

# Wyoming Department of Education Required Virtual Education Course Syllabus

## Niobrara County School District # 1

Program Name	Wyoming Virtual Academy	Content Area	SC
Course ID	D-SCI-203AV2-K	Grade Level	9-12
Course Name	Summit Biology Core - Semester 1	# of Credits	0.5
SCED Code	03051G0.501 2	Curriculum Type	K12 Inc

### COURSE DESCRIPTION

*In this course, students focus on the chemistry of living things: the cell, genetics, evolution, the structure and function of living things, and ecology. The program consists of online lessons including extensive animations, an associated reference book, collaborative activities, virtual laboratories, and hands-on laboratory experiments students can conduct at home.*

### WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	<a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a>
HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multi-cellular organisms.
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
HS-LS1-4	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
HS-LS1-5	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
HS-LS1-6	Construct explanations and revise, as needed, based on evidence for: 1) how carbon, hydrogen, and oxygen may combine with other elements to form amino acids and/ or other large carbon-based molecules, and 2) how other hydrocarbons may also combine to form large carbon-based molecules.
HS-LS1-7	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of sugar molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.
HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population
HS-PS1-2	Construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties, and revise, as needed.

HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

### SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Unit 1: The Science of Biology Lesson 1: Semester Introduction	0	Complete the Semester Introduction. Complete the Semester Introduction student activity.
Unit 1: The Science of Biology Lesson 2: Biology and Scientific Methods	0	List and explain the steps in a scientific method. List and explain the steps in scientific methods. Describe how scientific methods developed over time.
Unit 1: The Science of Biology Lesson 3: Scientific Processes 1	0	Describe the importance of developing a question and forming a hypothesis in a scientific method.  Understand how to design an experiment that tests a hypothesis.  Explain the elements of a well-designed experiment and discuss the importance of controlling extraneous variables.
Unit 1: The Science of Biology Lesson 4: Scientific Processes 2	0	Understand the difference between qualitative data and quantitative data.  Describe how taking data and analyzing it are important steps in the experimental scientific method.  Describe how forming conclusions and communicating are important for doing science.  Understand that sometimes new hypotheses or new experiments need to be made.
Unit 1: The Science of Biology Lesson 5: Review Scientific Processes	0	List and explain the steps in scientific methods. Describe how scientific methods developed over time. Understand how to design an experiment that tests a hypothesis. Explain the elements of a well-designed experiment and discuss the importance of controlling extraneous variables. Describe how taking data and analyzing it are important steps in the experimental scientific method. Understand the difference between qualitative data and quantitative data.

<p>Unit 1: The Science of Biology Lesson 6: The Characteristics of Life 1</p>	<p>0</p>	<p>Explain how living things meet the challenges of getting and using energy, growing, reproducing, and maintaining structure.</p> <p>Explain the characteristics of life as indicated by cellular processes, including homeostasis.</p> <p>Understand the characteristics of life as indicated by cellular processes, including homeostasis.</p> <p>Understand why it is important for living things to obtain and use energy, grow, reproduce, and maintain structure.</p> <p>Understand that homeostasis is the maintenance of an organism's internal environment within certain limits.</p> <p>Explain the concept of homeostasis and describe why it is considered one of life's chief characteristics.</p>
<p>Unit 1: The Science of Biology Lesson 7: The Characteristics of Life 2</p>	<p>0</p>	<p>Understand what it means for a living organism to be organized.</p> <p>Recognize the levels of organization in multicell organisms.</p> <p>Understand the concept of biological organization.</p> <p>Understand how structure relates to function in living organisms.</p>
<p>Unit 1: The Science of Biology Lesson 8: The Characteristics of Life 3</p>	<p>0</p>	<p>Recognize that evolutionary adaptations help an organism survive and reproduce.</p> <p>Understand that organisms sense, interact with, and respond to their environment.</p> <p>Understand that the principles of biological organization apply to populations, communities, ecosystems, and biomes.</p>
<p>Unit 1: The Science of Biology Lesson 9: Review Characteristics of Life</p>	<p>0</p>	<p>Understand what it means for a living organism to be organized.</p> <p>Recognize the levels of organization in multicell organisms.</p> <p>Understand the concept of biological organization.</p> <p>Understand how structure relates to function in living organisms.</p> <p>Understand that the principles of biological organization apply to populations, communities, ecosystems, and biomes.</p> <p>Recognize that evolutionary adaptations help an organism survive and reproduce.</p> <p>Understand that organisms sense, interact with, and respond to their environment.</p> <p>Understand the characteristics of life.</p> <p>Understand why it is important for living things to obtain and use energy, grow, reproduce, and maintain their structure.</p>

