Unit 1-Introduction

UNIT/ORGANIZING PRINCIPLE: **Nature of Science, Chemistry of Life**	**Suggested PACING: 12-16 days**
ESSENTIAL QUESTION: 1. How do current classification guidelines reveal evolutionary history? 2. Why do scientists use scientific names? 3. Why are fungi no longer grouped together with plants? 4. Why is Kingdom Protista often in quotation marks? 5. What is a dichotomous key?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	LEARNING TARGETS/GOALS	BENCHMARKS	KEY TERMINOLOGY
Practice of Science	• **Define** a problem based on a specific body of knowledge and: Pose questions, conduct observations, examine what is known, plan investigations, gather information, pose explanations, communicate results • **Recognize** that the strength or usefulness of a scientific claim is evaluated through scientific argumentation • Identify sources of information and assess their reliability according to the strict standards of scientific investigation. • **Describe** how scientific inferences are drawn from scientific observations and provide examples from the content being studied.	SC.912.N.1.1 SC.912.N.1.3 SC.912.N.1.4 SC.912.N.1.6	1. Observation 2. Inference 3. Hypothesis 4. Controlled Experiment 5. Independent variable 6. Dependent variable 7. Control Group 8. Data
Characteristics of Science Knowledge	• **Identify** what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). • **Identify** which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion. Honors	SC.912.N.2.1 SC.912.N.2.2 Honors SC.912.N.2.4	1. Pseudoscience 2. Claim

	• **Explain** that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability.		
Role of Theories, Laws, Hypotheses, and Models	• **Explain** that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. • **Recognize** that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions.	SC.912.N.3.1 SC.912.N.3.4	1. Theory 2. Law 3. Model
Chemistry of life	• **Discuss** the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. • **Describe** the basic molecular structures and primary functions of the four major categories of biological macromolecules. • **Explain** the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity. Honors • **Describe** the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things. • **Describe** the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.	SC.912.L.18.12 SC.912.L.18.1 SC.912.L.18.11 Honors SC.912.L.18.2 SC.912.L.18.3 SC.912.L.18.4	1. Atoms 2. Nucleus 3. Electron 4. Element 5. Isotope 6. Compound 7. Ionic Bond 8. Ion 9. Covalent Bond 10. Molecule 11. Van der Waals forces 12. Monomer 13. Polymer 14. Carbohydrates 15. Lipid 16. Nucleotide 17. Nucleic acid 18. Protein 19. Amino Acid 20. Chemical reaction

	• **Describe** the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes.		21. Reactant 22. Product 23. Activation Energy 24. Catalyst 25. Enzyme 26. Substate

Test Item Specifications

Students will design and/or evaluate a scientific investigation using evidence of scientific thinking and/or problem solving.

Students will interpret and analyze data to make predictions and/or defend conclusions.

Students will compare and/or contrast the structure and function of the compound microscope, dissecting microscope, scanning electron microscope, and/or the transmission electron microscope.

Students will evaluate the merits of scientific explanations produced by others.

Students will assess the reliability of sources of information according to scientific standards.

Students will describe how scientific inferences are made from observations and identify examples from biology.

Students will explain the properties of water at a conceptual level.

Students will explain how the properties make water essential for life on Earth.

Students will identify and/or describe the basic molecular structure of carbohydrates, lipids, proteins, and/or nucleic acids.

Students will describe the primary functions of carbohydrates, lipids, proteins, and/or nucleic acids in organisms.

Students will explain how enzymes speed up the rate of a biochemical reaction by lowering the reaction's activation energy.

Students will identify and/or describe the effect of environmental factors on enzyme activity.

Scales		Sample Progress Monitoring and Assessment Activities
4.0 *Knowledge Utilization*	**IN ADDITION TO SCORE 3.0, IN –DEPTH INFERENCES AND APPLICATIONS THAT GO BEYOND WHAT WAS TAUGHT** Student(s) will be able to: **I CAN** • **Develop** a theoretical scientific investigation, entailing all processes of the scientific method	• So you have a problem? Experiment design**(W,I,C,O, R)**

