

## Minnesota Academic Standards Science

<b>Grade Level</b>	<b>Strand</b>	<b>Sub-Strand</b>	<b>Standard</b>	<b>Benchmarks</b>
KINDER GARTEN	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will raise questions about the world around them, make careful observations, and seek answers to them.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe common objects using simple tools.</li> <li>▪ Students will follow appropriate safety rules concerning the use of goggles, heat sources, electricity, glass, and chemicals and biological materials.</li> </ul>
KINDER GARTEN	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will recognize weather changes.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe daily and seasonal changes in weather.</li> </ul>
KINDER GARTEN	IV. LIFE SCIENCE	B. Organisms	The student will understand that there are living and nonliving things.	<ul style="list-style-type: none"> <li>▪ Students will compare and contrast living and nonliving things.</li> </ul>
KINDER GARTEN	IV. LIFE SCIENCE	G. Human Organism	The student will understand that they have five senses.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe the environment through their five senses.</li> </ul>
GRADE 1	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will raise questions about the world around them, make careful observations, and seek answers to them.	<ul style="list-style-type: none"> <li>▪ Students will observe, describe, measure, compare, and contrast common objects using simple tools.</li> </ul>
GRADE 1	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will understand that materials have physical properties.	<ul style="list-style-type: none"> <li>▪ Students will describe objects in terms of color, size, shape, weight, texture, flexibility, and attraction to magnets.</li> </ul>
GRADE 1	II. PHYSICAL SCIENCE	E. Forces of Nature	The student will understand that forces can act at a distance with no substance in between.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe that magnetism and gravity can affect objects without being touched.</li> </ul>
GRADE 1	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	Student will recognize weather cycles.	<ul style="list-style-type: none"> <li>▪ Students will observe, record, and describe characteristics in daily weather and seasonal cycles.</li> </ul>
GRADE 1	IV. LIFE SCIENCE	B. Organisms	The student will understand that plants and animals have life cycles.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe plant and animal life cycles.</li> </ul>
GRADE 1	IV. LIFE SCIENCE	D. Heredity	The student will understand there is variation among individuals of one kind within a population and offspring are very much but not exactly like their parents and like one another.	<ul style="list-style-type: none"> <li>▪ Students will describe ways in which many plants and animals closely resemble their parents.</li> <li>▪ Students will match adult animals and plants to their offspring.</li> </ul>
GRADE 1	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will understand that organisms have basic needs.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe basic needs of organisms, including, but not limited to, nutrients, air, water and shelter.</li> </ul>
GRADE 1	IV. LIFE SCIENCE	G. Human Organism	The student will understand that the human body is made up of parts.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe major features of the body including, but not limited to, eyes, nose, heart, skin, arms, legs and muscles.</li> </ul>

<b>Grade Level</b>	<b>Strand</b>	<b>Sub-Strand</b>	<b>Standard</b>	<b>Benchmarks</b>
GRADE 2	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand that science is a human endeavor practiced by civilizations throughout the world.	<ul style="list-style-type: none"> <li>Students will know that when a science investigation or experiment is repeated, we expect to get a very similar result.</li> </ul>
GRADE 2	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will raise questions about the world around them, make careful observations, and seek answers to them.	<ul style="list-style-type: none"> <li>Students will observe, describe, measure, compare and contrast common objects using simple tools.</li> <li>Students will organize observable data and describe patterns.</li> <li>Students will follow appropriate safety procedures in their investigations. For example, the safe use of goggles, heat sources, electricity, glass, and chemicals and biological materials.</li> </ul>
GRADE 2	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will know that materials exist in different states.	<ul style="list-style-type: none"> <li>Students will observe and identify three states of matter.</li> </ul>
GRADE 2	II. PHYSICAL SCIENCE	D. Motion	The student will understand that objects move in various ways.	<ul style="list-style-type: none"> <li>Students will observe and describe how objects move in a straight line, zigzag, back-and-forth, round-and-round, and fast and slow.</li> <li>Students will observe that a push, pull, and spin are forces that can make objects move.</li> </ul>
GRADE 2	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand basic earth materials.	<ul style="list-style-type: none"> <li>Students will observe and describe the basic earth materials, such as rocks, soils, waters and gases.</li> </ul>
GRADE 2	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand the water cycle.	<ul style="list-style-type: none"> <li>Students will observe and describe the cycle of water as it moves through the environment.</li> <li>Students will observe and describe the relationship between the water cycle and the weather.</li> </ul>
GRADE 2	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will understand some relationships between the earth, moon and sun.	<ul style="list-style-type: none"> <li>Students will observe that the sun supplies heat and light to the earth.</li> <li>Students will observe that the sun and the moon are not always in the same place.</li> </ul>
GRADE 2	IV. LIFE SCIENCE	B. Organisms	The student will understand that plants and animals have life cycles.	<ul style="list-style-type: none"> <li>Students will observe, describe, compare and contrast plant and animal life cycles.</li> </ul>
GRADE 2	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will understand that organisms live in different environments that are suited to their needs.	<ul style="list-style-type: none"> <li>Students will observe and describe some features that plants and animals have that allow them to live in specific environments.</li> </ul>
GRADE 2	IV. LIFE SCIENCE	E. Biological Populations Change Over Time	The student will understand that biological populations change over time.	<ul style="list-style-type: none"> <li>Students will observe that some kinds of organisms that once lived on earth have completely disappeared, including, but not limited to, dinosaurs, trilobites, mammoths, giant tree ferns, and horsetail trees.</li> </ul>

<b>Grade Level</b>	<b>Strand</b>	<b>Sub-Strand</b>	<b>Standard</b>	<b>Benchmarks</b>
GRADE 2	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will understand some relationships among organisms.	<ul style="list-style-type: none"> <li>▪ Students will observe and describe predator and prey relationships.</li> <li>▪ Students will compare and contrast plant eaters and meat eaters.</li> </ul>
GRADE 2	IV. LIFE SCIENCE	G. Human Organism	The student will understand that people have needs.	<ul style="list-style-type: none"> <li>▪ Students will know that people need water, food, air, waste removal and a particular range of temperature in their environment, just like other animals.</li> </ul>
GRADE 3	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand the relationship between science and the environment.	<ul style="list-style-type: none"> <li>▪ Students will understand that science should be used responsibly.</li> <li>▪ Students will understand that science is a tool that can help investigate and solve environmental concerns.</li> </ul>
GRADE 3	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will understand the nature of scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will ask questions that can be investigated scientifically.</li> <li>▪ Students will participate in a scientific investigation.</li> <li>▪ Students choose appropriate tools and materials for measurement, and/or observation and/or construction in scientific investigation.</li> <li>▪ Students will follow appropriate safety behavior in their investigations. For example, the use of goggles, heat sources, electricity, glass, and chemicals and biological materials.</li> </ul>
GRADE 3	II. PHYSICAL SCIENCE	C. Energy Transformations	Students understand the characteristics and properties of sound and light	<ul style="list-style-type: none"> <li>▪ Students will explore the different sounds that are produced by changing vibrating objects.</li> <li>▪ Students will know that sound travels through air, water and other materials.</li> <li>▪ Students will know that sound can be reflected as an echo.</li> <li>▪ Students will know that something can be heard when sounds enter the ear.</li> <li>▪ Students will know that light travels in a straight line until it stopped by an object.</li> <li>▪ Students will know that light can be reflected.</li> <li>▪ Students will know that an object is seen when light from the object enters the eye.</li> </ul>
GRADE 3	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will describe the properties of rocks and minerals.	<ul style="list-style-type: none"> <li>▪ Students will group rocks and minerals based on shared physical characteristics.</li> </ul>
GRADE 3	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will describe the weather in terms of temperatures, wind speed, wind direction, precipitation, and sky cover.	<ul style="list-style-type: none"> <li>▪ Students will measure and record weather conditions using common instruments.</li> <li>▪ Students will identify major cloud types such as cumulus, cirrus, and stratus.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 3	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will understand the characteristics and relationships of objects in the Solar System.	<ul style="list-style-type: none"> <li>▪ Students will know that the earth is one of several planets that orbit the sun, and the moon orbits around the earth.</li> <li>▪ Students will recognize and understand why the appearance of the moon changes over the month.</li> <li>▪ Students will understand difference between rotation and revolution and their connection to day and night and the year.</li> <li>▪ Students will identify the relative sizes, distances, movement and basic characteristics of objects in the solar system.</li> <li>▪ Students will know that the Earth’s gravity pulls objects towards it without touching the objects.</li> </ul>