		<p>Understand the meaning of homeostasis. Recognize why homeostasis is important to living organisms.</p>
<p>Unit 1: The Science of Biology Lesson 10: Laboratory: Using a Microscope</p>	<p>0</p>	<p>Identify the parts of a microscope and describe their functions.  Demonstrate safe use of a microscope.  Observe prepared slides and living organisms under a microscope.</p>
<p>Unit 1: The Science of Biology Lesson 11: Energy and Life</p>	<p>HS-LS1-5  HS-PS1-7</p>	<p>Understand that all living things need energy.  Explain the role of the sun in meeting the energy needs of living things.  Describe the flow of energy from one living thing to another.  Understand that living things use energy in a chemical form.</p>
<p>Unit 1: The Science of Biology Lesson 12: Review Microscopes and Energy</p>	<p>0</p>	<p>Identify the parts of a microscope and describe their functions. Demonstrate safe use of a microscope. Observe prepared slides and living organisms under a microscope. Explain the role of the sun in meeting the energy needs of living things. Understand that living things use energy in a chemical form. Understand living things' need for energy. Describe the flow of energy through living things.</p>
<p>Unit 1: The Science of Biology Lesson 13: Structure and Function</p>	<p>0</p>	<p>Use examples to explain the relationship of structure and function in organisms.  Recognize how the structure of an organism's parts relates to their function.  Explain the role of adaptations in the relationship between structure and function.  Identify various examples of the relationship between structure and function.</p>

Unit 1: The Science of Biology Lesson 14: Review Structure and Function	0	Identify various examples of the relationship between structure and function. Recognize how the structure of an organism's parts relates to the function of those parts. Explain the relationship between structure and function.
Unit 1: The Science of Biology Lesson 15: Your Choice	0	00000
Unit 1: The Science of Biology Lesson 16: Unit Test	HS-LS1-5 HS-PS1-7	00000
Unit 2: The Chemistry of Life Lesson 1: Chemistry Review	0	Relate the importance of knowing chemistry to an understanding of the processes of life. Describe the parts of an atom. Explain the differences between different atoms. Explain what an element is and describe how and where elements occur on earth. Relate the importance of knowing chemistry to an understanding of the processes of life.
Unit 2: The Chemistry of Life Lesson 2: Chemical Bonds	0	Draw the formation of an ionic bond between atoms. Draw the formation of a covalent bond between atoms. Draw the formation of a hydrogen bond between atoms. Explain how matter tends toward disorganized states.
Unit 2: The Chemistry of Life Lesson 3: Review Chemical Bonds	0	Describe the parts of an atom. Explain the differences between different atoms. Explain how matter tends toward disorganized states. Explain what elements are and where they exist on earth. Understand how atoms form ionic bonds, and be able to diagram the interaction. Understand how atoms form covalent bonds, and be able to diagram the interaction. Understand how atoms form hydrogen bonds, and be able to diagram the interaction.
Unit 2: The Chemistry of Life Lesson 4: Carbon and Life	0	Describe the importance of carbon and carbon compounds to living things. Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water to living things. Recognize that organic compounds contain carbon and that carbon atoms are the building blocks of molecules essential for life. Recognize that carbon's ability to combine with other atoms makes it unique.

