weather, and seasonal patterns.	1. In what ways has Earth changed throughout its history? 2. What if one of these three (Sun, Earth Moon) disappeared?
Rocks and Minerals	To examine sedimentary rocks, igneous rocks and metamorphic rocks to find out what minerals are present in each rock.	Students will understand that all of the rocks are not the same and they develop in different ways that could affect their various qualities.	1. What are the similarities and differences between rocks and minerals? 2. How are rocks used to tell our past?
Weather	To discover how climate and weather are different and how weather could change from day to day.	Students will understand that there is a tool to measure/calculate all aspects of weather and how to use those tools.	1. How do we know a weather forecast is accurate? 2. Why is it important for a weather forecast to be accurate? 3. What type of method could be developed to reduce severe weather where we live?

Global Warming	To examine greenhouse and carbon gases, the ozone layer and how humans affect global warming (good and bad)	Students will understand that global warming is a threat to society and ways to reduce global warming.	1. How do human activities affect global warming? 2. What efforts are underway to research and reduce climate change?
Humans on our Earth (both beneficial and destructive)	To examine our day to day lives and how we affect our world in a positive or negative way.	Students will understand that humans, as a whole, are being destructive to Earth, but it is not too late to turn the corner and make it beneficial.	1. How could a force be destructive and constructive at the same time? 2. How could something happening on the other side of the world affect me?

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Year at a Glance Scope and Sequence for Science

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Chemistry (Grade 10)

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Laboratory Principals	To prepare for solving chemistry problems throughout the course, students learn about the metric system, significant figures, lab safety techniques, and the scientific method as applied in chemistry research.	The metric system, significant figures, and safe laboratory procedures need to be used as parts of the scientific method.	Is the metric system superior to the English system? When and why are significant figures necessary for use in the real world?
Matter	To examine different types of matter and substances and explore relationship of matter and energy, including learning about classification of matter, accuracy and precision, and density.	Data can be accurate or precise, changes are physical or chemical, and density is an intensive property that can be changed.	As a scientist, is it more important to be accurate or precise? What is the best way to classify chemical substances?
Atomic Theory	To learn about the parts of the atom and its properties and theories of atomic structure.	Different representations of the specific atomic theories have been developed over decades through indirect observation.	Which atomic structure is best used to represent an atom? Will we ever be able to directly observe an atom?

Periodic Table + Bonding	To examine properties and trends that are brought out by the arrangement of the periodic table and different types of bonds.	The properties of the periodic table influence where elements end up and what trends occur. Ionic and covalent bonds have key differences but also share many similarities.	How could the periodic table be reorganized into a better configuration? Are chemical bonds a necessary part of the world we live in?
Chemical Naming	To explore why and how bonds form as well as the naming and chemical groupings of the substances involved.	Bonds form molecules that belong to specific groups based on their names and properties.	Why is alphabetically categorizing chemicals not the best way to do it? What happens if everyone stops using the same chemical naming system?
Moles + Reactions	To learn how bonds break and form in chemical reactions and balance equations to show that mass is conserved as change happens in these reactions using stoichiometry.	Bonds make chemical reactions that all involve different products, reactants, and processes. All chemical reactions must be balanced.	Would it be possible to make a non-balanced reaction occur in nature? Why is it useful to know how much of each product you need for a reaction?
Acids and Bases	To examine the properties of acids and bases, analyze different definitions of acids and bases that have been developed.	Titrations can be used to observe common properties of acids and bases to determine properties of other unknown substances.	How could acid-base reactions be useful in the world around us? When is it possible for a weak base to fully neutralize and strong acid?

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Advanced Chemistry (Grades 11-12)

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Stoichiometry And Energy	To determine how energy is conserved during chemical reactions and when substances change from gas to liquids to solids—and back again.	The finite amount of energy in the universe can be traced and calculated. Matter experiences chemical and physical changes. Stoichiometry and the law of conservation on energy will be applied when using calculations to solve problems.	Are humans going to run out of usable energy eventually? Why are some sources of energy considered more efficient than others if energy cannot be lost?
Entropy and Gibbs Free Energy	To examine the role of energy in two important chemical phenomena: reaction rates and system equilibria. Students develop an understanding of why chemical reactions do and do not occur.	Enthalpy and entropy determine whether or not a reaction will occur and what effects they will have on free energy and rates of reaction.	Can an unfavorable chemical reaction be forced to happen? Why does the world still have order even though the universe favors disorder?
Solutions	To explore how the properties of solutions can be understood by examining the interactions between the parts of a solution.	The different measures of concentration and be able to convert between them. Solubility controls concentrations and saturation. Various units be used to describe the concentration of solutions and separate the component substances.	Is there such a thing as something that is completely soluble? How do you know which part of an aqueous mixture is doing the dissolving if both are soluble in water?
Molecular Geometry	To discover why different substances such as ice, liquid water, and even water vapor behave the	Molecular interactions depend upon the shape and arrangement of atoms. Different types of molecular shapes can be drawn and represented in different ways.	Could the world exist without polar molecules? How could flipping one polar molecule affect the entire world?