GRADE 3	IV. LIFE SCIENCE	B. Organisms	The student will recognize that plants and animals have different structures that serve different functions.	<ul style="list-style-type: none"> <li>▪ Students will know plants and animals have structures that serve different functions in growth, survival, and reproduction.</li> <li>▪ Students will know that plants have different structures from animals that serve the same necessary functions in growth, survival and reproduction.</li> <li>▪ Students will know examples of diverse life forms in different biomes, such as oceans, deserts, tundra, forests, grasslands, wetlands and some of the structures that allow them to survive in that biome.</li> </ul>
GRADE 3	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will understand an organism’s patterns of behavior are related to the nature of that organism’s environment.	<ul style="list-style-type: none"> <li>▪ Students will know that many organisms depend on living and dead plants and animals for food.</li> <li>▪ Students will know organisms interact with one another in various ways besides providing food including, but not limited to, pollination, seed dispersal, and parasite removal.</li> <li>▪ Students will know changes in an organism’s habitat are sometimes beneficial to it and sometimes harmful.</li> </ul>
GRADE 3	IV. LIFE SCIENCE	D. Heredity	The student will understand many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual’s interactions with the environment	<ul style="list-style-type: none"> <li>▪ Students will differentiate between observed characteristics of plants and animals that are fully inherited, and characteristics that are affected by the climate or environment.</li> <li>▪ Students will identify similarities and differences between parent and offspring.</li> </ul>
GRADE 3	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will understand some relationships among organisms.	<ul style="list-style-type: none"> <li>▪ Students will know energy is transferred through food chains.</li> <li>▪ Students will compare and contrast herbivores, carnivores, and omnivores.</li> <li>▪ Students will know that the food animals consume can be traced back to plants.</li> </ul>
GRADE 4	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand the relationship between science and the environment.	<ul style="list-style-type: none"> <li>▪ Students will understand that science and inventions should be used responsibly.</li> <li>▪ Students will understand that science is a tool that can help investigate solutions to environmental problems.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 4	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will participate in scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will collect, organize, analyze and present data.</li> <li>▪ Students will understand that conditions must be kept the same in order to compare investigations.</li> <li>▪ Students will recognize that evidence and logic, not merely opinion, are necessary to support scientific understandings.</li> <li>▪ Students will choose appropriate tools and materials for measurement, and/or observation and/or construction in scientific investigation.</li> <li>▪ Students will follow appropriate safety rules in their investigations. For example, the use of goggles, heat sources, electricity, glass, and chemicals and biological materials.</li> </ul>
GRADE 4	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will know that materials exist in different states and can change from one to another.	<ul style="list-style-type: none"> <li>▪ Students will distinguish between three states of matter.</li> <li>▪ Students will know that matter can change and exist in one or more states.</li> <li>▪ Students will know that heating and cooling can cause a change between states.</li> <li>▪ Students will know that solids have a definite shape and that liquids take the shape of their container.</li> </ul>
GRADE 4	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will understand basic electricity and its application in everyday life.	<ul style="list-style-type: none"> <li>▪ Students will know that an electrical circuit requires a complete loop through which an electric current can pass.</li> <li>▪ Students will demonstrate simple electrical circuits using components such as wires, batteries and bulbs.</li> <li>▪ Students will identify objects and materials that conduct electricity and objects and materials that are insulators.</li> <li>▪ Students will know how to produce and study the effects of static electricity.</li> </ul>
GRADE 4	II. PHYSICAL SCIENCE	E. Forces of Nature	The student will know that a relationships exists between electricity and magnetism.	<ul style="list-style-type: none"> <li>▪ Students will demonstrate how a wire and magnet can be used to generate electric current.</li> <li>▪ Students will demonstrate how an electric current can make something magnetic.</li> </ul>
GRADE 4	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand that water on Earth cycles and exists in many forms.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain and describe the water cycle involving the processes of evaporation, condensation, precipitation, and collection.</li> <li>▪ Students will describe the role of the sun in the water cycle.</li> <li>▪ Students will describe the distribution of water on Earth.</li> <li>▪ Students will describe the quality of water using physical characteristics.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 4	III. EARTH AND SPACE SCIENCE	D. The Universe	The student will understand the patterns and movements of celestial objects in the sky.	<ul style="list-style-type: none"> <li>▪ Students will observe that the patterns of stars in the sky appear to slowly move from east to west across the sky nightly and different stars can be seen in different seasons and locations.</li> <li>▪ Students will know that planets look like stars but over time they appear to wander among the constellations.</li> <li>▪ Students will understand that stars are like the Sun, some being smaller and some larger, but so far away that they look like points of light.</li> <li>▪ Students will know that telescopes magnify distant objects in the sky and dramatically increase the number of stars we can see.</li> </ul>
GRADE 4	IV. LIFE SCIENCE	A. Cells	The student will know that all organisms are composed of cells, which are the fundamental units of life, some organisms are single cells, but other organisms are multi-cellular	<ul style="list-style-type: none"> <li>▪ Students will understand that cells are very small and will utilize a microscope to observe single cell organisms and single cells within a multi-celled organism</li> <li>▪ Students will know that all living things consist of one or more cells.</li> <li>▪ Students will know that cells need food, water and air; a way to dispose of waste; and an environment that they can live in.</li> <li>▪ Students will know that cells vary greatly in appearance and perform very different roles in an organism.</li> </ul>
GRADE 4	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will know that living things can be sorted into groups in many ways according to their varied characteristics and structures.	<ul style="list-style-type: none"> <li>▪ Students classify plants and animals according to their physical characteristics.</li> <li>▪ Students learn that features used for grouping depend on the purpose of the grouping.</li> </ul>
GRADE 4	IV. LIFE SCIENCE	G. Human Organism	The student will understand the function of basic organs, major systems, growth and development of the human body.	<ul style="list-style-type: none"> <li>▪ Students will identify the major organs of the following systems: digestive, circulatory, nervous, skeletal/muscular, and respiratory, within the human body.</li> <li>▪ Students will identify the functions of the major organs and the systems of the human body.</li> <li>▪ Students will know there is a usual sequence of physical and mental development among human beings.</li> </ul>
GRADE 5	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will develop an expectation that there is order in the natural world and it is discoverable.	<ul style="list-style-type: none"> <li>▪ Students will understand that when a science investigation or experiment is repeated, a similar result is expected.</li> </ul>
			The student will understand the usefulness and consequences of science in our interaction with the natural world.	<ul style="list-style-type: none"> <li>▪ Students will understand that science is a tool that can help investigate solutions to environmental problems.</li> <li>▪ Students will understand that science should be used responsibly.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 5	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will understand the process of scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will perform a controlled experiment using a specific step-by-step procedure.</li> <li>▪ Students will support their statements with evidence from various sources.</li> <li>▪ Students will choose appropriate tools and materials for measurement, and/or observation and/or construction in scientific investigation.</li> <li>▪ Students will follow appropriate safety behavior in their investigations. For example, the use of goggles, heat sources, electricity, glass, and chemicals and biological materials.</li> </ul>
GRADE 5	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will understand that energy exists in many forms and can be transferred in many ways.	<ul style="list-style-type: none"> <li>▪ Students will know that heat can move from one object to another by conduction and that some materials conduct heat better than others.</li> <li>▪ Students will know that things that give off light also give off heat.</li> <li>▪ Students will know that things that absorb light collect heat and may become warmer.</li> </ul>
GRADE 5	II. PHYSICAL SCIENCE	D. Motion	The student will understand the principles and advantages provided by simple machines.	<ul style="list-style-type: none"> <li>▪ Students will use the principle of a simple machine to describe the use of levers, incline plane, wheel and axel.</li> </ul>
GRADE 5	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand that the surface of the earth changes due to slow processes, such as erosion and weathering, and rapid processes, such as landslides, volcano eruptions, and earthquakes.	<ul style="list-style-type: none"> <li>▪ Students will recognize the natural processes that cause rocks to break down into smaller pieces.</li> <li>▪ Students will explain how waves, wind, water, and ice shape and reshape the earth's surface.</li> <li>▪ Students will describe how humans prepare for and react to rapid Earth processes such as floods, tornadoes, earthquakes, and volcanoes.</li> <li>▪ Students will recognize the different composition and properties of soil.</li> <li>▪ Students will describe how humans prepare for and react to erosion.</li> </ul>
