Grade 8 Science (Life Science)

Unit 1 Basic Characteristics of Life

Estimated Time Frame for unit	Big Ideas	Essential Question	Concept	Competency	Suggested Resources and Materials	Vocabulary	PA Content /Keystone Standard
15 days	The cell is the basic unit of structure and function for all life on Earth.	What constitutes life?	All living things are made up of smaller units called cells.	Students should be able to compare and contrast living and non-living things.	Modern Biology Textbook Characteristics of life power point Biological hierarchy lab activity	Biology Cell Organelle Homeostasis Reproduction Development Tissue Organ	S6.A.3.1.1 S6.A.3.1.2 S7.A.3.1.1 S7.A.3.1.2 S7.A.3.1.3 S7.B.1.1.1 S8.A.3.1.1 S8.A.3.1.2 S8.B.1.1.4
	The cell is the basic unit of structure and function for all life on Earth.	What constitutes life?	All living things are made up of smaller units called cells.	Students should be able to identify characteristics shared by all living things.	Modern Biology Textbook Characteristics of life power point Biological hierarchy lab activity	Biology Cell Organelle Homeostasis Reproduction Development Tissue Organ	S6.A.3.1.1 S6.A.3.1.2 S7.A.3.1.1 S7.A.3.1.2 S7.A.3.1.3 S7.B.1.1.1 S8.A.3.1.1 S8.A.3.1.2 S8.B.1.1.4
	Science is an organized way of gaining information about the world around us.	What distinguishes science from non-science?	Science deals with observable and testable phenomenon. Non-science deals with beliefs, perceptions, and opinions.	Students should be able to analyze scientific and non-scientific protocol and distinguish between the two.	Modern Biology Textbook Scientific method power point	Hypothesis Scientific Theory Scientific Law Control Experimental Dependent Variable Independent Variable	S6.A.1.1.1 S6.A.1.1.2 S6.A.1.1.3 S6.A.2.1.1 S7.A.1.1.1 S7.A.1.1.2 S7.A.1.1.3 S7.A.1.1.4 S7.A.2.1.1 S8.A.1.1.1 S8.A.1.1.2

							S8.A.1.1.3 S8.A.1.1.4 S8.A.2.1.2 S8.A.2.1.3 S8.A.2.1.4 S8.A.2.1.5 S8.A.2.2.1 S8.A.2.2.2
Review Unit 1 Basic Characteristics of Life							
Assessment Unit 1 Basic Characteristics of Life							
Unit 2 Ecology							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
40 Days	Energy flows through systems while matter is cycled through systems.	What powers all life on Earth?	All energy on Earth originates from the sun. Heat is usually a by-product of an energy transformation	Students should be able to trace energy transformations beginning with light, moving to chemical, and ending with heat.	Ecology power point Nature trail field trip Nature trail plant and animal identification project	Ecology Energy Transformation Food Chain Food Web Energy Pyramid	S7.C.2.1.1 S7.C.2.1.3 S8.B.3.1.1 S8.A.3.1.4 S8.A.3.2.1
	Energy flows through systems while matter is cycled through systems.	What role do carbon, nitrogen, oxygen, and water play in sustaining life on Earth?	Living things are made up of Carbon, Nitrogen, Oxygen, Hydrogen, Phosphorous, and Sulfur. All of which are continuously cycled.	Students should be able to cite the roles of each of these substances in living things. Students should be able to analyze how each is cycled in nature.	Ecology power point Water cycle diagram Nitrogen cycle diagram Carbon cycle diagram	Biologic Cycles	S7.A.3.3.1 S8.A.3.1.4

				Students should be able to explain that the natural cycles of these elements are the key to sustainable agriculture.			
	All living and nonliving things on Earth adhere to a hierarchy of organization.	How are the elements of life on Earth arranged from simplest to increasing levels of complexity?	There are structural and functional similarities and differences that characterize diverse living things.	Students should be able to Identify examples of the relationships between structure and function in the living world.	Ecology power point Ecosystems and succession power point	Organism Species Biosphere Population Community Ecosystem Niche	S7.A.3.1.1 S7.A.3.1.2
	Biological systems interact in complex ways.	What are the relationships between the biotic and abiotic components of Earth's biomes?	There are structural and functional similarities and differences that characterize diverse living things.	Students should be able to identify examples of the relationships between structure and function in the living and non-living world.	Ecology power point Symbiosis power point Predator and prey lab	Biotic Factors Abiotic Factors Biomes Decomposers Producers Consumer Symbiosis	S8.B.3.1.2 S8.B.3.1.3 S7.D.1.1.1
	Biological systems interact in complex ways.	What are the relationships between the biotic and abiotic components of Earth's biomes?	Liquid water is a necessary prerequisite for all life.	Students should be able to explain the human impact on the water cycle and how this resource can be managed and cared for.	Ecology power point Watersheds power point	Watershed	S7.D.1.2.1 S7.D.1.2.2 S7.D.1.2.3 S8.A.3.1.1 S6.B.3.2.1
	Natural and man-made disasters can have dramatic effects on all of	What are the effects of natural and man-made disasters on	Changes in environmental conditions can affect the survival	Students should be able to predict the effects of natural and man-	Ecology power point Ecosystems and succession power	Biodiversity Agriculture Ecological Succession	S7.A.1.3.2 S8.A.1.2.2 S8.A.1.2.4 S8.A.1.3.2

