Biology (9th Grade)

Unit Title: 1. The Nature of Science & Classification	**Duration:** 3.5 weeks
Objective: TLW understand the nature of science and the current taxonomy system	
Standards: B1.1B, B1.2A, B1.2h, B1.2i	
Literacy Activities: -Close reading -Teacher/Student Think/Read Aloud -Contextual Problem Solving -Pair & share	
Skills: -State characteristics of living things. -Write appropriate testable hypotheses. -Critique what can be measured by science -Explain the classification of organisms -Identify characteristics of the six kingdoms -Analyze relationships of organisms based on shared characteristics and functions	

Vocabulary:

archaea autotroph binomial nomenclature dependent variable dichotomous key	eubacteria eukaryotic heterotroph independent variable multicellular protista	prokaryotic sample size scientific consensus unicellular validity

Unit Title: 2. Matter & Energy in Ecosystems	**Duration:** 3 weeks

Objective: TLW analyze the dependence of organisms on environmental resources and how matter and energy are transferred throughout

Standards: B2.5C, B3.2A, B3.2C, B3.3A, B3.2B, B3.3b, E2.2C, E2.2f, E4.1A

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Contextual Problem Solving
-Pair & share

Skills:
-Identify interrelationships that occur within ecosystems
-Create a food chain and web & reflect on the impact of introducing or removing an organism
-Describe biogeochemical cycles and how they sustain life

Vocabulary:

abiotic biomass biotic	biogeochemical cycles ecology energy pyramid	carbon cycle nitrogen cycle nitrogen fixation

Unit Title: 3. Population Ecology and Human Impacts on Ecosystems	**Duration:** 3 weeks

Objective: TLW explain factors that influence population dynamics, evaluate situations that disrupt ecosystems, and analyze the impact of humans on the environment.

Standards: B1.1A, B1.1C, B1.1D, B1.1E, B1.2C, B1.2f, B1.2g, B1.2j, B1.2k, B2.2g, B3.4A, B3.4C, B3.5A, B3.5B, B3.5d, B3.5e, B3.5f, B5.3f

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Contextual Problem Solving
-Pair & share
-Jigsaw Reading/Sharing

Skills:
-Describe ecosystem stability.
-Predict the impact of invading organisms on ecosystems.
-Graph changes in population growth and estimate carrying capacity.
-Discuss the greenhouse effect and the consequences of global warming.
-Examine negative human impacts.
-Explain how biotechnology can improve a species.

Vocabulary:

biotechnology carrying capacity ecosystem equilibrium	exponential growth global warming J-curve	population dynamics S-curve succession

Unit Title: 4. Biochemistry	**Duration:** 2.5 weeks

Objective: TLW explain the structure and function of organic molecules, including carbohydrates, lipids, proteins, and nucleic acids which contain many bonds that store energy.

Standards: B1.1A, B1.1B, B1.1C, B1.1D; B1.1E; B1.1f; B1.1g; B1.1h; B1.2A; B1.2B; B1.2D; B1.2g; B1.2h; B2.2A, B2.2B, B2.2C, B2.2D, B2.2E, B2.2f;B2.r6b, B2.4f, B2.5A

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skills:
-Recognize that compounds are composed of elements joined by energy containing bonds
-List the most common elements in organic compounds
-Explain that carbon can form complex molecules in chains or rings
-Demonstrate how hydrolysis and dehydration synthesis relate to organic molecules
-Recognize the four main categories of organic molecules and their characteristics and uses in the body
-Understand the role of enzymes as proteins in the body

Vocabulary:

amino acids	disaccharide	monomer
ATP	enzyme	monosaccharide
calorie	fatty acid	nucleic acid
carbohydrate	glucose	organic
catalyst	hydrolysis	polymer
dehydration synthesis	lipid	
DNA	macromolecule	

Unit Title: 5. Cell Structure and Function	**Duration:** 5 weeks

Objective: TLW demonstrate the relationship of cell structures, functions, and specialization to life processes.

Standards: B1.1A; B1.1B; B1.1C; B1.1E; B1.1f; B1.2A; B1.2h; B1.2i; B1.2k; B2.4f; B2.4g; B2.5f; B2.5g; B2.5h; B2.5i; B2.r6c; B2.r6d;

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skills:
-State the cell theory.
-Draw and label cell structures, relating structure to function.
-Compare and contrast plant and animal cells.
-Explain the role of the cell membrane as a semi-permeable barrier.

Vocabulary:

active transport cell membrane cell theory centriole chloroplast cytoplasm ER endocytosis	exocytosis Golgi apparatus hypertonic hypotonic impermeable isotonic lysosome mitochondria	organelle osmosis passive transport permeable ribosome vacuole

Unit Title: 6. Photosynthesis and Respiration	**Duration:** 3 weeks

Objective: TLW describe the processes of photosynthesis and cellular respiration (aerobic and anaerobic) and the role of ATP as it relates to these processes.

