

# Wyoming Department of Education Required Virtual Education Course Syllabus

## Washakie County School District # 1

Program Name	Washakie #1 Online	Content Area	SC
Course ID	WOL-SC7LSF1	Grade Level	7
Course Name	WOL-MS Life Science A	# of Credits	NA
SCED Code	NA	Curriculum Type	K12 Fuel Education

### COURSE DESCRIPTION

This year-long K12 Life Science program invites students to investigate the world of living things—at levels both large and small—by reading, observing, and experimenting with aspects of life on Earth. Students explore an amazing variety of organisms, the complex workings of the cell, the relationship between living things and their environments, and discoveries in the world of modern genetics. Practical, hands-on lesson activities help students discover how scientists investigate the living world. Students perform laboratory activities and a full-unit investigation to learn about the application of scientific methods

**WYOMING CONTENT AND PERFORMANCE STANDARDS**

STANDARD#	<a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a>
MS-LS1-1	Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.
MS-LS1-2	Develop and use models to describe the parts, functions, and basic processes of cells.
MS-LS1-3	Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-4	Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
MS-LS1-6	Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
MS-LS1-7	Develop a model to describe how food molecules (sugar) are rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
MS-LS1-8	Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
MS-LS3-1	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.
MS-LS3-2	Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.
MS-LS4-1	Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
MS-LS4-2	Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
MS-LS4-4	Construct an explanation based on evidence that describes how genetic variations of traits in a population affects individuals' probability of surviving and reproducing in a specific environment.
MS-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

**WYOMING CONTENT AND PERFORMANCE STANDARDS**

STANDARD#	<a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a>
MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
MS-ETS1-1	Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2	Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4	Develop a model for a proposed object, tool or process and then use an iterative process to test the model, collect data, and generate modification ideas trending toward an optimal design.
RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or Full opinions.
RST.6-8.3	Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
RST.6-8.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific Full scientific or technical context relevant to grades 6-8 texts and topics.
RST.6-8.5	Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.
RST.6-8.6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.
RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
RST.6-8.8	Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.
RST.6-8.9	Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
RST.6-8.10	By the end of grade 8, read and comprehend science/technical texts in the grades 6-8 text complexity band independently and proficiently.
WHST.6-8.1.a	Introduce claim(s) about a topic or issue, acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically.
WHST.6-8.1.b	Support claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.
WHST.6-8.1.c	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence.
WHST.6-8.1.d	Establish and maintain a formal style.