		<p>Explain that living cells are composed of a small number of key chemical elements.</p> <p>Describe the importance of carbon and carbon compounds to living things.</p>
Unit 2: The Chemistry of Life Lesson 5: Review Carbon and Life	0	<p>Explain that living cells are composed of a small number of key chemical elements.</p> <p>Recognize that organic compounds contain carbon and that carbon atoms are the building blocks of molecules essential for life.</p> <p>Understand that carbon is unique in how it combines with other atoms.</p>
Unit 2: The Chemistry of Life Lesson 6: Water	0	<p>Describe the importance of water to living things.</p> <p>Describe the chemical nature of water.</p> <p>Describe why water is called the universal solvent and relate that to chemical reactions in a cell.</p> <p>Describe how living things use the essential molecules in a water solution to meet challenges of getting and using energy, growing, reproducing, and maintaining their structure.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
Unit 2: The Chemistry of Life Lesson 7: Review Water	0	<p>Describe the importance of water to living things.</p> <p>Describe the chemical nature of water.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p> <p>Describe why water is called the universal solvent and relate that property to chemical reactions in a cell.</p> <p>Describe how living things use the essential molecules in a water solution to meet challenges of getting and using energy, growing, reproducing, and maintaining structure.</p>
Unit 2: The Chemistry of Life Lesson 8: Laboratory: Investigating Biological Compounds 1	0	<p>Understand that various tests can be used to detect the presence of certain macromolecules.</p> <p>Experiment with various chemical indicators to identify the presence or absence of macromolecules.</p> <p>Gather and analyze data.</p>

Unit 2: The Chemistry of Life Lesson 9: Laboratory: Investigating Biological Compounds 2	0	<p>Understand that various tests can be used to detect the presence of certain macromolecules.</p> <p>Experiment with various chemical indicators to identify the presence or absence of macromolecules.</p> <p>Gather and analyze data.</p>
Unit 2: The Chemistry of Life Lesson 10: Your Choice	0	00000
Unit 2: The Chemistry of Life Lesson 11: Mid-Unit Test	HS-LS1-6 HS-LS1-7, HS-PS1-2  HS-PS1-3	00000
Unit 2: The Chemistry of Life Lesson 12: Simple Carbohydrates	0	<p>Recognize that carbohydrates contain carbon, hydrogen, and oxygen.</p> <p>Explain why carbohydrates function so well as chemical energy: They are easily broken down into compounds that result in the formation of usable energy.</p> <p>Recognize that simple carbohydrates are made of one or two sugar molecules.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
Unit 2: The Chemistry of Life Lesson 13: Complex Carbohydrates	0	<p>Understand the roles of different complex carbohydrates in living organisms.</p> <p>Recognize the different types of complex carbohydrates.</p> <p>Understand that complex carbohydrates are made of many simple carbohydrates linked together.</p> <p>Understand how complex carbohydrates can be used as energy storage.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>

<p>Unit 2: The Chemistry of Life Lesson 14: Review Carbohydrates</p>	0	<p>Recognize that carbohydrates contain carbon, hydrogen, and oxygen.</p> <p>Explain why carbohydrates function so well as chemical energy: They are easily broken down into compounds that result in the formation of usable energy.</p> <p>Recognize that simple carbohydrates are made of one or two sugar molecules.</p> <p>Understand the roles of different complex carbohydrates in living organisms.</p> <p>Recognize the different types of complex carbohydrates.</p> <p>Understand that complex carbohydrates are made of many simple carbohydrates linked together.</p> <p>Understand how complex carbohydrates can be used as energy storage.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
<p>Unit 2: The Chemistry of Life Lesson 15: Lipids</p>	0	<p>Recognize the different types of lipids: fats, oils, phospholipids, steroids, and waxes.</p> <p>Understand the role that lipids play in living organisms, such as energy storage, chemical messenger, and membrane structure.</p> <p>Understand how phospholipids form a boundary between the inside and the outside of a cell.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
<p>Unit 2: The Chemistry of Life Lesson 16: Review Lipids</p>	0	<p>Recognize the different types of lipids: fats, oils, phospholipids, steroids, and waxes.</p> <p>Understand how phospholipids form a boundary between the inside and the outside of a cell.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p> <p>Understand the role that lipids play in living organisms, such as energy storage, chemical messengers, and membrane structure.</p>
<p>Unit 2: The Chemistry of Life Lesson 17: Amino Acids and Proteins</p>	0	<p>Understand the structure of amino acids and proteins.</p> <p>Recognize that a polypeptide is a chain of amino acids.</p> <p>Recognize the importance of amino acids and proteins to living things.</p> <p>Understand what makes up amino acids and proteins.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>