GRADE 5	IV. LIFE SCIENCE	E. Biological Populations Change Over Time	The student will know biological populations change over time.	<ul style="list-style-type: none"> <li>▪ Students will know that individuals of the same species differ in their characteristics, and sometimes the differences give individuals an advantage in surviving and reproducing and pass those differences on to successive generation.</li> <li>▪ Students will know extinction of a species occurs when the environment changes and adaptive characteristics of a species are insufficient to allow its survival</li> <li>▪ Students will know that fossils can be compared to one another and to living organisms according to their similarities and differences.</li> </ul>
GRADE 5	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will know that matter and energy flow into, out of, and within a biological system.	<ul style="list-style-type: none"> <li>▪ For a given ecosystem in Minnesota, students will identify major living and non-living components.</li> <li>▪ Students will understand some source of "energy" is needed for all organisms to stay alive and grow.</li> <li>▪ Students will understand that food webs describe the relationships among producers, consumers, and decomposers in an ecosystem.</li> <li>▪ Students will know organisms are growing, dying, and decaying, and their matter is recycled.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 6	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand that science is a way of knowing about the world that is characterized by empirical criteria, logical argument, and skeptical review.	<ul style="list-style-type: none"> <li>▪ Students will distinguish between scientific evidence and personal opinion.</li> <li>▪ Students will explain why scientists often repeat each other's investigations to be sure of their results.</li> <li>▪ Students will know that scientists assume that nature is the same everywhere and that it is understandable and predictable.</li> </ul>
GRADE 6	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will understand that scientific inquiry is used by scientists to investigate the natural world in systematic ways.	<ul style="list-style-type: none"> <li>▪ Students will identify questions that can be answered through scientific investigation and those that cannot.</li> <li>▪ Students will give examples of how different domains of science use differing bodies of scientific knowledge and employ different methods to investigate questions.</li> <li>▪ Students will know that observations and explanations can be affected by bias or strong beliefs about what should happen in particular circumstances.</li> <li>▪ Students will understand that a system is an organized group of related objects or components that form a whole.</li> </ul>
GRADE 6	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will conduct scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will use appropriate tools and Systems International units for measuring length, time, mass, volume, and temperature with suitable precision and accuracy.</li> <li>▪ Students will follow a specific step-by-step procedure for a scientific investigation.</li> <li>▪ Students will present and explain data and findings using multiple representations including tables, graphs, physical models, and demonstrations.</li> <li>▪ Students will use appropriate technology and mathematics skills to access, gather, store, retrieve and organize data.</li> <li>▪ Students will explain how the student's scientific investigations relate to established scientific principles.</li> <li>▪ Students will apply established safety rules and guidelines in conducting scientific investigations inside and outside the classroom.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 6	I. HISTORY AND NATURE OF SCIENCE	C. Scientific Enterprise	The student will know that science and technology are highly vigorous human efforts that both influence and are influenced by civilizations worldwide.	<ul style="list-style-type: none"> <li>▪ Students will know that people of all backgrounds and with diverse interests, talents, qualities, and motivations engage in fields of science and engineering.</li> <li>▪ Students will identify different disciplines of science and engineering.</li> <li>▪ Students will understand that scientists sometimes work in teams and sometimes work alone, but all communicate extensively with others.</li> <li>▪ Students will know that colleges and universities, business and industry, research institute and governmental agencies are major settings in which scientists and engineers work.</li> <li>▪ Students will explain that technology is the application of science in order to find solutions to societies' wants and needs.</li> <li>▪ Students will identify appropriate problems that can be solved using technological design or scientific inquiry.</li> </ul>
GRADE 6	I. HISTORY AND NATURE OF SCIENCE	D. Historic Perspectives	The student will understand how scientific discovery, culture, societal norms, and technology have influenced one another in different time periods.	<ul style="list-style-type: none"> <li>▪ Students will cite examples of various individuals throughout history who made discoveries and contributions in science and technology.</li> <li>▪ Students will relate student experiences in scientific investigation to the experiences of scientists throughout history.</li> </ul>
GRADE 6	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will use the idea that matter is made of small particles called atoms to explain that matter can exist in different states and that each state exhibits distinct physical properties.	<ul style="list-style-type: none"> <li>▪ Students will know that matter can exist as solid, liquid, gas or plasma.</li> <li>▪ Students will know that a change in temperature or pressure can change the state of a substance.</li> <li>▪ Students will know that there are about one hundred different elements with unique properties that combine in many ways.</li> </ul>
GRADE 6	II. PHYSICAL SCIENCE	B. Chemical Reactions	The student will use the idea that matter is made of small particles called atoms to explain how matter combines in a variety of ways to form all living and non-living substances.	<ul style="list-style-type: none"> <li>▪ Students will give examples of elements, compounds and mixtures.</li> <li>▪ Students will classify a substance as a mixture or pure substance.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 6	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will understand that energy is a property and cannot be created or destroyed, but only changed from one form into another.	<ul style="list-style-type: none"> <li>▪ Students will know that energy exists as heat, chemical energy, mechanical energy and electrical energy.</li> <li>▪ Students will recognize that most of what goes on in the universe from exploding stars and biological growth to the operation of machines and the motion of people involves some form of energy being transformed into another.</li> <li>▪ Students will recognize that energy in the form of heat is almost always one of the products of energy transformation.</li> <li>▪ Students will identify different forms of energy in everyday situations.</li> <li>▪ Students will identify transformations of energy from one form to another in everyday situations.</li> <li>▪ Students will know that energy is stored in many ways.</li> </ul>
GRADE 6	II. PHYSICAL SCIENCE	D. Motion	The student will understand the nature of force and motion.	<ul style="list-style-type: none"> <li>▪ Students will use a frame of reference to describe the position, direction, speed and motion of an object.</li> <li>▪ Students will determine the average speed of an object by measuring distance and time.</li> <li>▪ Students will know the difference between average speed versus speed at a particular time.</li> </ul>
GRADE 6	II. PHYSICAL SCIENCE	E. Forces of Nature	The student will understand that the structure and motion of objects in the universe are governed by different forces.	<ul style="list-style-type: none"> <li>▪ Students will know that every object exerts gravitational force on every other object.</li> <li>▪ Students will know that gravitational force between two objects depends on how much mass the objects have and on how far apart they are.</li> <li>▪ Students will know that gravitational force is hard to detect unless at least one of the objects has a lot of mass.</li> <li>▪ Students will know that electric currents and magnets can exert a force on certain objects and each other.</li> <li>▪ Students will recognize that gravitational forces are weak compared to electric and magnetic.</li> </ul>
GRADE 6	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand the Earth's composition and structure.	<ul style="list-style-type: none"> <li>▪ Students will know that the Earth is comprised of layers including the lithosphere, hydrosphere, and atmosphere.</li> </ul>
GRADE 6	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand how the atmosphere interacts on Earth.	<ul style="list-style-type: none"> <li>▪ Students will identify the composition and structure of the atmosphere.</li> <li>▪ Students will recognize that air masses circulate in the atmosphere.</li> <li>▪ Students will describe the temperature and pressure variations that exist in the layers of the atmosphere.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 6	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will understand the composition and structure of the solar system and the Earth's place in it.	<ul style="list-style-type: none"> <li>▪ Students will compare the characteristics of Earth with the characteristics and movement patterns of the other planets, their satellites, and other objects in our Solar System.</li> <li>▪ Students will know that the Sun is a medium-sized star and is the closest star to Earth. It is the central and largest body in the Solar System and is located at the edge of a galaxy.</li> <li>▪ Students will explain the length of day, length of year, phases of the Moon, eclipses, tides and shadows through the regular and predictable motions of the Earth and Moon.</li> </ul>
GRADE 6	IV. LIFE SCIENCE	A. Cells	The student will understand that all organisms are composed of cells, which are the fundamental units of life that carry on the many functions needed to sustain life.	<ul style="list-style-type: none"> <li>▪ Students will know that cells are the fundamental units of life.</li> <li>▪ Students will know that most organisms are single cells.</li> <li>▪ Students will know that all organisms are composed of cells.</li> </ul>
GRADE 6	IV. LIFE SCIENCE	B. Organisms	The student will understand living systems, at all levels of organization, demonstrate the complementary nature of structure and function.	<ul style="list-style-type: none"> <li>▪ Students will know a variety of body plans and external structures in plants and animals that serve specific functions for survival.</li> </ul>