**WYOMING CONTENT AND PERFORMANCE STANDARDS**

STANDARD#	<a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a>
WHST.6-8.1.e	Provide a concluding statement or section that follows from and supports the argument presented.
WHST.6-8.2.a	Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories as appropriate to achieving purpose; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension.
WHST.6-8.2.b	Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples.
WHST.6-8.2.c	Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts.
WHST.6-8.2.d	Use precise language and domain-specific vocabulary to inform about or explain the topic.
WHST.6-8.2.e	Establish and maintain a formal style and objective tone.
WHST.6-8.2.f	Provide a concluding statement or section that follows from and supports the information or explanation presented.
WHS.6-8.4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
WHS.6-8.5	With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.
WHS.6-8.6	Use technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently.
WHS.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
WHS.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
WHS.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
WHS.6-8.10	Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
<p>Module 1: Organisms</p> <p>Lesson 1.01: Organisms</p> <p>Lesson 1.02: Diversity of Life</p> <p>Lesson 1.03: Design a Madagascar Organism</p> <p>Lesson 1.04: Challenges of Life</p> <p>Lesson 1.05: Characteristics of Life</p> <p>Lesson 1.06: You Are an Organism</p> <p>Lesson 1.07: Living Things Classification</p> <p>Lesson 1.08: Make a Dichotomous Key</p> <p>Lesson 1.09: Domains of Life</p> <p>Lesson 1.10: Classifying Organisms</p> <p>Lesson 1.11: Chemistry of Life</p> <p>Lesson 1.12: Collage of Compounds</p> <p>Lesson 1.13: Single-Celled Organisms</p> <p>Lesson 1.14: Multicellular Organisms</p> <p>Lesson 1.15: Module Review</p> <p>Lesson 1.16: Module Exam</p>	<p>MS-LS1-1</p> <p>MS-LS1-4</p> <p>MS-LS1-5</p> <p>MS-ETS1-2</p> <p>MS-ETS1-3</p> <p>RST.6-8.2</p> <p>RST.6-8.5</p> <p>RST.6-8.6</p> <p>RST.6-8.7</p> <p>RST.6-8.9</p> <p>RST.6-8.10</p>	<p>Introduce concepts to be covered during the Life Science course. Use taxonomic organization to identify and compare different organisms. Define biology. Define organism. Describe some unique characteristics of various organisms on earth.</p> <p>State the range of sizes of organisms on Earth. Apply research on unfamiliar organisms and their environment to create a new organism that would survive in that environment. Define organism. Describe some unique characteristics of various organisms on earth.</p> <p>Identify the three basic challenges all organisms must meet.</p> <p>Describe the challenge of getting energy, the challenge of reproducing, and the challenge of maintaining structure. Give examples of how different organisms meet these challenges. Identify the three basic challenges all organisms must meet. Describe the challenge of getting energy, the challenge of reproducing, and the challenge of maintaining structure. Give examples of how different organisms meet these challenges. Identify the three basic challenges all organisms must meet.</p> <p>Give examples of these characteristics in different organisms. Identify seven characteristics of living things. Identify the basic needs of living things: food, water, air, and an appropriate environment. Summarize why it is difficult to be exact about the definition of "living."</p> <p>Give examples of these characteristics in different organisms. Identify seven characteristics of living things. Identify the basic needs of living things: food, water, air, and an appropriate environment.</p> <p>Define species. Define taxonomy. Explain how organisms are related based on a hierarchy of groups and subgroups. Recognize that Linnaeus created the first accepted scientific method of naming organisms.</p> <p>Create a dichotomous key and utilize it to classify the features of an animal. Define species. Define taxonomy. Describe what is a dichotomous key and what it is used for. Explain how organisms are related based on a hierarchy of groups and subgroups.</p> <p>Explain how a dichotomous key is used to identify organisms. Explain how an organism is related to classification levels above and below it. Identify the three domains of life and name at least one organism within</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>each domain.</p> <p>Define taxonomy. Develop a taxonomic chart to classify different organisms. State the levels of taxonomic organization and explain how an organism is related to levels above and below it.</p> <p>Recognize that carbon has a central role in the chemistry of living organisms. Recognize that living organisms are made of different types of molecules such as water, salt, fats, proteins, and DNA. Recognize that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. Define the term organic molecule and recognize why carbon is the basis of the vast array of organic molecules. Recognize the four fundamental types of organic molecules. Compare and contrast a simple and a complex carbohydrate molecule and recognize examples of each.</p> <p>Define the term organic molecule and recognize why carbon is the basis of the vast array of organic molecules. Recognize the four fundamental types of organic molecules. Compare and contrast a simple and a complex carbohydrate molecule and recognize examples of each.</p> <p>Describe and illustrate a single-celled organism. Distinguish between unicellular and multicellular organisms. Explain that a single cell must carry out all of the basic functions of life in single-celled organisms. Recognize that contagious diseases are caused by microorganisms. Recognize that many organisms are single celled (for example, bacteria, yeasts).</p> <p>Explain that cells within a multicellular organism differentiate as the organism develops. Recognize that many organisms are multicellular, and describe their advantages.</p>