Standards: B2.1A; B2.1B; B2.4e; B2.4f; B2.5C; B2.5D; B2.5e; B2.5f; B3.1A; B3.1B; B3.1C; B3.1D, B3.1e; B3.1f

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Contextual Problem Solving
-Pair & share

Skills:
-Write equations for photosynthesis and respiration.
-Relate how the mass of an organism changes due to photosynthesis and respiration.
-Compare aerobic and anaerobic respiration.

Vocabulary:

ADP	chlorophyll	light dependent
ATP	fermentation	photosynthesis
aerobic	glycolysis	product
anaerobic	Kreb's cycle (CAC)	reactant
Calvin cycle	lactic acid	respiration

Unit Title: 7. Human Body Systems and Health	**Duration:** 5 weeks

Objective: TLW explain the complex processes and interactions of cells, tissues, and organ systems that allow organisms to maintain a stable internal environment necessary for life.

Standards: B1.2A; B1.2B; B1.2C; B1.2E; B1.2j; B1.2k; B2.3A; B2.3B; B2.3C; B2.3d; B2.3e; B2.3f; B2.3g; B2.4h; B2.4i; B3.r5g; B2.5B, B2.6a; B2.r6e

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Group reading
-Pair & share

Skills:
-Determine the function and major organs of each body system.
-Describe ways that organ systems interact to maintain human health.
-Explain how the internal environment of living organisms must remain relatively constant.
-Diagram the stages of the life cycle for a human disease-causing organism.

Vocabulary:

circulatory system digestive system disease agents endocrine system	immunity integumentary system lymphatic system neuron	neurotransmitter respiratory system vector

Unit Title: 8. Cell Division	**Duration:** 3 weeks

Objective: TLW compare/contrast how genetic material is passed from cell to cell by the processes of mitosis and meiosis and explain how these processes relate to asexual and/or sexual reproduction.

Standards: B2.1C; B2.1d; B2.1e; B2.r6b; B3.5d; B4.3A; B4.3e; B4.3g

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skill:
-Describe reproductive strategies of various organisms and explain their advantages and disadvantages.
-Explain why cells need to reproduce.
-Identify the stages of mitosis and meiosis.
-Describe cell specialization through cell division.

Vocabulary:

anaphase cell differentiation cell division centromere chromatid chromosome	cytokinesis diploid DNA gamete haploid meiosis metaphase	mitosis prophase replication spindle fibers telophase zygote

Unit Title: 9. DNA, RNA, and Protein Synthesis	**Duration:** 3 weeks

Objective: TLW analyze the processes of replication and protein synthesis (transcription and translation) as it relates to DNA/RNA and explain how mutations and genetic engineering of DNA result in phenotypic changes in the organism or its offspring.

Standards: B1.2C; B1.2i; B1.2k, B4.1B; B4.2A; B4.2B; B4.2C, B4.2D; B4.2E; B4.2f; B4.2g; B4.2h; B4.3B; B4.3C; B4.3f; B4.4a; B4.4b; B4.3B; B4.3C; B4.3e; B4.4c, B4.r2i, B4.r5a; B4.r5b

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skills:
-Describe the structure and function of DNA.
-Extract DNA.
-Explain protein synthesis.
-Explain that the information passed from parents to offspring is transmitted by means of genes that are coded in DNA molecules.
-Identify mutations and determine how mutations may affect an organism and/or its offspring.

Vocabulary:

cancer	double helix	protein synthesis
carcinogen	genetic code	replication
codon	genetic mutation	transcription
crossing over	insertion	transfer RNA
deletion	messenger RNA	translation
DNA	phenotype	

Unit Title: 10. Genetics	**Duration:** 5 weeks

Objective: TLW predict patterns of inheritance using laws of heredity and analyze these patterns to explain variation.

Standards: B1.2D, B1.2h, B1.2i, B1.2k, B1.4d, B4.1A, B4.1C, B4.1d, B4.1e, B4.3d

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skills:
-Analyze Mendel's experiments and principles
-Differentiate between dominant and recessive traits
-Draw a homologous chromosome pair
-Determine genotypic and phenotypic ratios in a monohybrid and dihybrid crosses
-Differentiate between codominant, incomplete dominant, multiple allele, polygenic, and sex-linked traits.
-Diagram and analyze a pedigree

Vocabulary:

allele	heterozygous	pedigree
codominance	homozygous	phenotype
dihybrid cross	hybrid	polygenic trait
dominant trait	incomplete dominance	Punnett square
genetic mutation	independent assortment	recessive trait
genotype	monohybrid cross	

Unit Title: 11. Biodiversity and Natural Selection	**Duration:** 1 week

Objective:
TLW explain the classification of organisms and analyze their relationships based on their shared characteristics and functional processes.
TLW explain the theory of natural selection.

Standards: B1.2k, B2.4d, B5.1A, B5.1B, B5.3A

Literacy Activities:
-Close reading
-Teacher/Student Think/Read Aloud
-Pair & share

Skills:
-Explain the theory of natural selection
-Describe speciation

Vocabulary:

genetic diversity genetic drift	natural selection speciation	