GRADE 6	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will understand that within the diversity of living organisms, patterns of similarities, differences and complex interactions exist between organisms and with the physical environment.	<ul style="list-style-type: none"> <li>▪ Students will identify organisms that interact with each other as producers, consumers, and decomposers in a food chain.</li> <li>▪ Students will identify organisms that interact with each other as herbivores, carnivores, and omnivores through food webs.</li> <li>▪ Students will compare/contrast predator/prey, parasite/host, producer/consumer relationships.</li> <li>▪ Students will classify organisms based on the details of external features.</li> <li>▪ Students will know that all individuals of a species that exist together at a given place and time make up a population, and all populations living together and the physical factors with which they interact compose an ecosystem.</li> </ul>
GRADE 6	IV. LIFE SCIENCE	D. Heredity	The student will understand that heredity information is contained in genes that determine characteristics of organisms that are inherited.	<ul style="list-style-type: none"> <li>▪ Students will know that some traits are inherited and other result from interactions with the environment.</li> <li>▪ Students will know that reproduction is a characteristic of all living things and why it is essential for the continuation of a species.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 7	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand that science is a way of knowing about the world that is characterized by empirical criteria, logical argument, and skeptical review.	<ul style="list-style-type: none"> <li>▪ Students will explain, using examples, that for most core knowledge in science, there is much experimental and observational confirmation.</li> <li>▪ Students will understand how scientific knowledge is subject to change as new evidence becomes available, or as new theories cause scientists to look at old observations differently.</li> <li>▪ Students will explain how scientists distinguish among fact, hypothesis, theory and law.</li> <li>▪ Students will use accepted physical, conceptual, and mathematical scientific models to explain natural phenomena.</li> </ul>
GRADE 7	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will understand that scientific inquiry is used by scientists to investigate the natural world in systematic ways	<ul style="list-style-type: none"> <li>▪ Students will know that scientists use different kinds of investigations and methods depending on the questions they are trying to answer.</li> <li>▪ Students will distinguish among observation, prediction, and inference.</li> <li>▪ Students will know that hypotheses are valuable even if they turn out not to be true.</li> <li>▪ Students will know that an understanding of mathematics and the use of technology are essential in determining how a scientific investigation is conducted and the explanations that can be made.</li> <li>▪ Students will explain why an experiment must be repeated many times and yield consistent results before the results are accepted as correct.</li> <li>▪ Students will know that systems have boundaries, components, resources, flow and feedback.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 7	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will design and conduct scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will identify a question that can be answered with a scientific investigation with available knowledge and tools.</li> <li>▪ Students will formulate a testable hypothesis based on prior knowledge.</li> <li>▪ Students will systematically observe, organize, and record relevant qualitative and quantitative data in a clear and accurate way.</li> <li>▪ Students will use appropriate tools and Systems International units for measuring length, time, mass, volume, and temperature with suitable precision and accuracy.</li> <li>▪ Students will recognize that a variable is a condition that may influence the outcome of an investigation and know the importance of manipulating one variable at a time.</li> <li>▪ Students will write a specific step-by-step procedure for a scientific investigation.</li> <li>▪ Students will construct reasonable models, predictions and explanations based on collected data or evidence presented in tables or graphs and make inferences based on patterns or trends in the data.</li> <li>▪ Students will present and explain data and findings using multiple representations including tables, graphs, mathematical and physical models, and demonstrations.</li> <li>▪ Students will use appropriate technology and mathematics skills to access, gather, store, retrieve and organize data.</li> <li>▪ Students will explain how the student's scientific investigations relate to established scientific principles.</li> <li>▪ Students will apply established safety rules and guidelines in conducting scientific investigations inside and outside the classroom.</li> </ul>
GRADE 7	I. HISTORY AND NATURE OF SCIENCE	C. Scientific Enterprise	The student will know that science and technology are highly vigorous human efforts that both influence and are influenced by civilizations worldwide.	<ul style="list-style-type: none"> <li>▪ Students will know that the development of technology drives scientific investigation and explanations and that scientific knowledge drives the development of technology.</li> </ul>
GRADE 7	I. HISTORY AND NATURE OF SCIENCE	D. Historic Perspectives	The student will understand how scientific discovery, culture, societal norms, and technology have influenced one another in different time periods.	<ul style="list-style-type: none"> <li>▪ Students will cite examples of various individuals throughout history who made discoveries and contributions in science and technology.</li> <li>▪ Students will cite examples of how the prevailing culture of a time influenced scientific and technologic advances.</li> <li>▪ Students will relate student experiences in scientific investigation to the experiences of scientists throughout history.</li> </ul>
GRADE 7	II. PHYSICAL SCIENCE	A. Structure of Matter	Use the idea that matter is made of small particles called atoms to explain that matter can exist in different states and that each state exhibits distinct physical properties.	<ul style="list-style-type: none"> <li>▪ Students will distinguish between mass and volume.</li> <li>▪ Students will use the properties of substances to classify them into groups with common properties.</li> <li>▪ Students will compare and contrast the mass, shape and volume of solids, liquids and gases.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 7	II. PHYSICAL SCIENCE	B. Chemical Reactions	The student will use the idea that matter is made of small particles called atoms to explain how matter combines in a variety of ways to form all living and non-living substances.	<ul style="list-style-type: none"> <li>▪ Students will distinguish among elements, compounds and mixtures.</li> </ul>
GRADE 7	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will understand that energy cannot be created or destroyed, but only changed from one form into another.	<ul style="list-style-type: none"> <li>▪ Students will understand that adding or taking away heat from a system with a constant mass will result in temperature change.</li> <li>▪ Students will recognize that heat moves in predictable ways, moving from warmer objects to cooler ones until both reach the same temperature.</li> <li>▪ Students will give examples of the movement of heat by convection, conduction and radiation.</li> <li>▪ Students will know that energy can be transferred through waves.</li> <li>▪ Students will know that vibrations move at different speeds in different materials, have different wavelengths, and set up wave-like disturbances that spread away from the source.</li> <li>▪ Students will know that waves have many different forms, some visible, some not.</li> <li>▪ Students will demonstrate that light from the sun is made up of a mixture of many different colors of light.</li> <li>▪ Students will demonstrate that the light given off or reflected by objects is made up of a mixture of colors of light.</li> <li>▪ Students will know that human eyes respond to visible light, a narrow range of wavelengths of electromagnetic radiation, and that differences of wavelength within that range are perceived as differences in color.</li> </ul>
GRADE 7	II. PHYSICAL SCIENCE	D. Motion	The student will understand the nature of force and motion.	<ul style="list-style-type: none"> <li>▪ Students will represent the motion of an object on a graph.</li> <li>▪ Students will interpret distance vs. time graphs.</li> <li>▪ Students will distinguish between velocity and speed.</li> <li>▪ Students will know that acceleration is a change in speed or direction.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 7	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand Earth's composition and structure.	<ul style="list-style-type: none"> <li>▪ Students will explain how land forms are created through forces such as folding, faulting, volcanic eruptions, deposition of sediment, and weathering and erosion.</li> <li>▪ Students will explain how features on the Earth's surface are constantly changing through a combination of slow and rapid processes such as weathering, erosion, sediment deposition, landslides, volcanic eruptions, and earthquakes.</li> <li>▪ Students will understand the concept of plate tectonics including the organization of the Earth into plates and the processes that move them.</li> <li>▪ Students will describe the various processes and their interactions that are involved in the rock cycle.</li> <li>▪ Students will interpret successive layers of sedimentary rocks and their fossils to document the age and history of the Earth.</li> <li>▪ Students will know how constructive and destructive Earth processes can affect the evidence of Earth's history.</li> <li>▪ Students will be able to use various characteristics to classify and identify rocks and the minerals that comprise them.</li> </ul>
GRADE 7	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand how the Earth's atmosphere interacts in the Earth's system.	<ul style="list-style-type: none"> <li>▪ Students will explain how the processes of evaporation, condensation, and precipitation affect weather patterns.</li> <li>▪ Students will know that the sun is the principal energy source of winds, ocean currents, and the water cycle.</li> <li>▪ Students will know that changes in the composition of the atmosphere, ocean temperature, and geologic events can impact the Earth's climate.</li> <li>▪ Students will explain how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns.</li> </ul>