<p>Module 2: Cells                      Lesson 2.01: Cells                      Lesson 2.02: Cell Exploration                      Lesson 2.03: Cell Size                      Lesson 2.04: Differing Cells                      Lesson 2.05: The Plasma Membrane                      Lesson 2.06: Cell Organelles                      Lesson 2.07: If You Were an Organelle                      Lesson 2.08: Cell Origami Review Tool                      Lesson 2.09: Looking at Cells                      Lesson 2.10: Cell Analogy                      Lesson 2.11 Plant and Animal Cells                      Lesson 2.12: Cell Communication                      Lesson 2.13: How Cells Communicate</p>	<p>MS-LS1-1                      MS-LS1-2                      RST.6-8.7                      RST.6-8.10                      WHST.6-8.1a                      WHST.6-8.1b                      WHST.6-8.1c                      WHST.6-8.1d                      WHST.6-8.1e                      WHST.6-8.10</p>	<p>Define the cell as the basic unit of structure and function in all living things. Describe how chemical functions of organisms begin and take place within a cell. Explain that the nucleus of a cell contains instructions about living and growing. Recognize that the cell contains genetic information.</p> <p>Compare and contrast different types of cells from different organisms. Define the cell as the basic unit of structure and function in all living things. Describe how chemical functions of organisms begin and take place within a cell. Research pictures and information of cells online to become aware of the many diverse types of cells.</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
<p>Lesson 2.14: Module Review Lesson 2.15: Module Exam</p>		<p>Calculate the surface area of a model cell using the cell's side length. Create models of three different size cells to describe a cell's size and surface area.</p> <p>Define prokaryotic cells as simple structures that lack a cell nucleus other membrane-enclosed structures. Describe eukaryotic cells as containing membrane-enclosed structures, such as a nucleus and other organelles. Give examples of eukaryotic cells. Give examples of prokaryotic cells.</p> <p>Define plasma membrane and state its function as part of the cell. Describe the roles of the different kinds of embedded proteins in the plasma membrane. Illustrate a plasma membrane, showing the positions of the phospholipids and the different kinds of embedded proteins. Illustrate the structure of a phospholipid and describe its arrangement in the plasma membrane.</p> <p>Describe the cell as a system of organelles mirroring the systems within multicellular organisms. Draw and label the parts of a eukaryotic cell. Draw and label the parts of a prokaryotic cell. Explain that the basic chemical functions of organisms (extracting energy from food, getting rid of wastes, and so on) begin occur within the cell. Recognize the functions of the major components of cells, including structures of prokaryotic cells and organelles of eukaryotic cells. Recognize which organelles of eukaryotic cells are part of the major internal membrane system.</p> <p>Describe the cell as a system of organelles mirroring the systems within multicellular organisms. Explain that the basic chemical functions of organisms (extracting energy from food, getting rid of wastes, and so on) begin occur within the cell. Recognize the functions of the major components of cells, including structures of prokaryotic cells and organelles of eukaryotic cells. Recognize which organelles of eukaryotic cells are part of the major internal membrane system.</p> <p>Describe the cell as a system of organelles mirroring the systems within multicellular organisms. Draw and label the parts of a eukaryotic cell. Draw and label the parts of a prokaryotic cell. Recognize the functions of the major components of cells, including structures of prokaryotic cells and organelles of eukaryotic cells. Recognize which organelles of eukaryotic cells are part of the major internal membrane system.</p> <p>Analyze, critique, and communicate the results of investigations. Draw and label the parts of a typical</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>prokaryotic and a eukaryotic cell. Recognize that scientific explanations come from observations.</p> <p>Compare the parts of a cell and the cell as a whole to another common non-living system (i.e. a car, a city, etc.). Describe the parts of a cell and their primary function.</p> <p>Compare and contrast plant and animal cells. Identify different structures, such as chloroplasts and the cell wall, that differentiate plant and animal cells. Recognize that plants and animals have levels of organization of structure and function: cells, tissues, organs, organ systems, and the whole organism. Recognize that the nucleus is the repository of genetic information in plant and animal cells.</p> <p>Differentiate between structure and function in plant and animal cell organelles, including cell membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole.</p> <p>Compare and contrast plant and animal cells. Compare and contrast prokaryotic and eukaryotic cells.</p>
<p>Module 3: Cells and Energy                      Lesson 3.01: Cells and Energy                      Lesson 3.02: Photosynthesis                      Lesson 3.03: Phases of Photosynthesis                      Lesson 3.04: Modeling the Calvin Cycle                      Lesson 3.05: Breaking Down Glucose                      Lesson 3.06: The Breakdown of Glucose                      Lesson 3.07: Making ATP                      Lesson 3.08: How ATP Works in the Cell                      Lesson 3.09: ATP, ADP, and AMP                      Lesson 3.10: Diffusion and Osmosis                      Lesson 3.11: Cell Division                      Lesson 3.12: Mitosis                      Lesson 3.13: The Meaning of Mitosis                      Lesson 3.14: Module Review                      Lesson 3.15: Module Exam</p>	<p>MS-LS1-6                      MS-LS1-7                      RST.6-8.4</p>	<p>Explain how sunlight provides energy, directly indirectly, to all living things on earth. Explain the main function of chloroplasts. Explain the role of mitochondria in converting and releasing stored energy in cells. Identify mitochondria in an illustration of a cell.</p> <p>Explain why photosynthesis is an essential process of life on Earth, emphasizing the role of glucose. Interpret the absorption spectrums of two types of chlorophyll. Write the equations for photosynthesis and cellular respiration, showing the products and reactants.</p> <p>Describe the Calvin cycle, emphasizing reactants and products. Describe the first two stages of photosynthesis. Distinguish between the different kinds of reactions of photosynthesis. Write the equation for photosynthesis, showing the products and reactants, and describe what happens to each product of the process.</p> <p>Describe the Calvin cycle, emphasizing reactants and products. Describe the first two stages of photosynthesis.</p> <p>Describe the process of glycolysis. Describe the products and reaction of two kinds of fermentation. Distinguish between the different ways that glucose is broken down in the cell. Identify some products and reactions of the Krebs cycle and the electron transport system.</p> <p>Describe how to use a process flowchart to map the</p>



## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>breaking down of glucose processes. Describe the process of glycolysis. Describe the products and reaction of two kinds of fermentation. Identify some products and reactions of the Krebs cycle and the electron transport system.</p> <p>Define an electron transport system and state its function. Describe the process of the electron transport system in the context of glucose breakdown. List the reactants and products in the electron transport system.</p> <p>Describe what happens when ATP is involved in a chemical reaction. Distinguish between ATP and ADP. Illustrate a molecule of ATP and describe its parts.</p> <p>Describe how energy is released added during the bond breaking bond forming processes between ATP, ADP, and AMP. Describe the process of creating ATP, ADP, and AMP models. Distinguish between ATP and ADP. Illustrate a molecule of ATP and describe its parts.</p> <p>Compare and contrast diffusion and osmosis. Define diffusion as the movement of atoms and molecules from an area of higher concentration to an area of lower concentration, and explain its importance. Describe the movement of water across the cell membrane of a cell as osmosis, and explain its importance.</p> <p>Define cell cycle and mitosis and state the relationship between the two. Define the cell cycle as the sequence of events in the life cycle of a cell. Describe mitosis as a process of replicating genetic material within the nucleus. Distinguish how cytokinesis occurs in animals and in plants. Recognize and label the phases of mitosis and describe what happens to each chromosome during the process. Recognize cell division as a recurring process that contributes to growth and repair. Recognize the function of mitosis, including its role in the cell cycle. Recognize that the nucleus is the repository of genetic information in plant and animal cells.</p> <p>Compare and contrast the cell cycle and mitosis. Define cell cycle and mitosis and state the relationship between the two. Distinguish how cytokinesis occurs in animals and in plants. Give examples of different types of cells that undergo cell division (e.g., skin cells, blood cells, cells that line the mouth). Interpret a diagram that shows the phases of mitosis and describe what happens during this process. Recognize and label the phases of mitosis and describe what happens to each chromosome during the process.</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Recognize the function of mitosis, including its role in the cell cycle.</p> <p>Define cell cycle and mitosis and state the relationship between the two. Recognize and label the phases of mitosis and describe what happens to each chromosome during the process. Distinguish how cytokinesis occurs in animals and in plants. Recognize the function of mitosis, including its role in the cell cycle.</p> <p>Compare and contrast plant and animal cells.</p> <p>Compare and contrast plant and animal cells. Describe how chemical functions of organisms start and are carried out within a cell and how material moves in and out of the cell.</p>
<p>Module 4: Living Systems                      Lesson 4.01: Living Systems                      Lesson 4.02: Levels of an Organ System                      Lesson 4.03: Muscular and Skeletal Systems                      Lesson 4.04: Chicken Wing Anatomy                      Lesson 4.05: Respiratory System                      Lesson 4.06: Circulatory System                      Lesson 4.07: How the Blood and Air Flow                      Lesson 4.08: Digestive and Excretory Systems                      Lesson 4.09: Digestive Journey                      Lesson 4.10: Nervous System                      Lesson 4.11: Paralysis and the CNS                      Lesson 4.12: Immune and Lymphatic Systems                      Lesson 4.13: The Immune Response                      Lesson 4.14: Endocrine and Integumentary                      Lesson 4.15: How Systems Work Together                      Lesson 4.16: Module Review                      Lesson 4.17 Module Exam</p>	<p>MS-LS1-3                      MS-LS1-7                      MS-LS1-8                      WHST.6-8.2a                      WHST.6-8.2b                      WHST.6-8.2c                      WHST.6-8.2d                      WHST.6-8.2e                      WHST.6-8.2f                      WHST.6-8.4                      WHST.6-8.5                      WHST.6-8.6                      WHST.6-8.7                      WHST.6-8.8                      WHST.6-8.9                      WHST.6-8.10</p>	<p>Describe how cells differentiate as multicellular organisms develop. Explain how organ systems (organs, tissues, and cells) function, and recognize that failure of any part may affect the entire system. Explain the hierarchical relationships of cells, tissues, organs, and organ systems. Relate diversity of cell structure to diversity of function within an organism.</p> <p>Explain how organ systems (organs, tissues, and cells) function, and recognize that failure of any part may affect the entire system. Explain the hierarchical relationships of cells, tissues, organs, and organ systems. Explain the levels of organization within the body.</p> <p>Compare the skeletal systems of animals and plants. Describe the structure and function of the muscular and skeletal systems. Explain how bones and muscles work together to allow animal locomotion.</p> <p>Analyze, critique, and communicate the results of investigations. Recognize that scientific explanations come from observations.</p> <p>Compare and contrast gills and lungs. Compare and contrast the respiratory systems of a grasshopper, a fish, and a mammal. Compare the circulatory systems of animals with two-chambered, three-chambered, and four-chambered hearts. Compare the respiratory systems of animals and plants. Describe the function of the respiratory system in organisms. Describe the functions of organs and other structures in the respiratory system. Describe the movement of blood through the chambers of a mammalian heart and elements of the mammalian circulatory system, including distinguishing between arteries and veins. Describe the route of blood through the</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>human circulatory system.</p> <p>Compare and contrast the respiratory systems of a grasshopper, a fish, and a mammal. Compare the circulatory system of animals and plants. Compare the circulatory systems of animals with two-chambered, three-chambered, and four-chambered hearts. Describe the function of the circulatory system in organisms. Describe the movement of blood through the chambers of a mammalian heart and elements of the mammalian circulatory system, including distinguishing between arteries and veins. Describe the functions of organs in the circulatory system. Describe the route of blood through the human circulatory system. Describe the structure and function of the human respiratory system. Identify the structure of the circulatory system and organs within this system of different organisms. Illustrate the anatomy of a mammalian heart. Recognize the function of circulatory systems of animals.</p> <p>Compare and contrast the respiratory systems of a grasshopper, a fish, and a mammal. Compare the circulatory systems of animals with two-chambered, three-chambered, and four-chambered hearts. Describe the movement of blood through the chambers of a mammalian heart and elements of the mammalian circulatory system, including distinguishing between arteries and veins. Describe the route of blood through the human circulatory system. Describe the structure and function of the human respiratory system.</p> <p>Compare the digestive and excretory systems of animals and plants. Describe the function of the digestive and excretory systems in organisms. Describe the functions of organs and other structures in the digestive and excretory systems. Identify the structure of the digestive and excretory systems and organs within these systems.</p> <p>Identify the structure of the digestive and excretory systems and organs within these systems.</p> <p>Compare and contrast the nervous systems of a hydra, a flatworm, and a fish. Label a diagram of the structure of the vertebrate nervous system, and recognize the name of the division that connects with the internal organs. Recognize that nervous systems vary with the animal's niche and associated behavioral adaptations. Recognize the definition of a reflex and the advantage of a reflex over other types of behavior in some situations.</p> <p>Recognize how a nerve signal passes along a nerve axon.</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Define the immune system as a network of cells, tissues, and organs that help to defend the body against harmful substances. Describe how plants defend themselves against disease. Explain how the immune and lymphatic systems work together for certain human body defense processes. Explain the role of the lymphatic system in the human body. Explain the role of white blood cells in the immune system. Recognize that antigens may trigger an immune response, and cells of the immune system that recognize these antigens remain in the system for a long period of time to fight off subsequent invaders.</p> <p>Distinguish between specific and non-specific defenses of the body's immune system. Explain the role of white blood cells in the immune system. Recognize that antigens may trigger an immune response, and cells of the immune system that recognize these antigens remain in the system for a long period of time to fight off subsequent invaders.</p> <p>Recognize some important features of the structure and function of the human endocrine system. Recognize some important features of the structure and function of the human integumentary system.</p> <p>Compare major features and functions of plant and animal systems. Give an example of how a problem in one part of a body system can affect the entire system.</p>