<p>Unit 2: The Chemistry of Life Lesson 18: Proteins as Enzymes</p>	<p>0</p>	<p>Understand the structure of amino acids and proteins.</p> <p>Understand what makes up amino acids and proteins.</p> <p>Understand that enzymes are proteins that speed up chemical reactions without being changed themselves.</p> <p>Understand how the environment may affect enzyme activity.</p> <p>Understand how enzymes lower the activation energy of a chemical reaction.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
<p>Unit 2: The Chemistry of Life Lesson 19: Review Proteins</p>	<p>0</p>	<p>Understand what makes up amino acids and proteins. Understand the structure of amino acids and proteins. Recognize that a polypeptide is a chain of amino acids. Recognize the importance of amino acids and proteins to living things. Understand that enzymes are proteins that speed up chemical reactions without being changed themselves. Understand how the environment may affect enzyme activity. Understand how enzymes lower the activation energy of a chemical reaction. Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
<p>Unit 2: The Chemistry of Life Lesson 20: Nucleic Acids</p>	<p>0</p>	<p>Recognize that nucleic acids are macromolecules with information on how to build and maintain an organism.</p> <p>Understand the roles that DNA and RNA play in the body.</p> <p>Understand the structural similarities and differences between DNA and RNA.</p> <p>Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>
<p>Unit 2: The Chemistry of Life Lesson 21: Review Nucleic Acids</p>	<p>0</p>	<p>Recognize that nucleic acids are macromolecules with information on how to build and maintain an organism. Understand the roles that DNA and RNA play in the body. Understand the structural similarities and differences between DNA and RNA. Describe the role of carbohydrates, proteins, lipids, nucleic acids, and water in living things.</p>

Unit 2: The Chemistry of Life Lesson 22: ATP	0	<p>Understand that the energy stored in ATP bonds is the most common source of energy for life processes.</p> <p>Recognize how ATP stores and releases energy.</p> <p>Understand how the structure of ATP contributes to its function in storing and providing energy.</p> <p>Recognize some of the cellular processes that require ATP.</p>
Unit 2: The Chemistry of Life Lesson 23: Review ATP	0	<p>Recognize how ATP stores and releases energy.</p> <p>Understand how the structure of ATP contributes to its function in storing and providing energy.</p> <p>Recognize some of the cellular processes that require ATP.</p> <p>Understand that the energy stored in ATP bonds is the most common source of energy for most cellular processes.</p>
Unit 2: The Chemistry of Life Lesson 24: Your Choice	0	00000
Unit 2: The Chemistry of Life Lesson 25: Unit Test	HS-LS1-1 HS-LS1-6 HS-LS1-7	00000
Unit 3: Cell Biology Lesson 1: The Cell and Life	0	<p>Understand that the cell is the basic unit of life. Some organisms are unicellular. Organisms that are multicellular generally have cells that perform specialized functions.</p> <p>Explain that cells are the basic unit of structure and function of all living things.</p> <p>Compare and contrast organisms that are unicellular and multicellular.</p> <p>Describe how, in multicell organisms, cells are arranged into tissues, tissues into organs, and organs into systems with major functions.</p>
Unit 3: Cell Biology Lesson 2: Cell Structure	0	<p>Explain how cells were discovered and how the cell theory was developed.</p> <p>Draw a diagram of a cell and name each of its parts.</p> <p>Explain how most of the metabolic activity in a cell occurs in the cytoplasm.</p>
Unit 3: Cell Biology Lesson 3: Cell Organelles	0	<p>Recognize the major organelles in plant and animal cells and describe their function.</p> <p>Understand how the structure of an organelle relates to the function of that organelle.</p> <p>Identify the parts of a cell where most chemical reactions essential to life take place.</p>