GRADE 7	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will understand the composition and structure of the solar system and the Earth's place in it.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain the length of day, length of year, phases of the Moon, eclipses, tides, and shadows through the regular and predictable motions of the Earth and Moon.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	A. Cells	The student will understand that all organisms are composed of cells, which are the fundamental units of life that carry on the many functions needed to sustain life.	<ul style="list-style-type: none"> <li>▪ Students will distinguish between single and multi-cellular organisms.</li> <li>▪ Students will distinguish between plant and animal cells.</li> <li>▪ Students will know that cells repeatedly divide for growth and repair.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	B. Organisms	The student will understand living systems, at all levels of organization, demonstrate the complementary nature of structure and function.	<ul style="list-style-type: none"> <li>▪ Students will explain the organization of whole organisms in a living system including populations, niche, and communities.</li> <li>▪ Students will explain how organisms are organized into specialized cells, tissues, organs and organ systems that perform specialized functions.</li> <li>▪ Students will know that organisms can react to internal and environmental stimuli through behavior.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 7	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will understand that within the diversity of living organisms, patterns of similarities, differences and complex interactions exist between organisms and with the physical environment.	<ul style="list-style-type: none"> <li>▪ Students will use and create dichotomous keys to classify organisms based on the details of external and /or internal features.</li> <li>▪ Students will give examples of ways humans can alter the equilibrium of ecosystems, including human population growth, technology, and consumption; human destruction of habitats (through direct harvesting, pollution and atmospheric changes).</li> <li>▪ Students will give examples of how environmental neglect or degradation can lead to potentially irreversible effects.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	D. Heredity	The student will understand that heredity information is contained in genes that determine characteristics of organisms that are inherited through asexual and sexual reproduction.	<ul style="list-style-type: none"> <li>▪ Students will know that inherited traits result from information contained in genes located on chromosomes of each cell.</li> <li>▪ Students will know that each gene carries a single unit of information and can influence more than one trait.</li> <li>▪ Students will know that inherited traits can be determined by one or many genes.</li> <li>▪ Students will identify the criteria established to define and distinguish species.</li> <li>▪ Students will explain how flowering plants reproduce sexually.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	E. Biological Populations Change Over Time	The student will understand how evolution provides a scientific explanation for the fossil record of ancient life forms, as well as the striking similarities observed among the diverse species of living organisms.	<ul style="list-style-type: none"> <li>▪ Students will know the concept of extinction and that extinction is common.</li> <li>▪ Students will know that fossils document the appearance of many life forms.</li> <li>▪ Students will give examples how fossils record the diversification of many life forms.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will understand how the flow of energy and the recycling of matter contributes to a stable ecosystem.	<ul style="list-style-type: none"> <li>▪ Students will know all energy within an ecosystem originates from the sun.</li> <li>▪ Students will know that plants use the energy in light to make sugars out of carbon dioxide and water. They use or store this food/sugar/. Organisms eat plants for the food/sugar and energy, and produce carbon dioxide and water.</li> </ul>
GRADE 7	IV. LIFE SCIENCE	G. Human Organism	The student will understand human body systems and their relationship to good health.	<ul style="list-style-type: none"> <li>▪ Students will give examples of the effects of how environmental factors can lead to diseases and other risks to human health.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand that science is a way of knowing about the world that is characterized by empirical criteria, logical argument, and skeptical review.	<ul style="list-style-type: none"> <li>▪ Students will explain how scientific knowledge is subject to change as new evidence becomes available, or as new theories cause scientists to look at old observations differently.</li> <li>▪ Students will know that science can sometimes be used to inform ethical decisions by identifying the likely consequences of particular actions.</li> <li>▪ Students will explain how scientific claims are subject to peer review, where scientists evaluate explanations proposed by other scientists by examining and comparing evidence, identifying faulty reasoning, pointing out statements that go beyond the evidence, replicating investigations, and suggesting alternative explanations for the same observations.</li> <li>▪ Students will explain the development, usefulness, and limitations of scientific models in the explanation and prediction of natural phenomena.</li> </ul>
GRADE 8	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will understand that scientific inquiry is used by scientists to investigate the natural world in systematic ways.	<ul style="list-style-type: none"> <li>▪ Students will give examples of how different domains of science use differing bodies of scientific knowledge and employ different methods to investigate questions.</li> <li>▪ Students will know that scientific investigations involve the common elements of systematic observations, carefully collected, relevant evidence, logical reasoning, and some imagination in developing hypotheses and explanations.</li> <li>▪ Students will know that an understanding of mathematics and the use of technology are essential in determining how a scientific investigation is conducted and the explanations that can be made.</li> <li>▪ Students will know that scientists may conduct investigations in a simple system and make generalizations to more complex systems.</li> <li>▪ Students will know that scientists and engineers have ethical codes regarding living things and impact on the environment.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will use multiple skills to design and conduct scientific investigations.	<ul style="list-style-type: none"> <li>▪ Students will identify a question that can be answered with a scientific investigation with available knowledge and tools.</li> <li>▪ Students will formulate a testable hypothesis based on prior knowledge.</li> <li>▪ Students will systematically observe, organize, and record relevant qualitative and quantitative data in a clear and accurate way.</li> <li>▪ Students will use appropriate tools and Systems International units for measuring length, time, mass, volume, and temperature with suitable precision and accuracy.</li> <li>▪ Students will specify variables to be changed, controlled, and measured.</li> <li>▪ Students will use sufficient trials and adequate sample size to ensure reliable data.</li> <li>▪ Students will write a specific step-by-step procedure for a scientific investigation.</li> <li>▪ Students will construct reasonable models, predictions and explanations based on collected data or evidence presented in tables or graphs and make inferences based on patterns or trends in the data.</li> <li>▪ Students will present and explain data and findings using multiple representations including tables, graphs, mathematical and physical models, and demonstrations.</li> <li>▪ Students will explain how variability affects measurements and calculations.</li> <li>▪ Students will be able to use appropriate technology and mathematics skills to access, gather, store, retrieve and organize data.</li> <li>▪ Students will establish cause effect relationships based on gathered and established evidence.</li> <li>▪ Students will explain how the student’s scientific investigations relate to established scientific principles.</li> <li>▪ Students will be able to apply established safety rules and guidelines in conducting scientific investigations inside and outside the classroom.</li> </ul>
GRADE 8	I. HISTORY AND NATURE OF SCIENCE	C. Scientific Enterprise	The student will know that science and technology are highly vigorous human efforts that both influence and are influenced by civilizations worldwide.	<ul style="list-style-type: none"> <li>▪ Students will evaluate the documentation and verifiability of information from a variety of sources.</li> <li>▪ Students will know that technological solutions have intended benefits and unintended consequences.</li> <li>▪ Students will use scientific inquiry and the technological design process to solve problems.</li> <li>▪ Students will know that technological changes and scientific advances are often accompanied by social, political, and economic changes.</li> <li>▪ Students will recognize that science and technology are influenced by social needs, attitudes, values, and limitations, and cultural backgrounds and beliefs.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	I. HISTORY AND NATURE OF SCIENCE	D. Historic Perspectives	The student will understand how scientific discovery, culture, societal norms, and technology have influenced one another in different time periods.	<ul style="list-style-type: none"> <li>▪ Students will cite examples of various individuals throughout history who made discoveries and contributions in science and technology.</li> <li>▪ Students will cite examples of how the prevailing culture of a time influenced scientific and technologic advances.</li> <li>▪ Students will relate student experiences in scientific investigation to the experiences of scientists throughout history.</li> <li>▪ Students will cite examples of how science contributed to revolutions or changes in agriculture, manufacturing, sanitation, medicine, warfare, transportation, information processing, or communication.</li> </ul>
GRADE 8	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will use the idea that matter is made of small particles called atoms to explain that matter can exist in different states and that each state exhibits distinct physical properties.	<ul style="list-style-type: none"> <li>▪ Students will use evidence to explain that matter is made of small particles called atoms, which are too small to see.</li> <li>▪ Students will describe the states of matter in terms of the space between atoms and/or molecules.</li> <li>▪ Students will give evidence that the space between atoms and/or molecules is smallest in a solid, and greatest in a gas.</li> <li>▪ Students will know that equal volumes of different substances usually have different masses.</li> <li>▪ Students will know that an atom is the smallest unit of an element that maintains the characteristics of the element.</li> <li>▪ Students will differentiate between an atom and a molecule.</li> <li>▪ Students will understand that atoms combine to form molecules that are the smallest unit of a compound.</li> <li>▪ Students will know that all pure substances have characteristic properties of solubility, density, melting point and boiling point and that characteristic properties are independent of the amount of the sample of substance.</li> <li>▪ Students will use characteristic properties to identify elements and compounds.</li> </ul>