	Earth's biomes.	biodiversity?	of populations and entire species.	made disasters on various ecosystems.	point		S8.A.1.3.3 S8.A.3.2.3 S8.B.3.2.2 S8.B.3.2.3 S8.B.3.3.1 S8.B.3.3.2
	Natural and man-made disasters can have dramatic effects on all of Earth's biomes.	What are the effects of natural and man-made disasters on biodiversity?	All life generates waste.	Students should be able to explain how the accumulation of waste is a major limiting factor to population growth.	Ecology power point	Pollution Recycling	S8.B.3.2.1 S8.B.3.3.1 S8.B.3.3.3 S7.A.3.2.1
	Natural and man-made disasters can have dramatic effects on all of Earth's biomes.	What are the effects of natural and man-made disasters on biodiversity?	Competition and resource scarcity limit population growth and size.	Students should be able to analyze the effects of limiting factors on exponential growth and carrying capacity.	Ecology power point	Limiting Factor Carrying Capacity Exponential Growth	
	Natural and man-made disasters can have dramatic effects on all of Earth's biomes.	What are the effects of natural and man-made disasters on biodiversity?	Human intervention can disrupt existing communities in a negative ways.	Students should be able to explain the effects of non-native species and introduced pests on the biodiversity of native communities.	Ecology power point Ecology word search Ecology Exam		S6.A.1.2.2
Review Unit 2 Ecology							
Assessment Unit 2 Ecology							

Unit 3 Biochemistry

Estimated Time Frame for unit	Big Ideas	Essential Question	Concept	Competency	Suggested Resources and Materials	Vocabulary	PA Content/Keystone Standard
10 Days	Organisms use molecular building blocks to grow, reproduce, and maintain homeostasis.	What role does carbon play in creating the building blocks of life?	All organic molecules are made up of a carbon backbone.	Students should be able to describe the structure and function of carbohydrates, lipids, nucleic acids, and proteins.	Biochemistry power point Teacher demonstration of water's properties Macromolecule differentiation activity Carbon Bonding Activity Iodine test for starch Biochemistry quiz	Chemical Reaction Product Reactant Enzyme Protein Carbohydrate Lipid Nucleic Acid Monomer Polymer Monosaccharide(glucose) Fatty Acid Amino Acid Nucleotides Organic Molecule Inorganic Molecule	S6.A.3.2.1 S7.A.3.3.1 S7B.1.1.2

Review Unit 3 Biochemistry

Assessment Unit 3 Biochemistry

Unit 4 The Cell

Estimated Time Frame for unit	Big Ideas	Essential Question	Concept	Competency	Suggested Resources and Materials	Vocabulary	PA Content/Keystone Standard
20 Days	The cell is the basic unit of structure and function.	What basic components do all cells share?	Cellular structures define classification of organisms.	Student should be able to compare and contrast prokaryotic and eukaryotic cell structures and functions.	Microscopes and cells power point Introduction to microscopes lab activity Microscope parts quiz Cell coloring activity Cell exam	Plasma Membrane Cytoplasm Nucleus Prokaryote Eukaryote Cell Wall	S6.B.1.1.1 S6.B.1.1.2 S6.B.1.1.3 S7.B.1.1.2 S7.B.1.1.3 S6.A.2.2.1 S6.A.3.2.1 S8.A.2.2.3
	The cell is the basic unit of structure and function.	What basic components do all cells share?	Cellular structures define classification of organisms.	Students should be able to compare and contrast plant and animal cell structures and functions.	Microscopes and cells power point Introduction to microscopes lab activity Microscope parts quiz Cell coloring activity Cell exam	Plasma Membrane Cytoplasm Nucleus Cell Wall Chloroplast Central Vacuole Plant Cell Animal Cell	S6.B.1.1.1 S6.B.1.1.2 S6.B.1.1.3 S7.B.1.1.2 S7.B.1.1.3 S6.A.2.2.1 S6.A.3.2.1 S8.A.2.2.3
	The cell is the basic unit of structure and function.	What basic components do all cells share?	Structure and function are interrelated with each other.	Students should be able to identify examples of the relationship between structure and function at different levels of organization.	Microscopes and cells power point Create a model of a cell and its organelles Research assignment on a specific organelle Cell coloring activity	Organelle Plasma Membrane Cytoplasm Nucleus Cell Wall Ribosome Mitochondria	S6.B.1.1.1 S6.B.1.1.2 S6.B.1.1.3 S7.B.1.1.2 S7.B.1.1.3 S6.A.2.2.1 S6.A.3.2.1 S8.A.2.2.3