		Explain how cells were discovered and how the cell theory was developed.
Unit 3: Cell Biology Lesson 4: Review Cell Structure and Organelles	0	Describe how, in multicell organisms, cells are arranged into tissues, tissues into organs, and organs into systems with major functions. Compare and contrast organisms that are unicellular and multicellular. Explain how cells were discovered and how the cell theory was developed. Explain how most of the metabolic activity in a cell occurs in the cytoplasm. Recognize the major organelles in plant and animal cells and describe their function. Understand how the structure of an organelle relates to the function of that organelle. Identify the parts of a cell where most chemical reactions essential to life take place. Explain that cells are the basic unit of the structure and function of all living things.
Unit 3: Cell Biology Lesson 5: Two Types of Cells	0	Compare and contrast prokaryotic cells and eukaryotic cells.  Explain that prokaryotic cells do not contain a nucleus or membrane-bound organelles.  Explain that in eukaryotic cells, most of the DNA is located in the nucleus.  Given examples, determine if the cell shown is a prokaryote or a eukaryote.
Unit 3: Cell Biology Lesson 6: Review Two Types of Cells	0	Compare and contrast prokaryotic cells and eukaryotic cells. Explain that prokaryotic cells do not contain a nucleus or membrane-bound organelles. Explain that in eukaryotic cells, most of the DNA is located in the nucleus. Given examples, determine if the cell shown is a prokaryote or a eukaryote.
Unit 3: Cell Biology Lesson 7: Cell Membrane Structure	0	Describe how cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.

<p>Unit 3: Cell Biology Lesson 8: Movement Across Membranes</p>	<p>0</p>	<p>Describe how one challenge that organisms face is exchanging materials and energy between themselves and their environment.</p> <p>Explain some of the ways that cells interact with their environment and why this interaction is critical for survival.</p> <p>Explain that nutrients, water, oxygen, carbon dioxide, and waste products must leave and enter the cell through the cell membrane.</p> <p>Describe the processes of passive transport and active transport.</p>
<p>Unit 3: Cell Biology Lesson 9: Review Cell Membranes</p>	<p>0</p>	<p>Describe how cells are enclosed within semipermeable membranes that regulate their interaction with their surroundings.</p> <p>Describe how one challenge that organisms face is exchanging materials and energy between themselves and their environment.</p> <p>Explain some of the ways that cells interact with their environment and why this interaction is critical for survival.</p> <p>Explain that nutrients, water, oxygen, carbon dioxide, and waste products must leave and enter the cell through the cell membrane.</p> <p>Describe the processes of passive transport and active transport.</p>
<p>Unit 3: Cell Biology Lesson 10: Laboratory: Determining the Rate of Diffusion 1</p>	<p>0</p>	<p>Understand how the process of diffusion occurs in cells.</p> <p>Apply the concept of homeostasis to the process of diffusion.</p> <p>Understand how the surface area-to-volume ratio of a cell affects diffusion of materials into that cell.</p> <p>Conduct an experiment, and gather and analyze data.</p>
<p>Unit 3: Cell Biology Lesson 11: Laboratory: Determining the Rate of Diffusion 2</p>	<p>0</p>	<p>Understand how the process of diffusion occurs in cells.</p> <p>Apply the concept of homeostasis to the process of diffusion.</p> <p>Understand how the surface area-to-volume ratio of a cell affects diffusion of materials into that cell.</p> <p>Conduct an experiment, and gather and analyze data.</p>
<p>Unit 3: Cell Biology Lesson 12: Your Choice</p>	<p>0</p>	<p>00000</p>
<p>Unit 3: Cell Biology Lesson 13: Mid-Unit Test</p>	<p>HS-LS1-2</p>	<p>00000</p>