<p>Module 5: Animals and Species            Lesson 5.01: Animals and Species            Lesson 5.02: Cnidarians and Roundworms            Lesson 5.03: Annelids and Arthropods            Lesson 5.04: Fish and Amphibians            Lesson 5.05: Amphibians            Lesson 5.06: Reptiles, Birds, and Mammals            Lesson 5.07: The West Nile Virus            Lesson 5.08: Distinguishing Phyla            Lesson 5.09: Comparison Within Species            Lesson 5.10: Characteristic Comparisons            Lesson 5.11: Continuation of Species            Lesson 5.12: Cells Reproduction            Lesson 5.13: Sexual and Asexual Reproduction            Lesson 5.14: Life Cycles            Lesson 5.15: Combining Life Cycles            Lesson 5.16: Module Review            Lesson 5.17: Module Exam            Lesson 5.18: Portfolio</p>	<p>MS-LS3-2            MS-LS4-5            MS-ETS1-4            RST.6-8.1            RST.6-8.5            RST.6-8.6            RST.6-8.8</p>	<p>Describe some of the advantages and challenges that come with evolution from the unicellular to the multicellular life-form. Describe the structure of a flatworm, illustrate an example, and label its parts. Describe the structure of a sponge; illustrate an example, and label its parts. Explain the biology of flatworms, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of sponges, citing their characteristics, diversity, habitat, methods of feeding, reproduction, and locomotion.</p> <p>Compare and contrast asymmetry, bilateral symmetry, and radial symmetry. Describe the structure of a cnidarian; illustrate an example and label its parts. Describe the structure of a mollusk, illustrate an example, and label its parts. Describe the structure of a roundworm, illustrate an example, and label its parts. Explain the biology of cnidarians, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of mollusks, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of roundworms, citing their characteristics, diversity, habitat, and methods of</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>feeding, reproduction, and locomotion.</p> <p>Describe the structure of an annelid, illustrate an example, and label its parts. Describe the structure of an arthropod, illustrate an example, and label its parts. Describe the structure of an echinoderm, illustrate an example, and label its parts. Explain the biology of annelids, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of arthropods, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of echinoderms, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion.</p> <p>Describe the characteristics of the chordates. Describe the external and internal structure of a fish, illustrate an example, and label its parts. Describe the structure of an amphibian, illustrate an example, and label its parts. Explain the biology of amphibians, citing their characteristics, taxonomy, examples, habitats, reproduction, and locomotion. Explain the biology of fish, citing their characteristics, taxonomy, key examples, habitats, and locomotion.</p> <p>Conduct research in order to compare and contrast the major physical structures, coloring, and habitat of various amphibians. Describe the structure of an amphibian, illustrate an example, and label its parts. Explain the biology of amphibians, citing their characteristics, taxonomy, examples, habitats, reproduction, and locomotion.</p> <p>Compare and contrast endothermy and ectothermy and give animal examples of each. Explain the biology of birds, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of mammals, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of reptiles, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Interpret a phylogenetic tree of the animal kingdom, describing what it states about the evolution of animals.</p> <p>Explain the biology of birds, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Explain the biology of mammals, citing their characteristics, diversity, habitat, and methods of feeding, reproduction, and locomotion. Research and explain the role that birds, reptiles, and mammals played in</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>the transmission of West Nile virus.</p> <p>Describe the characteristics of annelids, arthropods, and echinoderms and give examples of each. Describe the characteristics of chordates and recognize that vertebrates are one subphylum of chordates. Describe the characteristics of cnidarians, roundworms, and mollusks and give examples of each.</p> <p>Describe how internal characteristics of individuals may differ (for example, size of bones, near-sightedness, blood type, resting heart rate). Recognize that members of a species may be diverse. Recognize that similarities among human beings make it possible for them to donate organs blood to one another.</p> <p>Describe how internal characteristics of individuals may differ (for example, size of bones, near-sightedness, blood type, resting heart rate). Explain through observation the differences in characteristics among individuals. Recognize that members of a species may be diverse.</p> <p>Compare biological advantages and disadvantages of asexual and sexual reproduction. Describe the life cycle of asexual organisms. Explain how asexual organisms reproduce. Recognize that reproduction is essential for the continuation of a species.</p> <p>Compare and contrast the structure and function of the sperm cell and egg cell in vertebrate animals and plants. Differentiate seeds and spores and their role in plant reproduction. Examine views of others and revise own views if warranted. Recognize that organisms that reproduce sexually have differentiated cells for this purpose. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Examine and describe the reproductive structures of a plant. Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Define the term life cycle. Describe the life cycle of invertebrates (for example, contrast complete metamorphosis with incomplete metamorphosis of insects). Describe the life cycle of vertebrates (for example, dog, bird, frog). Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources.</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		Describe the life cycle of invertebrates (for example, contrast complete metamorphosis with incomplete metamorphosis of insects). Describe the life cycle of vertebrates (for example, dog, bird, frog).
Lab Appendix A	RST6-8.3	Use a microscope Use Punnett Squares
Semester 2		
Module 1: Interdependence of Life Lesson 1.01: Organisms and Their Needs Lesson 1.02: Staying Balanced Lesson 1.03: Responses Lesson 1.04: Aquarium Ecosystem Lesson 1.05: Population Limits Lesson 1.06: Populations Lesson 1.07: Cycles in Nature Lesson 1.08: Energy Flow in Ecosystems Lesson 1.09: Food Chains Lesson 1.10: A Decomposer Food Chain Lesson 1.11: Food Webs Lesson 1.12: Making a Desert Food Web Lesson 1.13: A New Organism in the Food Web Lesson 1.14: Competitive Relationships Lesson 1.15: Cooperative Relationships Lesson 1.16: Symbiotic Partners Lesson 1.17: Module Review Lesson 1.18: Module Exam	MS-LS2-1 MS-LS2-2 MS-LS2-3 MS-LS2-4 WST.6-8.2a WST.6-8.2b WST.6-8.2c WST.6-8.2d WST.6-8.2e WST.6-8.2f WST.6-8.4 WST.6-8.5 WST.6-8.6 WST.6-8.7 WST.6-8.8 WST.6-8.9 WST.6-8.10	<p>Define and describe adaptation and the environmental conditions that are basic needs of living organisms: temperature, shelter, and space.</p> <p>Examine views of others and revise own views if warranted. Explain the importance of water to living organisms. Identify the basic needs of living organisms: food, water, oxygen (animals) or carbon dioxide Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Define homeostasis as the tendency of an organism to regulate its internal conditions to maintain good health. Describe different feedback mechanisms in the body that help to maintain homeostasis. Examine views of others and revise own views if warranted. Explain and give examples of how organisms maintain internal stability as external environments change. Explain that the normal growth, development, maintenance, and reproduction of an organism may be altered by changes in the external environment. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Describe ways that organisms respond to external stimuli, such as the presence or absence of heat or light. Describe ways that organisms respond to internal stimuli, such as hunger or thirst. Examine views of others and revise own views if warranted. Explain how plants respond to changed conditions or external stimuli. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Define an ecosystem as a community of organisms living together and interacting in a particular physical environment. Distinguish between biotic and abiotic factors of an environment. Recognize that the number and types of organisms an ecosystem can support depend on available resources and abiotic factors (light and water, temperature range, soil composition, etc.).</p> <p>Define community as a group of organisms or populations living and interacting within a specific environment, and</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>give examples. Define population as a group of individuals of the same species that exist together at a given place and time. Describe and give examples of how overpopulation may affect an ecosystem.</p> <p>Describe and give examples of how overpopulation may affect an ecosystem. Research and describe populations of organisms in various biomes.</p> <p>Describe energy flow in ecosystems, including the role of producers and consumers. Describe how to create a food chain diagram in order to determine the trophic level of each organism in the chain. Recognize that the amount of usable energy available to organisms decreases at each trophic level of a food chain or web.</p> <p>Describe energy flow in ecosystems, including the role of producers and consumers. Describe how to create a food chain diagram in order to determine the trophic level of each organism in the chain. Recognize that the amount of usable energy available to organisms decreases at each trophic level of a food chain or web.</p> <p>Define and give examples of producers, consumers, and decomposers in an ecosystem. Describe the interaction of producers, consumers, and decomposers in an ecosystem. Interpret a diagram of a food chain and explain the interactions represented.</p> <p>Define and give examples of producers, consumers, and decomposers in an ecosystem. Describe the interaction of producers, consumers, and decomposers in an ecosystem. Describe the primary characteristics of a decomposer food chain. Interpret a diagram of a food chain and explain the interactions represented.</p> <p>Categorize populations by the functions they serve in an ecosystem. Create and interpret a diagram of a food web and explain the interactions represented. Compare and contrast food chains and food webs. Recognize that all organisms are part of and depend on two main interconnected global food webs: the ocean food web and the land food web.</p> <p>Compare and contrast food chains and food webs. Create and interpret a diagram of a food web and explain the interactions represented. Explain what happens when an organism is removed from an existing food web. Recognize that all organisms are part of and depend on two main interconnected global food webs: the ocean food web and the land food web.</p>