					Organelle word search Cell exam	Chloroplast Endoplasmic Reticulum Golgi Apparatus Lysosome Central Vacuole	
Review Unit 4 The Cell							
Assessment Unit 4 The Cell							
Unit 5 Cell Transport and Homeostasis							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
10 Days	Cells continuously exchange materials with their environments in order to maintain homeostasis.	How do cells obtain necessary nutrients and expel waste?	The major mechanism for exchange of materials between a cell and its environment is diffusion which is passive.	Students should be able to explain the mechanisms of diffusion as molecules move down the concentration gradient.	Cell transport power point Gummy bear osmosis lab Diffusion demonstration	Diffusion Passive Transport Concentration Gradient Osmosis Equilibrium	S6.A.3.1.1 S6.A.3.2.1 S6.B.1.1.1 S7.B.1.1.2
	Cells continuously exchange materials with their environments in order to maintain homeostasis.	How do cells obtain necessary nutrients and expel waste?	Active transport processes require energy.	Students should be able to compare and contrast active and passive transport with respect to concentration gradients.	Cell transport power point Cell transport exam	Active Transport ATP Concentration Gradient Endocytosis Exocytosis	S6.A.3.1.1 S6.A.3.2.1 S6.B.1.1.1 S7.B.1.1.2
Review Unit 5 Cell Transport and Homeostasis							

Assessment Unit 5 Cell Transport and Homeostasis							
Unit 6 Bioenergetics							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
10 Days	Living things must utilize energy to maintain life.	What are the major energy transformation processes?	Photosynthesis transfers light energy into chemical energy and cellular respiration transfers chemical energy into ATP.	Students should be able to compare and contrast the processes of photosynthesis and cellular respiration with respect to energy flow and cycling of matter.	Photosynthesis and respiration power point Photosynthesis lab Respiration demonstration Photosynthesis and respiration Venn diagram Bioenergetics exam	ATP Photosynthesis Respiration Autotroph Heterotroph Chloroplast Mitochondria Energy Transformations Organic Molecules Inorganic Molecules Transpiration Stomata	S7.A.3.1.1 S7.A.3.1.2 S7.B.1.1.2 S7.C.2.1.1
Review Unit 6 Bioenergetics							
Assessment Unit 6 Bioenergetics							
Unit 7 Growth and Reproduction							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
20 Days	Organisms grow and develop	How do organisms grow	Both growth and reproduction	Students should be able to	Cell growth and reproduction power	Chromosome	S7.B.1.2.1 S7.B.1.2.2

	throughout their lives and perpetuate the species via reproduction.	and reproduce?	require cellular division.	compare and contrast mitosis and meiosis and their roles in growth and reproduction. Students should be able to compare and contrast the processes of sexual and asexual reproduction by identifying the advantages and disadvantages of each.	point Stages of mitosis graphic organizer Stages of meiosis graphic organizer Create a karyotype lab Cell growth and reproduction lab Advantages and disadvantages of sexual and asexual reproduction Venn diagram Short video clips on mitosis and meiosis simulations Cell growth and reproduction exam	Autosome Sex Chromosome Karyotype Mitosis Interphase Prophase Metaphase Anaphase Telophase Meiosis Sexual Reproduction Asexual Reproduction Haploid Diploid Gonads Gametes	S7.B.1.2.3
Review Unit 7 Growth and Reproduction							
Assessment Unit 7 Growth and Reproduction							
Unit 8 Molecular Genetics and Inheritance Patterns							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
20 Days	Living systems store, use, and	How is information	All living things use the same universal	Describe the structure of DNA	Molecular genetics and inheritance	Genetics Genetic Code	S7.B.2.2.2 S7.B.2.2.3