Unit 3: Cell Biology Lesson 14: Chemical Energy and Life	0	<p>Understand that living organisms need energy to live.</p> <p>Explain that some living things use sunlight for energy, while others get energy from consuming other life-forms.</p> <p>Explain that living things convert some forms of energy into the chemical energy of those compounds that support life.</p> <p>Explain that organisms need energy to live. Some living things use sunlight for energy. Others get it from consuming other life-forms.</p> <p>Describe how living things convert some forms of energy into the chemical energy of those compounds that support life.</p>
Unit 3: Cell Biology Lesson 15: Review Chemical Energy and Life	0	<p>Explain that organisms need energy to live. Some living things use sunlight for energy. Others get it from consuming other life-forms. Describe how living things convert some forms of energy into the chemical energy of those compounds that support life. Understand that living organisms need energy to live. Explain that some living things use sunlight for energy, while others get energy from consuming other life-forms. Explain that living things convert some forms of energy into the chemical energy of those compounds that support life.</p>
Unit 3: Cell Biology Lesson 16: Respiration and Photosynthesis	0	<p>Discuss the relationship between cellular respiration and photosynthesis.</p> <p>Describe what products cellular respiration and photosynthesis use and release.</p> <p>Explain that the chemical energy that is gathered from glucose during cellular respiration is used to replenish the ATP in the cell.</p> <p>Explain how the chemical bonds of glucose are broken during processes that either use oxygen or do not use oxygen.</p>
Unit 3: Cell Biology Lesson 17: Review Respiration and Photosynthesis	0	<p>Discuss the relationship between cellular respiration and photosynthesis.</p> <p>Describe what products cellular respiration and photosynthesis use and release.</p> <p>Explain that the chemical energy that is gathered from glucose during cellular respiration is used to replenish the ATP in the cell.</p> <p>Explain how the chemical bonds of glucose are broken during processes that either use or do not use oxygen.</p>
Unit 3: Cell Biology Lesson 18: Laboratory: The Rate of Photosynthesis 1	HS-LS1-5	<p>Explain that glucose is formed during photosynthesis, a process in which plants use light energy from the sun to form glucose from carbon dioxide and water.</p> <p>Perform an experiment to determine some factors that affect the rate of photosynthesis.</p>

Unit 3: Cell Biology Lesson 19: Laboratory: The Rate of Photosynthesis 2	HS-LS1-5	<p>Explain that glucose is formed during photosynthesis, a process in which plants use light energy from the sun to form glucose from carbon dioxide and water.</p> <p>Perform an experiment to determine some factors that affect the rate of photosynthesis.</p>
Unit 3: Cell Biology Lesson 20: Reproduction and Development	0	<p>Explain that cells must replicate for an organism to grow and develop.</p> <p>Understand that mitosis and meiosis are two processes that help with growth and development.</p> <p>Draw a diagram to show how a chromosome forms from the winding of DNA.</p> <p>Discuss the relationship between chromosomes and genes.</p> <p>Explain that reproduction is the characteristic of life that allows for the continuation of a species and creates variety in a population.</p>
Unit 3: Cell Biology Lesson 21: Mitosis	HS-LS1-2, HS-LS1-4	<p>Describe mitosis and cytokinesis, and explain their function: to produce identical gametes to sustain an organism.</p> <p>Understand that a cell's genetic material divides in half during mitosis and finishes during cytokinesis, resulting in two gametes that are identical to the body cell.</p> <p>Explain that during cell division, body cells replicate their nuclei in a process called mitosis.</p>
Unit 3: Cell Biology Lesson 22: Review Reproduction, Development, and Mitosis	0	<p>Explain that reproduction is the characteristic of life that allows for the continuation of a species and creates variety in a population.</p> <p>Explain that cells must replicate for an organism to grow and develop.</p> <p>Understand that mitosis and meiosis are two processes that help with growth and development.</p> <p>Draw a diagram to show how a chromosome forms from the winding of DNA.</p> <p>Discuss the relationship between chromosomes and genes.</p> <p>Explain that during cell division, body cells replicate their nuclei in a process called mitosis.</p> <p>Describe the processes of mitosis and cytokinesis and explain their function: to produce identical daughter cells to sustain an organism.</p> <p>Understand that a cell's genetic material divides in half during mitosis and the cytoplasm divides in cytokinesis, resulting in two daughter cells that are genetically identical to the parent cell.</p>
Unit 3: Cell Biology Lesson 23: Laboratory:	HS-LS1-2, HS-LS1-4	Prepare a slide using an onion root.