	way they do and investigate the concepts behind the properties of different types of matter.		
Electrochemistry	To experiment with the basics of the conversion of electrical energy to chemical energy and vice versa. Students examine voltaic cells, batteries and electrolytic cells.	Energy depends upon the movement of subatomic particles and that chemical reactions can be used to produce and predict energy flow.	How is it possible to make a battery that constantly produces power without having to charge? Why will every battery eventually die?
Acids and Bases	To compare and contrast complex properties of acids and bases and different definitions of acids and bases to be used in designing titration experiments.	Acids and bases are only acids and bases when there is a change in hydronium concentration and hydronium concentrations can be used to manipulate acid, bases, and buffers.	How can human activity affect the balance of acids and bases? Is it essential to have a balance of acids and bases on earth?

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Physics (Grades 11 & 12)

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Introduction to Physics	Explore physics and its place among science	Students will understand that everything that they accomplish is related to physics, because motion, sound, waves, etc. are all based on physics.	How do the principles of physics affect your daily life? How has something in nature become more compelling because of an understanding of physics principles.
Physical Units and Measurement	To prepare for solving problems using the correct data and method.	Students will understand that the SI units and significant figures are important in finding out the final answer because it increases the certainty of your final answer.	Can you ever be sure about your precision and accuracy? Is the degree of precision relevant to our lives?
Kinematics	Explore direct study of physics using kinematics motion.	Students will understand that velocity (initial and final), acceleration, displacement (initial and final) and time, are directly related in a given formula.	Why is it important for understanding various physical properties about motion be useful in understanding everyday occurrences? How can kinematics be applied to real-world motion problems?
Forces	Explore how forces affect the motion of a body.	Students will understand that all forces are acting upon a body and could draw them out in free body diagram.	How can an athlete in a given sport improve their performance using one of Newton's three laws of motion? Is it important to understand that variables can be manipulated to affect the movement of objects?
Motion in Two Dimensions	Explore the kinematics and forces in two directions of	Students will understand that projectile motion and circular motion are in two dimensions and could calculate it out by going in the	Where do you observe that vertical and horizontal motions of a projectile are related?

	motion on a physical body.	horizontal and vertical direction.	What are the relationships between a projectile's height, time in the air, initial velocity, and horizontal distance traveled?
Momentum, Work and Energy	Explore the quality of motion and forms of energy	Students will understand that conservation of momentum and conservation of energy are important in everyday life because we need energy and movement to survive.	How do you know something has energy? In what ways do we witness the effects of something having energy? What limits the efficiency of a car engine?
Waves and Light	Explore how energy moves form one place to another through waves.	Students will understand that the characteristics of waves are important to hear and see because that brings our senses into a physics topic.	How do you know that waves carry energy? How does the knowledge of waves help us understand our world better and improve the quality of our lives?

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Biotechnology (Grades 11 & 12)

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Introduction/history of biotechnology	To explore the history and importance of biotechnology's impact.	The technological advances seen in the field of biotechnology has had a tremendous impact and influence on scientific knowledge and progress.	1. How has biotechnology impacted human society today? 2. Does biotechnology interfere with the natural progression of evolution?
DNA/Genetics	To discover the structure of DNA and how it is involved in life functions and heredity.	An in depth knowledge of the structure and nature of DNA is essential to understanding how genetic information is stored and inherited from one generation to the next.	1. Why do we care about the structure of DNA? 2. Is one's persona a product of genetics alone?
Restriction enzymes and electrophoresis	To examine and utilize specific tools that scientists use to manipulate and use DNA in scientific discovery.	Specific techniques and tools have been discovered and developed to manipulate and alter DNA in species.	1. How can restriction enzymes be used to develop new techniques to manipulate DNA? 2. Is electrophoresis data completely discriminatory?
Recombinant DNA technology	To explore genetic modification and genetic engineering through DNA manipulation.	Genetic modification and engineering allow for scientists to alter genomes of species to produce commercial products and improve quality of life.	1. How does recombinant DNA technology aid/harm human society? 2. Is it morally acceptable to insert foreign DNA into different species?
Bioethics	To evaluate ethical questions surrounding various aspects of biotechnology.	Ethical dilemmas inherent in biotechnology must be considered and analyzed to make education decisions about the direction and ethical use of the technology.	1.Should we consider pursuing the development of "designer" human babies? 2. Are GMOs good or bad for human society?