GRADE 8	II. PHYSICAL SCIENCE	B. Chemical Reactions	The student will use the idea that matter is made of small particles called atoms to explain how matter combines in a variety of ways to form all living and non-living substances.	<ul style="list-style-type: none"> <li>▪ Students will distinguish among elements, compounds, and heterogeneous and homogeneous mixtures.</li> <li>▪ Students will use characteristic properties to separate mixtures.</li> <li>▪ Students will differentiate between physical changes and chemical changes.</li> <li>▪ Students will recognize that no matter how substances within a closed system interact, the total mass of the system remains the same.</li> <li>▪ Students will show how the idea of atoms and molecules explains conservation of mass.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will understand that energy is a property and cannot be created or destroyed, but only changed from one form into another.	<ul style="list-style-type: none"> <li>▪ Students will understand that energy is a property of many substances.</li> <li>▪ Students will compare and contrast heat energy, chemical energy, mechanical energy and electrical energy.</li> <li>▪ Students will know that potential energy is stored energy and is associated with gravitational or electrical force, mechanical position, or chemical composition.</li> <li>▪ Students will differentiate between kinetic and potential energy and identify situations where kinetic energy is converted into potential energy and vice versa.</li> <li>▪ Students will use the idea that matter is made of small particles to explain the movement of heat in conduction and convection.</li> <li>▪ Students will know that electromagnetic waves have ranges of wavelengths such as radio waves, microwaves, infrared wave, visible light, ultraviolet light, and x-rays.</li> </ul>
GRADE 8	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand Earth's composition and structure.	<ul style="list-style-type: none"> <li>▪ Students will explain how earthquakes, volcanoes, sea-floor spreading, and mountain building are a result of the movement of crustal plates.</li> </ul>
GRADE 8	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand how the atmosphere interacts with the Earth system.	<ul style="list-style-type: none"> <li>▪ Students will understand how radiation, conduction and convection of energy in and out of the atmosphere affects weather and climate.</li> <li>▪ Students will know that the wind, ocean currents, and layers of the atmosphere are produced by gravitational forces and unequal heating of the Earth.</li> <li>▪ Students will demonstrate how the rotation of the Earth affects the winds and ocean currents.</li> <li>▪ Students will predict or forecast the weather based on collected data.</li> </ul>
GRADE 8	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will understand the composition and structure of the solar system and the Earth's place in it.	<ul style="list-style-type: none"> <li>▪ Students will know that the Sun is the principle energy source for the solar system and that this energy is transferred in the form of radiation.</li> <li>▪ Students will know that energy that travels through space in the form of waves as electromagnetic radiation and that some types electromagnetic radiation can be seen as color and others are made of wave lengths that are too long or too short to be seen.</li> </ul>
GRADE 8	III. EARTH AND SPACE SCIENCE	D. The Universe	The student will understand the composition and structure of the universe.	<ul style="list-style-type: none"> <li>▪ Students will know that the universe consists of many billions of galaxies, each containing many billions of stars and that there are vast distances measured in light years that separate these galaxies and stars from one another and from the Earth.</li> <li>▪ Students will know common types and life cycles of stars in the universe.</li> <li>▪ Students will explain how Doppler evidence suggests that our universe is expanding, moving away from the Earth and indicates support for the Big Bang theory of the origin of the universe.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	IV. LIFE SCIENCE	A. Cells	The student will understand that all organisms are composed of cells, which are the fundamental units of life that carry on the many functions needed to sustain life.	<ul style="list-style-type: none"> <li>▪ Students will know that cells convert energy from food for the production of materials necessary for life, including cell growth and cell division.</li> <li>▪ Students will explain that multi-cellular organism have specialized cells that perform specialized functions.</li> </ul>
GRADE 8	IV. LIFE SCIENCE	B. Organisms	The student will understand living systems, at all levels of organization, demonstrate the complementary nature of structure and function.	<ul style="list-style-type: none"> <li>▪ Students will compare and contrast specialized functions of digestion, circulation, respiration, reproduction, excretion, control and coordination and movement in multi-cellular organisms including humans</li> <li>▪ Students will know that an organism's ability to regulate its internal environment enables it to grow, reproduce and obtain resources in a constantly changing environment.</li> <li>▪ Students will know that organisms' behavioral response may be determined by heredity and past experience.</li> </ul>
GRADE 8	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will understand that within the diversity of living organisms, patterns of similarities, differences and complex interactions exist between organisms and with the physical environment.	<ul style="list-style-type: none"> <li>▪ Students will give examples of relationships that are mutually beneficial and competitive.</li> <li>▪ Students will be able to taxonomically group organisms to the appropriate kingdom.</li> <li>▪ Students will know that living and nonliving factors affect the number and types of organisms that an ecosystem can support.</li> <li>▪ Students will explain the factors that affect the number and types of organisms an ecosystem can support including available resources; abiotic factors, and disease.</li> <li>▪ Students will be able to explain how the interrelationships and interdependencies among organisms generate stable ecosystems.</li> <li>▪ Students will be able to explain how the amount of life an environment can support is limited by the availability of matter, energy, and the ability of the ecosystem to recycle materials.</li> </ul>
GRADE 8	IV. LIFE SCIENCE	D. Heredity	The student will understand that heredity information is contained in genes that determine characteristics of organisms that are inherited through asexual and sexual reproduction.	<ul style="list-style-type: none"> <li>▪ Students will compare and contrast the advantages and disadvantages of sexual and asexual reproduction.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 8	IV. LIFE SCIENCE	E. Biological Populations Change Over Time	The student will understand how evolution provides a scientific explanation for the fossil record of ancient life forms, as well as the striking similarities observed among the diverse species of living organisms.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain how a species' biological adaptation in structure, function and behavior enhances its reproductive success and survival in a particular environment.</li> <li>▪ Students will understand that there is scientific evidence of common ancestry among some organisms.</li> <li>▪ Students will give examples of how characteristics of some species do not allow survival when the environment changes.</li> <li>▪ Students will give examples of physical characteristics of an organism that changes the organisms' chance of survival.</li> <li>▪ Students will explain how diversity of species can develop through gradual processes over generations.</li> </ul>
GRADE 8	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will understand how the flow of energy and the recycling of matter contributes to a stable ecosystem.	<ul style="list-style-type: none"> <li>▪ Students will explain how energy is transferred through food chains and food webs in an ecosystem.</li> <li>▪ Students will explain how the amount of useable energy available to organisms decreases as it passes through a food chain and/or food web.</li> <li>▪ Students will know that the total amount of matter in a closed system remains the same as it is transferred between organisms and the physical environment even though the matters location or form changes.</li> </ul>
GRADE 8	IV. LIFE SCIENCE	G. Human Organism	The student will understand human body systems and their relationship to good health.	<ul style="list-style-type: none"> <li>▪ Students will explain how many factors related to human health can be controlled and some cannot be controlled.</li> <li>▪ Students will know that protection from disease is a specialized function in multi-cellular organisms.</li> <li>▪ Students will know that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms.</li> <li>▪ Students will use systematic approach to think critically about risks/benefits of a variety of hazards.</li> </ul>
GRADE 9–12	I. HISTORY AND NATURE OF SCIENCE	A. Scientific World View	The student will understand the nature of scientific ways of thinking and that scientific knowledge changes and accumulates over time, some scientific ideas are incomplete, and opportunity exists in these areas for new advances.	<ul style="list-style-type: none"> <li>▪ Students will be able to distinguish among hypothesis, theory, and law as scientific terms and how they are used to answer a specific question.</li> <li>▪ Students will be able to explain how scientific innovations and new evidence can challenge accepted theories and models, including cell theory, atomic theory, theory of evolution, plate tectonic theory, germ theory of disease, Big Bang theory.</li> <li>▪ Students will know that scientific explanations must meet criteria to be considered valid, including that they must be consistent with experimental and observational evidence about nature, logical, respect the rules of evidence, be open to criticism, and report methods and procedures.</li> <li>▪ Students will recognize how traditions govern the conduct of science, including ethics, peer review, conflict, and consensus.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	I. HISTORY AND NATURE OF SCIENCE	B. Scientific Inquiry	The student will design and conduct a scientific investigation and evaluate the results of that investigation, understand and use the processes of scientific investigation to design, conduct, describe, and evaluate these investigations.	<ul style="list-style-type: none"> <li>▪ Students will be able to design and complete a scientific experiment using the scientific method including questioning, testing, hypothesizing, analyzing data, making conclusions based on evidence, and comparing conclusions to the original hypothesis and prior knowledge.</li> <li>▪ Students will be able to distinguish between qualitative and quantitative data.</li> <li>▪ Students will be able to apply mathematics to analyze and support conclusions and models.</li> <li>▪ Students will be able to identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions.</li> <li>▪ Students will be able to apply established safety rules and guidelines in conducting scientific investigations inside and outside the classroom.</li> </ul>