Observing Mitosis Lesson 23:		Observe stages of mitosis in a provided slide of an onion root tip.
Unit 3: Cell Biology Lesson 24: Cell Differentiation	0	<p>Understand that cell differentiation is necessary if cells are to become specialized.</p> <p>Explain that without cell differentiation, all cells would be identical; there would not be different cells with specific functions.</p> <p>Explain the importance of specialized cells to organisms.</p> <p>Describe the processes of cell division and cell differentiation.</p> <p>Explain that differentiation is the process of cells becoming specialized. Multicell organisms start as one or more very similar cells. Those cells undergo changes by which they become different.</p>
Unit 3: Cell Biology Lesson 25: Review Cell Differentiation	0	<p>Explain that differentiation is the process of cells becoming specialized. Multicell organisms start as one or more very similar cells. Those cells undergo changes by which they become different.</p> <p>Describe the processes of cell division and cell differentiation.</p> <p>Understand that cell differentiation is necessary if cells are to become specialized.</p> <p>Explain that without cell differentiation, all cells would be identical; there would not be different cells with specific functions.</p> <p>Explain the importance of specialized cells to organisms.</p>
Unit 3: Cell Biology Lesson 26: Cell Specialization	0	<p>Recognize the three major structural levels: tissues, organs, and systems.</p> <p>Explain that multicellularity allows an organism to function as a collection of cells working together, rather than individually.</p> <p>Explain that complex multicell organisms are formed as highly organized arrangements of differentiated cells.</p>
Unit 3: Cell Biology Lesson 27: Review Cell Specialization	0	<p>Explain that complex multicell organisms are formed as highly organized arrangements of differentiated cells.</p> <p>Explain that multicellularity allows an organism to function as a collection of cells working together, rather than individually.</p> <p>Recognize the three major structural levels: tissues, organs, and systems.</p>
Unit 3: Cell Biology Lesson 28: Sexual Reproduction	0	<p>Explain how sexual reproduction allows organisms to produce genetically diverse offspring.</p> <p>Explain how two parents produce offspring that have unique combinations of genes inherited from both parents.</p> <p>Explain how when two haploid gametes come together at</p>

		<p>fertilization, the original number of chromosomes is reinstated.</p>
<p>Unit 3: Cell Biology Lesson 29: Meiosis I</p>	<p>0</p>	<p>Interpret a diagram showing crossing-over.</p> <p>Understand that meiosis is a process by which the genetic material in a cell is divided among gametes.</p> <p>Compare and contrast the function and process of cell division (mitosis) with the production of gametes (meiosis).</p> <p>Describe how meiosis results in gametes that have half the genetic material of the body cells.</p> <p>Understand that meiosis is a process by which the genetic material in a cell divides among gametes.</p>
<p>Unit 3: Cell Biology Lesson 30: Meiosis II</p>	<p>0</p>	<p>Interpret a diagram showing crossing-over.</p> <p>Compare and contrast the function and process of cell division (mitosis) with the production of gametes (meiosis).</p> <p>Describe how meiosis results in gametes that have half the genetic material of the body cells.</p> <p>Understand that meiosis is a process by which the genetic material in a cell divides among gametes.</p> <p>Explain how, in animals, the cells that form during meiosis differentiate to form gametes.</p>
<p>Unit 3: Cell Biology Lesson 31: Review Sexual Reproduction and Meiosis</p>	<p>0</p>	<p>Explain how sexual reproduction allows organisms to produce genetically diverse offspring. Explain how two parents produce offspring that have unique combinations of genes inherited from both parents. Explain how when two haploid gametes come together at fertilization, the original number of chromosomes is reinstated. Understand that meiosis is a process by which the genetic material in a cell is divided among gametes. Compare and contrast the function and process of cell division (mitosis) with the production of gametes (meiosis). Describe how meiosis results in gametes that have half the genetic material of the body cells. Interpret a diagram showing crossing-over. Explain how, in animals, the cells that form during meiosis differentiate to form gametes.</p>
<p>Unit 3: Cell Biology Lesson 32: Your Choice</p>	<p>0</p>	<p>00000</p>