Forensic Science	To integrate biotechnology concepts and technique in the field of forensic science.	Biotechnology techniques and tools are utilized by forensic scientists to provide evidence to help convict/exonerate suspects and help to solve crimes.	1.Does DNA evidence alone prove guilt or innocence? 2. What impact does biotechnology have on forensic science?

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Anatomy & Physiology

Unit Theme	Unit Goal	Enduring Understandings for the Unit	Essential Questions for the Unit
Introduction to Anatomy & Physiology, and Homeostasis	To explore anatomical terms, and homeostatic mechanisms.	Students will understand that anatomical terms and directions as the basis of scientific language, and that homeostasis utilizes both negative and positive feedback mechanisms to regulate body functions.	1. Do the various homeostatic mechanisms always provide balance in the body? 2. What ways and why does the body cause potential harm in order to maintain homeostasis?
Histology	To discover the functions and connections of the tissue types.	Students will understand that the functions and connections of the 4 primary tissue types: epithelial, connective, muscle, and nervous, are essential in the composition of organs and the functioning of the body.	1. How does tissue type correlate to the function of the organs in which they are found? 2. What does the composition of a primary tissue type have to do with its main function?
Integumentary System	To examine the functions and the structure of the skin and associated appendages	Students will understand that the functions and the structure of the skin and associated appendages are essential in protecting our internal structures and to maintain homeostasis.	1. What is the purpose of the integumentary system? 2. What are various diseases associated with the integumentary system? 3. How does the skin help regulate the body?
Skeletal System	To explore the functions and the structure of bones, cartilage, and bone and bone marking identification.	Students will understand that the functions and the structure of bones and cartilage, are needed for support and metabolism and essential to the maintenance of homeostasis. Students will also understand bone and bone marking identification in order to make connections to support and movement of the skeleton.	1. What motions are possible at each type of joint? 2. How is the skeleton involved in support and movement of the body?
Muscular System	To examine the functions and the structure of muscles, mechanisms of the muscle contraction, and muscle	Students will understand that functions and the structure of muscles, and the mechanism of the muscle contraction are directly related to movement of and within the body, and maintenance of homeostasis. Students will also understand that muscle identification is important in making connections to	1. How are muscles responsible for motion? 2. What are the distinguishing functional characteristics of muscles and how does the muscle permit movement?

	identification.	skeletal and muscular interactions in regard to movement.	
Nervous System	To discover the functions and the structure of the nervous system including the neurons, glial cells, nervous pathways, the reflex arc, impulse transmission, and the synapse.	Students will understand that functions and the structure of the nervous system (including the neurons, and glial cells) allow for the control and communication in the body as well as nervous pathways, the reflex arc, impulse transmission, and the synapse to provide a means for the maintenance of homeostatic mechanisms in the body.	1. How does the body receive information from the environment? 2. How is sensory information sent and received within the body?
Special Senses	To explore the functions and structure of the special senses.	Students will understand that functions and structure of our sense of vision, hearing, taste, and smell are essential to being able to respond to various stimuli in our environment, and to understand the homeostatic connection of the senses.	1. How is sensory information collected and used by the body? 2. What is the most important human special sense and why?
Blood, Immunity, and Cardiovascular System	To explore the functions and components of blood, blood types, and the immune response, as well as to the structure and functions of the heart, vessels, and circulatory pathways.	Students will understand that the functions and components of blood are important in transportation throughout the body, and to understand that the different blood types, and antigen/antibody complexes are essential to the immune response. Students will also understand that the structure and functions of the heart, associated vessels, and major circulatory pathways are important in transport of blood and the maintenance of homeostasis.	1. Why is blood essential for the maintenance of the body? 2. How do nonspecific and specific body defenses keep the human body healthy? 3. How does the cardiovascular system maintain health?
Digestive, and Urinary System	To discover the structure and functions of the digestive and urinary systems.	Students will understand that the structure and functions of the digestive system, nutrition, enzymes, and the structure and functions of filtration and urine formation are essential in delivering needed nutrients and excreting wastes as well as the maintenance of homeostasis.	1. What is the role of the urinary system in maintaining the body's chemical balance? 2. What happens to the foods once they enter the blood?