GRADE 9– 12	I. HISTORY AND NATURE OF SCIENCE	C. Scientific Enterprise	The student will explain the relationship between science and technology and how both are used in our world.	<ul style="list-style-type: none"> <li>▪ Students will be able to analyze an example of a way you use the scientific method in your daily life.</li> <li>▪ Students will compare and contrast the goals and career opportunities of engineering/technology and science.</li> <li>▪ Students will provide an example of a need/problem explained by science and solved by engineering/ technology.</li> <li>▪ Students will describe the different scientific and engineering disciplines involved in a common household item.</li> <li>▪ Students will provide an example of how technology facilitated a rapid advancement in science.</li> </ul>
GRADE 9–12	I. HISTORY AND NATURE OF SCIENCE	D. Historic Perspectives	The student will recognize the historical and cultural context of scientific endeavors and how they influence each other.	<ul style="list-style-type: none"> <li>▪ Students will be able to trace the development of a scientific advancement, invention, or theory through time and its impact on society.</li> <li>▪ Students will provide an example of a scientific advancement contributed by another civilization.</li> <li>▪ Students will compare and contrast the differences between scientific theory and other bodies of knowledge, including cultural beliefs, and the importance of each in a science discussion.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	II. PHYSICAL SCIENCE	A. Structure of Matter	The student will understand the nature of matter including their forms, properties and interactions.	<ul style="list-style-type: none"> <li>▪ Students will identify protons, neutrons, electrons as the major components of the atom, their mass relative to one another their arrangement, and their charge.</li> <li>▪ Students will be able to explain the relationship of an element's position on the periodic table to its atomic number and mass.</li> <li>▪ Students will compare and contrast the properties of an element and its isotopes and how isotopes can be used in research, medicine, and industry.</li> <li>▪ Students will use the periodic table to identify regions, families, groups and periods, and to predict atomic size, number of bonding electrons and reactivity of elements.</li> <li>▪ Students will be able to explain how atoms form compounds through ionic and covalent bonding.</li> <li>▪ Students will compare and contrast the four states of matter in terms of structure and magnitude of intermolecular forces.</li> </ul>
GRADE 9–12	II. PHYSICAL SCIENCE	B. Chemical Reactions	The student will understand that the conservation of atoms in chemical reactions leads to the ability to calculate quantities of products and reactions in chemical changes of matter.	<ul style="list-style-type: none"> <li>▪ Students will describe chemical reactions using words and symbolic equations.</li> <li>▪ Students will observe, measure, and calculate quantities to demonstrate conservation of matter in chemical changes.</li> <li>▪ Students will be able to explain how temperature, surface area, agitation, and catalysts influence the rate of reaction.</li> <li>▪ Students will differentiate between complete and reversible reactions.</li> <li>▪ Students will distinguish between a chemical reaction and a nuclear reaction.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	II. PHYSICAL SCIENCE	C. Energy Transformations	The student will identify, analyze, and measure relationships with energy forms, transformations, and transfers.	<ul style="list-style-type: none"> <li>▪ Students will know that potential energy is stored energy and is associated with gravitational or electrical force, mechanical position, or chemical composition.</li> <li>▪ Students will differentiate between kinetic and potential energy and identify situations where kinetic energy is converted into potential energy and vice versa.</li> <li>▪ Students will distinguish between current and static electricity.</li> <li>▪ Students will distinguish between AC and DC current.</li> <li>▪ Students will explain how electricity travels through circuits.</li> <li>▪ Students will know that electricity is the movement of charged particles.</li> <li>▪ Students will describe the production, storage, transmission of electricity.</li> <li>▪ Students will know that photons behave as both particles and waves.</li> <li>▪ Students will explain how the energy of the waves described the electromagnetic spectrum is used in research, medicine and industry.</li> <li>▪ Students will be able to use the Law of Conservation of Energy to explain changes in energy in physical and chemical changes.</li> <li>▪ Students will compare and contrast the amount of energy released through chemical reactions and nuclear fission and fusion.</li> <li>▪ Students will describe the risks and benefits of fossil fuels, renewable sources, and nuclear power as sources of usable energy.</li> </ul>
GRADE 9–12	II. PHYSICAL SCIENCE	D. Motion	The student will understand the nature of force and motion.	<ul style="list-style-type: none"> <li>▪ Students will explain the relationship between force, mass, and acceleration.</li> <li>▪ Students will know that an object that is not being subjected to a net force will continue to move at a constant speed and in a straight line (Inertia).</li> <li>▪ Students will know that if more than one force acts on an object in a straight line, the forces will reinforce or cancel one another, depending on their direction and magnitude.</li> <li>▪ Students will know that unbalanced forces will cause changes in the speed or direction of an object's motion.</li> <li>▪ Students will use the concepts of inertia, force, velocity, and mass to describe the motion of an object.</li> <li>▪ Students will describe the effect of friction and gravity on motion.</li> <li>▪ Students will describe the relationship among energy, work and power both conceptually and quantitatively.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	II. PHYSICAL SCIENCE	E. Forces of Nature	Understand the forces of nature and their application in the real world.	<ul style="list-style-type: none"> <li>▪ Students will be able to identify the gravity, electromagnetic, weak and strong nuclear forces as the four forces of nature.</li> <li>▪ Students will be able to recognize that the nuclear forces that hold the nucleus of an atom together are usually stronger than the electric forces that would make it fly apart.</li> <li>▪ Students will describe the electrical force that exists between any two charged objects and distinguish between attraction and repulsion between charged objects.</li> </ul>
GRADE 9–12	III. EARTH AND SPACE SCIENCE	A. Earth Structure and Processes	The student will understand how the interaction of the atmosphere, biosphere, lithosphere, hydrosphere and space has resulted in ongoing change of the Earth system over geologic time.	<ul style="list-style-type: none"> <li>▪ Students will identify the internal and external sources of energy for the Earth.</li> <li>▪ Students will demonstrate understanding of the laws of thermodynamics as they apply to the cycling of materials and transfer of energy in the Earth system.</li> <li>▪ Students will give examples of how biological processes have played significant roles in determining the character of the atmosphere, biosphere and lithosphere over time.</li> <li>▪ Students will be able to use the theory of plate tectonics to explain relationships among earthquakes, volcanoes, mountains, mid-oceanic ridges and deep-sea trenches.</li> <li>▪ Students will be able to describe how glaciers, gravity, wind, temperature changes, waves, and rivers cause weathering and erosion.</li> <li>▪ Students will describe the rock cycle and compare and contrast the processes responsible for the formation of igneous, sedimentary, and metamorphic rocks.</li> <li>▪ Students will use evidence such as fossils, rock layers, ice caves, radiometric dating, and globally gathered data, to explain how Earth has changed or remained constant over short and long periods of time.</li> <li>▪ Students will be able to apply an integrated understanding of chemistry, physics, and biology to the analysis of global change issues, such as ozone depletion, greenhouse warming and overpopulation.</li> <li>▪ Students will be able to use globally gathered data to describe how Earth systems interact to create our climate and ecosystems.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	III. EARTH AND SPACE SCIENCE	B. The Water Cycle, Weather and Climate	The student will understand the relationships between the global atmospheric processes driven by energy from the sun, the Earth’s tilt, rotation, revolution, the influence of land and water, and the impact of human affairs.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain how the transfer of energy and motions of the Earth all contribute to global atmospheric processes.</li> <li>▪ Students will be able to trace cyclical movement of an element through the lithosphere, hydrosphere, atmosphere, and biosphere.</li> <li>▪ Students will demonstrate the effect of the Earth’s tilt, rotation, and revolution on the seasons, day length, and tides.</li> <li>▪ Students will identify, investigate and predict the factors that influence the quality of water and how it can be reused, recycled and conserved.</li> <li>▪ Students will be able to identify, analyze and evaluate the factors that may influence weather and climate, and describe both their short and long term effects on the environment.</li> <li>▪ Students will discuss the impact of human activity and natural resource use on the Earth’s climate.</li> <li>▪ Students will be able to connect the biotic and abiotic factors that affect the evolution of the Earth’s environment and structure.</li> <li>▪ Students will explain how specific chemical reactions or reaction series have major implication for climate conditions and ecosystem change.</li> </ul>