	transmit information.	encoded in the genetic material?	genetic code.	and explain how it relates to information storage and protein synthesis.	patterns power point Create a model of DNA lab Mutations lab	Nucleotide DNA Base Pairing Rules Double Helix Replication Genome Gene pool RNA Transcription Translation Protein Amino Acid Codon	
	Living systems store, use, and transmit information.	How is information transmitted from generation to generation?	The gene is the basic unit of inheritance.	Explain the relationship between DNA, Chromosomes, and genes.	Molecular genetics and inheritance patterns power point	Gene Chromosome	S7.B.2.2.2
	Living systems store, use, and transmit information.	How is information transmitted from generation to generation?	Offspring receive genetic information for their traits from both parents equally.	Students will predict inheritance patterns using punnett squares.	Molecular genetics and inheritance patterns power point Monohybrid crosses practice problem Inheritance problems	Allele Dominant Recessive Punnett Square Monohybrid Cross Genotype Phenotype Homozygous Heterozygous Mutation	S8.A.1.2.3 S7.B.2.2.2 S8.B.2.1.4 S8.B.2.1.5 S8.B.2.2.2 S7.B.2.2.4
	Living systems store, use, and transmit information.	How do viruses affect the structure and functions of an organism?	Viruses need a host cell to reproduce.	Students will describe the life cycle of a virus.	Virus power point Lytic and lysogenic life cycles of a virus diagrams Genetics exam	Virus Lytic Cycle Lysogenic Cycle	S8.B.1.1.1 S8.B.1.1.3
Unit 8 Molecular Genetics and Inheritance Patterns							

Unit 8 Molecular Genetics and Inheritance Patterns							
Unit 9 Evolution							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
10 Days	The process of evolution drives the diversity and unity of life.	What is the role of Natural Selection in affording a population the ability to change over time?	Populations change over time in response to changes in the environment.	Students should be able to identify the four premises of natural selection.	Evolution power point Lamarck vs. Darwin compare and contrast activity Natural selection premises graphic organizer Evolution Exam	Evolution Variation Natural Selection Adaptation Speciation Extinction Population Gene Pool Acquired Characteristics Inherited Traits	S8.A.3.3.2 S7.B.2.1.1 S7.B.2.1.2 S7.B.2.1.3 S7.B.2.2.1 S6.B.2.1.2 S6.B.3.1.1 S7.B.2.2.3 S7.B.2.2.4 S7.D.1.1.2 S8.B.2.1.1 S8.B.2.1.2 S8.B.2.1.3 S8.B.2.1.5 S8.B.2.2.1 S8.A.1.3.4
Review Unit 9 Evolution							
Assessment Unit 9 Evolution							
Unit 10 Zoology and/or Botany							
Estimated Time Frame for unit	**Big Ideas**	**Essential Question**	**Concept**	**Competency**	**Suggested Resources and Materials**	**Vocabulary**	**PA Content/Keystone Standard**
15 Days	Classification aids in our	How are animals placed into	There is a hierarchal	Students should be able to	Animals power point	Biodiversity Taxonomy	S6.A.2.1.1 S7.A.3.2.1

	understanding of shared characteristics among related organisms.	groups?	sequence of classifying animals that involves seven levels.	determine that animals are grouped according to their shared characteristics ranging from most general to most specific and differentiate between them.	Perch exploration lab Phylum identification lab Animals exam	Binomial Nomenclature Animal Vertebrate Invertebrate Dorsal Ventral Body Symmetry Endoskeleton Exoskeleton	S7.B.1.1.2 S7.B.1.1.3 S8.A.3.3.2 S8.B.1.1.1 S8.B.1.1.2 S8.B.1.1.3
	Classification aids in our understanding of shared characteristics among related organisms.	How are plants placed into groups?	There is a hierarchal sequence of classifying animals that involves seven levels.	Students should be able to determine that plants are grouped according to their internal structures as well as their methods of reproduction with emphasis on the role of flowers in sexual reproduction and differentiate between them.	Plants power point Transpiration lab Phylum identification lab Plants exam	Plant Flower Fruit Vegetable Seed Seed Dispersal Vascular Tissue Xylem Phloem Transpiration Root Stem Leaf Stomata	S6.A.2.1.1 S7.A.3.2.1 S7.B.1.1.2 S7.B.1.1.3 S8.A.3.3.2 S8.B.1.1.1 S8.B.1.1.2 S8.B.1.1.3
Review Unit 10 Zoology and/or Botany							
Assessment Unit 10 Zoology and/or Botany							