3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** • **Describe** what characterizes science and its methods • **Recognize** that the strength of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented	• Is she a Witch? Video analysis of the scientific method. _____ **(W,I,C,R)** • The Scientific Method is Crap!_____ **(W,I,C,R)** • SpongeBob Scientific Method Practice_____ **(W,C)**
2.0 *Comprehension*	Student(s) will be able to: **I CAN** • **Recognize** a problem based on a specific body of knowledge • **Describe** the processes used in scientific investigations, including posing a research question, forming a hypothesis, reviewing what is known, collecting evidence, evaluating results and reaching conclusions • **Describe** how scientific inferences are drawn from scientific observations and provide examples from the content being studied • **Differentiate** between a theory and a law • **Define bias** **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• The Nature of Science Cornell Notes _____**(W)** • Scientific Method Cornell Notes_____**(W)** • Claims, Evidence, Reasoning Practice_____**(W,I,C,O, R)** • Theory vs. Law vs. Fact Venn _____**(W, C,O)**
1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes**	

Suggested Resources
Quicklab- Replicating Procedures- Textbook p.18 Open-Ended Inquiry- Develop a Solution Lab - textbook p 29 Digital Lab- Acidic and Basic Foods Digital Exploration Lab- Temperature and Enzymes A Day of Macromolecules-CPALMS Leson- http://www.cpalms.org/Public/PreviewResourceLesson/Preview/163244 Nature of Science Inquiry Activities- http://www.indiana.edu/~ensiweb/natsc.fs.html

Gummy Bear Lab (higher level)- https://nwabr.org/sites/default/files/GummyBear_7_20_13.pdf
Understanding Science 101- https://undsci.berkeley.edu/teaching/guide_to_us.php

Unit 2-Cells

UNIT/ORGANIZING PRINCIPLE: Cells and Cellular Transport	**Suggested PACING: 16-20 days**
ESSENTIAL QUESTION: What are the three parts of the cell theory? Name the four macromolecules in the human body. Compare active and passive transport. Differentiate between mitosis and meiosis. Identify the major organelles in a plant cell. Identify the major organelles in an animal cell. What is osmosis?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**BENCHMARKS**	**KEY TERMINOLOGY**
Cells and their organelles	• **Describe** the scientific theory of cells and relate the history of its discovery to the process of science • **Compare** and **contrast** the general structures of prokaryotic and eukaryotic cells. • **Compare** and **contrast** the general structures of plant and animal cells • **Relate** structure to function for the components of plant and animal cells.	SC.912.L.14.1 SC.912.L.14.2 SC.912.L.14.3 SC.912.L.14.4 **Honors Standards** **SC.912.L.16.12**	Cell Theory Organelle "Cell Parts" Prokaryote Eukaryote Cell Membrane Semipermeable Endosymbiosis Nucleus Cell/plasma membrane Lipid bilayer Ribosomes Cytoplasm Nucleolus Nuclear envelope Rough/smooth endoplasmic reticulum (ER) Golgi apparatus Vacuoles Lysosomes Cytoskeleton Microtubules Microfilaments Cilia Flagella

			Chloroplast Mitochondrion(-a)
Cellular Transport	• **Explain** the role of cell membranes as a highly selective barrier. (passive and active transport) • **Describe** how the chemistry of living cells helps maintain homeostasis	SC.912.L.14.2 **Honors Standards** SC.912.L.14.5 SC.912.L.18.10	Phospholipid Protein Channel Passive Transport Diffusion Osmosis Facilitated Diffusion Active Transport Endocytosis Phagocytosis Exocytosis Hypotonic Hypertonic Isotonic

Test Item Specification

Students will describe and/or explain the cell theory.
Students will describe how continuous investigations and new scientific information influenced the development of the cell theory.
Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).
Students will identify the criteria that differentiate science from nonscience and pseudoscience.
Students will explain the development of a theory.
Students will recognize the differences between theories and laws.

Scales

4.0 *Knowledge Utilization*	**IN ADDITION TO SCORE 3.0, IN –DEPTH INFERENCES AND APPLICATIONS THAT GO BEYOND WHAT WAS TAUGHT** Student(s) will be able to: **I CAN** • **Evaluate** the roles of cell membranes as highly selective barriers in terms of passive and active transport • **Write** the Calvin cycle in detail	• Lab Analysis _____ **(W,I,C,O,R)** • Calvin Cycle _____ **(W,I,C,O,R)**