**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Recognize that the introduction of a new species to an ecosystem can disrupt the balance of that ecosystem. Research and describe what happens when an organism becomes part of a new ecosystem as the result of human activities.</p> <p>Describe the interaction of predators and prey in a specific area and relate the interaction to competition for resources. Explore and describe reasons why populations of organisms may change over time. Give examples of competition in specific environments (freshwater, ocean, forest, desert, grassland, mountain region, etc.).</p> <p>Define and explain mutualism, commensalism, parasitism. Differentiate cooperative and competitive relationships among organisms (predator-prey, parasitism, mutualism, and commensalism).</p> <p>Differentiate cooperative and competitive relationships among organisms (predator-prey, parasitism, mutualism, and commensalism). Research and describe different examples of symbiosis and symbiotic partners.</p>
<p>Module 2: Adaptation and Change            Lesson 2.01: Change over Time            Lesson 2.02: Galapagos Island Changes            Lesson 2.03: Structural Adaptations            Lesson 2.04: Organisms and Biomes            Lesson 2.05: Behavioral Adaptations            Lesson 2.06: Extinct or Endangered?            Lesson 2.07: Meet an Endangered Species            Lesson 2.08: Changes in Ecosystems            Lesson 2.09: Ecosystems and Decomposition            Lesson 2.10: Rates of Environmental Change            Lesson 2.11: Mount St. Helens Succession            Lesson 2.12: Population Changes            Lesson 2.13: The Human Factor Part 1            Lesson 2.14: The Human Factor Part 2            Lesson 2.15: Module Review            Lesson 2.16: Module Exam</p>	<p>MS-LS2-3            MS-LS2-4            MS-LS2-5            WST.6-8.1a            WST.6-8.1b            WST.6-8.1c            WST.6-8.1d            WST.6-8.1e            WST.6-8.2a            WST.6-8.2b            WST.6-8.2c            WST.6-8.2d            WST.6-8.2e            WST.6-8.2f            WST.6-8.4            WST.6-8.5            WST.6-8.6            WST.6-8.7            WST.6-8.8            WST.6-8.9            WST.6-8.10</p>	<p>Describe different examples of species that have changed over time. Explain that diversity develops gradually over many generations in response to different influences.</p> <p>Describe different examples of species that have changed over time. Explain that diversity develops gradually over many generations in response to different influences. Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Define adaptation as a change that improves the chances of survival for a species in a specific environment. Describe and give examples of how diversity of animals in a population combined with selection pressures over time can change population characteristics. Identify and give specific examples of structural adaptations in animals. Identify and give specific examples of structural adaptations in plants.</p> <p>Identify and give specific examples of structural adaptations in animals. Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Explain how behavioral adaptations differ from structural adaptations. Explain how behavioral adaptations help animals survive. Explain how behavioral adaptations help</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>plants survive. Give an example of how behavioral responses may be determined by heredity or past experience.</p> <p>Distinguish between extinct and endangered species and give examples of each. Explain that extinction may result from mismatch of adaptations and the environment. Give examples of specific traits of different species that helped them survive.</p> <p>Explain that extinction may result from mismatch of adaptations and the environment. Use technology and online research to gather and synthesize information, which also cites and links sources. Give examples of specific traits of different species that helped them survive.</p> <p>Analyze and predict the results of introducing or removing an organism from a food web. Describe how a change in one part of an ecosystem affected other parts of that same ecosystem. Give examples of changes within an ecosystem and explain why they occurred.</p> <p>Describe how a change in one part of an ecosystem affected other parts of that same ecosystem. Give examples of changes within an ecosystem and explain why they occurred. Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Describe environmental changes that occur rapidly, such as forest fires and decomposition. Describe environmental changes that occur slowly, such as forest and pond succession.</p> <p>Describe environmental changes that occur slowly, such as forest and pond succession. Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Analyze and predict the results of introducing an organism to a food web or removing an organism from a food web. Describe and give examples of the consequences of overpopulation in an ecosystem. Describe how overpopulation is often limited.</p> <p>Describe how human activity can affect the transfer of energy in ecosystems (for example, roads, oil spills, hurricanes). Examine views of others and revise own views if warranted. Explain how human activity may alter the balance of an ecosystem. Use technology to collaborate with peers by publishing writing which links and cites sources.</p>