GRADE 9–12	III. EARTH AND SPACE SCIENCE	C. The Solar System	The student will connect the formation and characteristics of our solar system and its components to the conditions necessary for life.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain how the sun, earth, and solar system formed.</li> <li>▪ Students will be able to compare and contrast the nature of the planets taking into account their composition, mass and distance from the sun.</li> <li>▪ Students will be able to describe the remotely sensed evidence from current technology that has been used to understand the early history of the solar system.</li> <li>▪ Students will be able to compare and contrast the environmental parameters that make life possible on Earth with conditions found on the other planets of our solar system.</li> </ul>
GRADE 9–12	III. EARTH AND SPACE SCIENCE	D. The Universe	The student will understand that astronomical data reveals the structure, scale, and changes in the stars, galaxies, and universe over time.	<ul style="list-style-type: none"> <li>▪ Students will recognize that stars, galaxy, and universe change over time.</li> <li>▪ Students will recognize that the visible mass of the universe consists of billions of galaxies, each of which is a gravitationally bound cluster of billions of stars.</li> <li>▪ Students will understand that stars produce energy from nuclear reactions, primarily the fusion of hydrogen to form helium.</li> <li>▪ Students will be able to identify that the processes in stars that lead to the formation of other elements.</li> <li>▪ Students will describe the evidence from current technologies that has been used to understand the early history of the universe.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	IV. LIFE SCIENCE	A. Cells	The student will comprehend that all living things are composed of cells and the life processes in a cell are based on molecular interactions.	<ul style="list-style-type: none"> <li>▪ Students will be able to relate cellular structures and organelles to their functions.</li> <li>▪ Students will be able to differentiate between prokaryotic and eukaryotic cells in terms of their structure and complexity.</li> <li>▪ Students will compare and contrast the structures found in typical plant and animal cells.</li> <li>▪ Students will be able to explain the role of the cell membrane as a highly selective barrier (diffusion, osmosis, active transport).</li> <li>▪ Students will describe the role of enzymes as catalysts in metabolism and cellular synthesis of new molecules.</li> <li>▪ Students will be able to differentiate between the processes of photosynthesis and respiration in terms of energy flow, reactants, and products.</li> <li>▪ Students will describe how cell functions are regulated through intercellular and extra cellular signaling (hormones, neurotransmitters, proteins).</li> <li>▪ Students will describe and compare the processes of mitosis and meiosis and their role in the cell cycle.</li> </ul>
GRADE 9–12	IV. LIFE SCIENCE	B. Organisms	The student will classify, compare, and contrast the diversity of organisms on earth and their modes of accommodating the requirements for life.	<ul style="list-style-type: none"> <li>▪ Students will relate the structure, complexity and organization of organisms (all organ systems) to their methods of obtaining, transforming, releasing, and eliminating the matter and energy used to sustain the organism.</li> <li>▪ Students will be able to explain the development of multicellular organisms from a single cell through the regulation and expression of different genes.</li> <li>▪ Students will recognize that organisms have innate and/or learned behavioral responses to internal and external stimuli, including the tropic responses in plants.</li> <li>▪ Students will be able to identify significant adaptations that have allowed life to evolve from single-celled aquatic organisms to multicellular terrestrial organisms over a period of more than 3.5 billion years.</li> <li>▪ Students will be able to use scientific evidence, including the fossil record, homologous structures, embryological development, or biochemical similarities, to classify organisms showing probable evolutionary relationships and common ancestry.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	IV. LIFE SCIENCE	C. Diversity and Interdependence or Life	The student will describe how the environment and interactions between organisms can affect the number of species and the diversity of species in an ecosystem.	<ul style="list-style-type: none"> <li>▪ Students will be able to describe the factors related to matter and energy in an ecosystem that influence fluctuations in population size and determine the carrying capacity of a population.</li> <li>▪ Students will be able to explain how adaptations of species and co-evolution with other species are related to success in an ecosystem.</li> <li>▪ Students will identify the types of symbiotic relationships (mutualism, commensalism, parasitism) that occur in a stable ecosystem.</li> <li>▪ Students will predict and analyze how a change in an ecosystem, resulting from natural causes, changes in climate, human activity, or introduction of invasive species, can affect the number of organisms in a population and the biodiversity of species in the ecosystem.</li> </ul>
GRADE 9–12	IV. LIFE SCIENCE	D. Heredity	The student will explain how inherited characteristics are encoded by genes.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain that the instructions for the characteristics of all organisms are carried in nucleic acids (DNA and RNA).</li> <li>▪ Students will be able to define the relationship between DNA, genes, and chromosomes.</li> <li>▪ Students will describe the structure and function of DNA and distinguish between replication, transcription, and translation.</li> <li>▪ Students will know that different species of multicellular organisms have a characteristic diploid number chromosomes, and that in typical humans there are 22 autosomal pairs and two sex chromosomes (XX for female and XY for male).</li> <li>▪ Students will describe how genetic information is transmitted from parents to offspring through the process of meiosis and fertilization as they relate to chromosome recombination and sexual reproduction.</li> <li>▪ Students will be able to use Mendel’s laws of segregation and independent assortment and a Punnett Square to determine the genotype and phenotype of a monohybrid crosses.</li> <li>▪ Students will differentiate between dominant, recessive, co- dominant, incompletely dominant, polygenic, and sex-linked traits.</li> <li>▪ Students will be able to explain how somatic and germ-line mutations in the DNA sequence of a gene may be silent or result in phenotypic change in an organism and/or its offspring.</li> <li>▪ Students will determine the factors that affect the rate of mutations, including, but not limited to, ionizing radiation and chemicals.</li> <li>▪ Students will recognize that biochemical analytical techniques allow for sophisticated analysis with applications such as forensic science, genetic engineering of plants, and medical applications and their societal impacts.</li> </ul>

Grade Level	Strand	Sub-Strand	Standard	Benchmarks
GRADE 9–12	IV. LIFE SCIENCE	E. Biological Populations Change Over Time	The student will explain how evolution provides a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.	<ul style="list-style-type: none"> <li>▪ Students will understand that species change over time and the term biological evolution is used to describe this process.</li> <li>▪ Students will describe how natural selection, the mechanism of biological evolution, causes the differential survival of groups of organisms as a consequence of:               <ul style="list-style-type: none"> <li>a. the potential for a species to increase its numbers;</li> <li>b. the genetic variability of offspring due to mutation and recombination of genes;</li> <li>c. a finite supply of the resources required for life;</li> <li>d. the ensuing selection based on environmental factors of those offspring better able to survive and produce reproductively successful offspring.</li> </ul> </li> <li>▪ Students will be able to predict the success or failure of a population of organisms over time based on genetic variability of offspring, the ability to reproduce, and the exposure to changing environmental factors.</li> <li>▪ Students will be able to describe how genetic variation between populations is due to different selective pressures acting on each population, which can lead to speciation/a new species.</li> <li>▪ Students will recognize that a great amount of time, approximately 3.5 billion years, is necessary to explain the variation of species that has produced the great diversity of life currently present on earth and found in the fossil record.</li> </ul>
GRADE 9–12	IV. LIFE SCIENCE	F. Flow of Matter and Energy	The student will describe and explain the cycling of matter and flow of energy through an ecosystem’s living and non-living components.	<ul style="list-style-type: none"> <li>▪ Students will be able to explain the relationship between abiotic and biotic components of an ecosystem in terms of cycling of water, carbon, oxygen, and nitrogen.</li> <li>▪ Students will know that all matter tends to become more disorganized and that living systems require a continuous input of energy in order to maintain their chemical and physical organizations and prevent death.</li> <li>▪ Students will identify that the primary source of energy for life and fossil fuels is derived from the sun, and explain how sunlight energy is transformed into chemical energy by photosynthesis in organisms.</li> <li>▪ Students will identify and distinguish producers, consumers, and decomposers, and explain the transfer of energy through the trophic levels.</li> <li>▪ Students will describe how respiration releases chemical energy by the breakdown of molecules and store the energy.</li> <li>▪ Students will understand that energy flows through different levels of organization of living systems (cells to communities) and between living systems and the physical environment as chemical elements are recombined in different ways. Each recombination results in storage and dissipation of energy.</li> </ul>

<b>Grade Level</b>	<b>Strand</b>	<b>Sub-Strand</b>	<b>Standard</b>	<b>Benchmarks</b>
GRADE 9–12	IV. LIFE SCIENCE	G. Human Organism	The student will relate the structure and function of human organ systems to the ability to maintain a stable internal environment (homeostasis) despite changes in the outside environment.	<ul style="list-style-type: none"> <li>▪ Students will explain how major organ systems in humans have functional subunits with specific anatomy that perform the function of that organ system.</li> <li>▪ Students will understand and describe the basic anatomy and physiology of the nervous system and sense organs.</li> <li>▪ Students will be able to describe how the function of individual systems within humans is integrated to maintain a homeostatic balance in the body.</li> <li>▪ Students will be able to illustrate how feedback loops in the nervous and endocrine system regulate conditions in the body.</li> <li>▪ Students will realize that behavioral biology has implications for humans since it provides links to psychology, sociology and anthropology.</li> </ul>