Unit 3: Cell Biology Lesson 33: Unit Test	HS-LS1-2, HS-LS1-3, HS-LS1-4,HS-LS1-5,HS-LS1-6	00000
Unit 4: Mendelian Genetics Lesson 1: The Work of Gregor Mendel	0	<p>Know the genetic basis for Mendel's laws of segregation and independent assortment.</p> <p>Explain that a unit of hereditary information is called a gene, and that genes may occur in different forms called alleles.</p> <p>Explain how the fundamental rules of inheritance began with the work of Gregor Mendel and have been modified since their initial discovery.</p> <p>Describe Mendel's experiments that led to the laws of segregation and independent assortment.</p> <p>Compare and contrast the concepts of dominant and recessive traits.</p>
Unit 4: Mendelian Genetics Lesson 2: Mendelian Inheritance	0	<p>Know the genetic basis for Mendel's laws of segregation and independent assortment.</p> <p>Explain that a unit of hereditary information is called a gene, and that genes may occur in different forms called alleles.</p> <p>Explain how the fundamental rules of inheritance began with the work of Gregor Mendel and have been modified since their initial discovery.</p> <p>Describe Mendel's experiments that led to the laws of segregation and independent assortment.</p> <p>Compare and contrast the concepts of dominant and recessive traits.</p>
Unit 4: Mendelian Genetics Lesson 3: Review Mendel and Mendelian Inheritance	0	<p>Explain how the fundamental rules of inheritance began with the work of Gregor Mendel and have been modified since their initial discovery.</p> <p>Describe Mendel's experiments that led to the laws of segregation and independent assortment.</p> <p>Compare and contrast the concepts of dominant and recessive traits.</p> <p>Explain that a unit of heredity information is called a gene, and that genes may occur in different forms called alleles.</p>
Unit 4: Mendelian Genetics Lesson 4: Laboratory: Genetic Crosses 1	HS-LS3-1,HS-LS3-2, HS-LS3-3	<p>Predict the probable outcome of phenotypes in a genetic cross given the genotypes of the parents.</p> <p>Predict the probable outcome of phenotypes and genotypes in a genetic cross given the genotypes of the parents.</p> <p>Show how new combinations of genes result in genetic variation.</p>

Unit 4: Mendelian Genetics Lesson 5: Laboratory: Genetic Crosses 2	HS-LS3-1,HS-LS3-2, HS-LS3-3	<p>Predict the probable outcome of phenotypes in a genetic cross given the genotypes of the parents.</p> <p>Predict the probable outcome of phenotypes and genotypes in a genetic cross given the genotypes of the parents.</p> <p>Show how new combinations of genes result in genetic variation.</p>	
Unit 4: Mendelian Genetics Lesson 6: Chromosomes and Genes	0	<p>Discuss the relationship between chromosomes and genes.</p> <p>Explain that genes control all aspects of cell life and are the vehicle by which genetic information is passed to the next generation.</p>	
Unit 4: Mendelian Genetics Lesson 7: Genes and Alleles	0	Describe the relationship between a gene and an allele.	
Unit 4: Mendelian Genetics Lesson 8: Review Chromosomes, Genes, and Alleles	0	<p>Discuss the relationship between chromosomes and genes.</p> <p>Explain that genes control all aspects of cell life and are the vehicle by which genetic information is passed to the next generation.</p> <p>Describe the relationship between a gene and an allele.</p>	
Unit 4: Mendelian Genetics Lesson 9: Proteins Express DNA	0	<p>Explain how gene expression affects the development of cells. Define gene expression, and discuss its importance in cell development and the life of an organism.</p> <p>Describe how cell specialization in multicell organisms is the result of gene expression, since all body cells contain the exact same genes in the nucleus.</p>	
Unit 4: Mendelian Genetics Lesson 10: Review Proteins Express DNA	0	<p>Explain how gene expression affects the development of cells. Define gene expression, and discuss its importance in cell development and the life of an organism.</p> <p>Describe how cell specialization in multicell organisms is the result of gene expression, since all body cells contain the exact same genes in the nucleus.</p>	
Unit 4: Mendelian Genetics Lesson 11: Your Choice	0		00000
Unit 4: Mendelian Genetics Lesson 12: Unit Test	HS-LS3-1,HS-LS3-2, HS-LS3-3, HS-ETS1-2		00000
Unit 5: Semester Review and Test Lesson 1: Semester Review	0		00000
Unit 5: Semester Review and Test Lesson 2: Your Choice	0		00000
Unit 5: Semester Review and Test Lesson 3: Your Choice	0		00000
Unit 5: Semester Review and Test Lesson 4: Semester Test	0		00000