**SCOPE AND SEQUENCE**

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Describe how human activity can affect the transfer of energy in ecosystems (for example, roads, oil spills, hurricanes). Examine views of others and revise own views if warranted. Explain how human activity may alter the balance of an ecosystem. Use technology to collaborate with peers by publishing writing which links and cites sources.</p>
<p>Module 3: Genetics and Heredity            Lesson 3.01: Genetics and Heredity            Lesson 3.02: Mendel's Pea Plants            Lesson 3.03: Genes and Alleles            Lesson 3.04: Inheritance            Lesson 3.05: Punnett Squares            Lesson 3.06: Using Punnett Squares            Lesson 3.07: Similarities Among Organisms            Lesson 3.08: Chromosomes            Lesson 3.09: Meiosis            Lesson 3.10: Making a Meiosis Mobile            Lesson 3.11: Meiosis and Mitosis            Lesson 3.12: Mutations            Lesson 3.13: Karyotypes            Lesson 3.14: Genetic Engineering            Lesson 3.15: Debating Genetic Engineering            Lesson 3.16: Module Review            Lesson 3.17: Module Exam</p>	<p>MS-LS3-1            MS-LS3-2            MS-LS4-5            MS-LS4-6            RST.6-8.4            WST.6-8.1a            WST.6-8.1b            WST.6-8.1c            WST.6-8.1d            WST.6-8.1e</p>	<p>Describe DNA as a blueprint for life. Describe what happens to the chromosomes and genes during meiosis. Explain how genes and chromosomes determine hereditary traits. Explain how mutations and genetic engineering can alter genes. Explain Mendel's theory of how traits are passed from parents to offspring. Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.</p> <p>Distinguish between dominant and recessive traits. Identify traits as genetically determined characteristics and give examples of traits (for example, eye color, leaf shape). Summarize Mendel's contributions to the field of genetics.</p> <p>Define allele as one of the form of a gene. Define gene as the basic unit of inheritance. Distinguish between dominant and recessive traits. Explain that dominant alleles result in the expression of dominant traits.</p> <p>Describe how a special set of homologous chromosomes determines gender in some species. Describe how new pairs of alleles come together for sexually reproducing organisms.</p> <p>Summarize Gregor Mendel's contributions to our understanding of genetics and heredity. Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.</p> <p>Use a Punnett Square to show the possible outcomes of various combinations of alleles from two parents.</p> <p>Define species as a group of organisms closely resembling one another and able to interbreed. Describe ways that external and internal anatomical features may be similar among organisms. Examine views of others and revise own views if warranted. Explain that anatomical similarities among organisms occur at the cellular level through genes and chromosomes. Use technology to collaborate with peers by publishing writing which links and cites sources.</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>Define chromosome as a structure that contains a single long DNA molecule and associated proteins. Describe how RNA acts like a messenger that delivers genetic code information. Describe the relationships of cells, chromosomes, and genes. Examine views of others and revise own views if warranted. Explain that DNA is a "blueprint for life" that is coded into a double-helix structure. Explain that one strand of DNA is made of many genes, and that DNA is packed into the chromosomes of a cell. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Define meiosis as a process of cell division in organisms that reproduce sexually. Identify and label each stage of meiosis and describe what happens to the chromosomes and genes during this process. Recognize that the cells resulting from meiosis may serve as gametes. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Identify and label each stage of meiosis and describe what happens to the chromosomes and genes during this process. Recognize that the cells resulting from meiosis may serve as gametes.</p> <p>Describe what happens to each chromosome during mitosis. Describe what happens to the chromosomes and genes during meiosis. Distinguish meiosis from mitosis. Recognize and label each stage of m</p> <p>Describe the role of genetic technologies and their influence on genetic change. Explain how selective breeding and natural selection can change the genetic makeup of organisms.</p> <p>Describe the role of genetic technologies and their influence on genetic change. Explain how selective breeding and natural selection can change the genetic makeup of organisms.</p>
Module 4: How the Gene Works Lesson 4.01: How the Gene Works Lesson 4.02: Structure of DNA and RNA Lesson 4.03: Making a DNA Model Lesson 4.04: DNA Replication Lesson 4.05: Modeling DNA Replication Lesson 4.06: What Is a Gene? Lesson 4.07: What Is a Gene? Lesson 4.08: DNA Makes RNA Makes Protein Lesson 4.09: Transcription and Translation	MS-LS3-1 MS-LS3-2 MS-LS4-5 MS-LS4-6 RST.6-8.4 WST.6-8.1a WST.6-8.1b WST.6-8.1c WST.6-8.1d WST.6-8.1e	Compare and contrast the structure and function of DNA and RNA. Define gene and explain how DNA makes RNA. Define gene expression and describe how genes are turned on and off. Define morphogenesis and recognize the role of differentiating cells in it, including cells that are programmed to die under certain conditions. Examine views of others and revise own views if warranted. Explain how gene expression leads to different kinds of cell differentiation. Explain how the cell uses different kinds of RNA to make proteins. Explain the various functions of

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
<p>Lesson 4.10: What Proteins Do                      Lesson 4.11: Protein Power                      Lesson 4.12: Gene Expression                      Lesson 4.13: Gene Expression Eukaryotes                      Lesson 4.14: Differentiation in Cells                      Lesson 4.15: DNA Today                      Lesson 4.16: Module Review                      Lesson 4.17: Module Exam</p>		<p>proteins in and out of cells and how their functions are related to protein structure. Illustrate and explain the process of DNA replication. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Compare and contrast the structures of DNA and RNA. Illustrate the structure of DNA and RNA and label all the parts. Recognize how bases are paired in DNA. Recognize the functions of DNA and RNA in the cell.</p> <p>Illustrate the structure of DNA and RNA and label all the parts. Recognize how bases are paired in DNA.</p> <p>Define replication. Explain how both new DNA molecules end up exactly alike after replication, if no mutation takes place. Explain how the double helix of DNA unwinds as an early step in replication. Recognize the role of DNA polymerase in the replication process.</p> <p>Explain how both new DNA molecules end up exactly alike after replication, if no mutation takes place. Explain how the double helix of DNA unwinds as an early step in replication. Recognize the role of DNA polymerase in the replication process.</p> <p>Define gene in terms of both its structure and its function. Explain the arrangement of genes on a DNA strand using the terms exon and intron. Recognize the functions of some genes found on a chromosome of a bacterium. Recognize the functions of some genes found on specific human chromosomes.</p> <p>Define gene in terms of both its structure and its function. Explain the arrangement of genes on a DNA strand using the terms exon and intron.</p> <p>Explain the phrase "DNA makes RNA makes protein." Interpret a table showing the genetic code and recognize the meaning and importance of a codon. Recognize the meanings of transcription and translation and the process by which each occurs. Recognize the three main types of RNA and the function of each.</p> <p>Interpret a table showing the genetic code and recognize the meaning and importance of a codon. Recognize the meanings of transcription and translation and the process by which each occurs.</p> <p>Describe the activation energy of a reaction and how</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>enzymes lower it. Interpret an illustration of a chemical reaction involving an enzyme. List some of the roles that proteins play in the cell and in the organism. Recognize the primary, secondary, tertiary, and quaternary structure of a protein.</p> <p>List some of the roles that proteins play in the cell and in the organism. Recognize the primary, secondary, tertiary, and quaternary structure of a protein. Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Define gene expression and describe the advantages of a bacterium being able to regulate a gene. Describe the process of the control of gene expression by use of the lac Operon.* Examine views of others and revise own views if warranted. Explain the structure of the lac Operon and its associated repressor protein gene*. State the number of genes in E. coli and describe that not all are active all the time. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Diagram a segment of mRNA showing the relationship between exons and introns.* Diagram the process by which introns are sliced out of segment of mRNA and describe how the resulting segment is active in making proteins.* Distinguish between control at transcription and control after transcription. Examine views of others and revise own views if warranted. Interpret an illustration showing how control at transcription proceeds in a eukaryotic cell. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Define cell differentiation and explain the process during development. Define morphogenesis and explain that, coupled with differentiation, cells organize into tissues, which form organs. Describe three examples in which programmed cell death is part of normal development of an organism. Examine views of others and revise own views if warranted. Interpret a diagram showing the pathway of cell differentiation in C. elegans. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources</p>
Module 5: History of Life on Earth Lesson 5.01: History of Life on Earth Lesson 5.02: Ancient Earth	MS-LS4-1 MS-LS4-2 MS-LS4-3	Describe changes in scientific thinking about the development of life on earth and the origin of new species. Describe evidence supporting the theory of

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
<p>Lesson 5.03: Origins of Life on Earth                      Lesson 5.04: Redi and Pasteur Experiments                      Lesson 5.05: Evidence for Change Over Time                      Lesson 5.06: Finding Fossils                      Lesson 5.07: The Theory of Evolution                      Lesson 5.08: Darwin's Journal                      Lesson 5.09: Natural Selection                      Lesson 5.10: The Arms of a Sea Star                      Lesson 5.11: Predator vs. Prey                      Lesson 5.12: Origin of a New Species                      Lesson 5.13: Adaptations to New Environments                      Lesson 5.14: Development of Life                      Lesson 5.15: Development of Life Timeline                      Lesson 5.16: Module Review                      Lesson 5.17: Module Exam                      Lesson 5.18: Portfolio</p>	<p>MS-LS4-4                      MS-LS4-5                      MS-LS4-6</p>	<p>evolution. Explain the theory of evolution through the process of natural selection. Summarize major evidence supporting the theory of evolution.</p> <p>Describe scientific hypotheses that explain how life-forms first arose on earth.</p> <p>Describe scientific hypotheses that explain how life-forms first arose on earth. Explain how the first organisms on earth contributed to change in the atmosphere. Identify specific fossil evidence for the earliest life-forms.</p> <p>Describe scientific hypotheses that explain how life-forms first arose on earth.</p> <p>Explain why scientists think evidence about homologous structures and vestigial structures supports the idea that life changes over time. Explain why scientists think evidence from embryology supports the idea that life changes over time. Explain why scientists think evidence from the fossil record supports the idea that life changes over time. Explain why scientists think evidence regarding DNA and other biochemicals supports the idea that life changes over time.</p> <p>Use technology and online research to gather and synthesize information, which also cites and links sources.</p> <p>Define evolution. Describe major findings in Charles Darwin's research that led to the theory of evolution by natural selection.</p> <p>Explain the process of natural selection. Identify specific adaptations that favor the survival of certain organisms in their environment. Recognize that environmental changes may affect the survival of particular organisms and entire species.</p> <p>Explain the process of natural selection. Recognize that environmental changes may affect the survival of particular organisms and entire species.</p> <p>Interpret the results of a scientific investigation. Recognize that scientific explanations come from observations. Record scientific data using charts, graphs, and written descriptions.</p> <p>Define biological species. Describe the sequential stages of speciation. Examine views of others and revise own views if warranted. Explain the meaning of the term speciation and the phrase origin of species. Use</p>

## SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/ STUDENT CENTERED GOALS
		<p>technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Describe the sequential stages of speciation. Examine views of others and revise own views if warranted. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Describe the development of life on earth. Examine views of others and revise own views if warranted. Identify the age of the earth, on the basis of current scientific theory. Use technology to collaborate with peers by publishing writing which links and cites sources.</p> <p>Describe the development of life on earth. Explain why scientists think evidence from the fossil record supports the idea that life changes over time. Identify the age of the earth, on the basis of current scientific theory.</p>
Lab Appendix B	MS-LS4-6 MS-ETS1-1 RST.6-8.3	Lab: Natural Selection: Predator vs Prey Lab: Building a Dam Lab: Using Punnett Squares