3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** ● **Compare and contrast** the general structures of prokaryotic and eukaryotic cells ● **Compare and contrast** the general structures of plant and animal cells ● **Compare and contrast** active and passive transport ● **Illustrate** the development of the cell theory ● **Differentiate** between mitosis and meiosis ● **Demonstrate** how major elements, macromolecules, water properties and enzymes help cells maintain homeostasis ● **Compare and contrast** photosynthesis and cellular respiration ● **Compare and contrast** aerobic and anaerobic respiration	● Cell Analogy Project_____ **(W,I,O,R)** ● Fermentation Lab_____ **(W,I,C,O,R)** ● Cell Review Sheet _____ **(W,C,O,R)** ● Cell Quiz _____ **(W,O,R)** ● Graphic Organizer _____ **(W,C,O,R)**
2.0 *Comprehension*	Student(s) will be able to: **I CAN** ● **Define** the following: prokaryotes, eukaryotes, passive transport, active transport, selectively permeable, osmosis ● **Describe** the scientific theory of cells and relate the history of its discovery to the process of science ● **Relate** structure to function for the components of plant and animal cells ● **Identify** the parts of the plant cell and the animal cell ● **State** the cell theory ● **Identify** the steps of mitosis ● **Identify** the steps of meiosis ● **Define**: CHNOPS, lipids, carbohydrates, nucleic acids, proteins, enzymes, homeostasis ● **Recall** the equation for photosynthesis ● **Recall** the equation for cellular respiration **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	● Draw and Label cells_____ **(W,O,R)** ● Cornell Notes on cell functions_____ **(W,I,C,O,R)** ● Draw Timeline on cell theory _____ **(W,O,R)** ● Draw the steps of mitosis_____ **(W,O,R)** ● Draw the steps of meiosis_____ **(W, O,R)**

1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes**	

Suggested Resources
Cell Defense Game (Cell membrane and diffusion, Osmosis, and Transport) and associated worksheet Cell Craft Game- (Cell structure and Function) and associated worksheet Origin of Life WS Pearson Microscope Lab http://www.lamission.edu/lifesciences/bio3labs/Bio3%20Lab03-Fa12-Microscopy%20%20Cells.pdf Egg or Raisin or Prune Diffusion Lab http://education.seattlepi.com/diffusion-experiments-eggs-4759.html Cell Model - have students create a representation of a cell either accurate or representative (cell cemetery or cell city)

Unit 3- Plants and Energy

UNIT/ORGANIZING PRINCIPLE:	**Suggested PACING: 10-16 days**
ESSENTIAL QUESTION: 1. How do plants and other organisms capture energy from the sun? 2. What cellular structures and molecules are involved in photosynthesis? 3. How do photosynthetic organisms convert the sun's energy into chemical energy? 4. How do organisms obtain energy? 5. Why do most organisms undergo the process of cellular respiration? 6. How do cells release energy from food in the presence of oxygen? 7. Differentiate between anaerobic and aerobic respiration. 8. How do plants obtain the nutrients they need for life? 9. How do plants reproduce? 10. Do plants have organs and tissues? 11. What is the formula for photosynthesis?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**BENCHMARKS**	**KEY TERMINOLOGY**
	• **Relate** the structure of each of the major plant organs and tissues to physiological processes. • **Identify** the reactants, products and basic functions of aerobic and anaerobic cellular respiration • **Explain** the interrelated nature of photosynthesis and cellular respiration • Connect the role of ATP to energy transfers within a cell • **Identify** the reactants, products and basic functions of photosynthesis	SC. 912.L.14.7 SC.912.L.18.7 SC.912.L.18.8 SC.912.L.18.9 SC.912.L.18.10	Anaerobic Fermentation Stomata Vascular System Seed Pollination Cones Meristematic tissue Dermal tissue Ground tissue Vascular tissue Cambium Xylem Phloem Transpiration Roots Stem Leaves

			Flowers Fruits Cones Guard Cells ATP/ADP Photosynthesis Chlorophyll Light-Dependent Reaction Light-Independent Reaction Cellular Respiration Aerobic

Test Item Specifications

Items will assess the function of plant tissues and organs in the context of physiological processes.

Items assessing plant organs are limited to roots, stems, leaves, flowers, fruits, and cones.

Items referring to physiological processes are limited to photosynthesis, cellular respiration, transpiration, and reproduction.

Items assessing plant tissues are limited to meristematic, ground, dermal, and vascular tissues.

Items referring to plant structures are limited to cambium, guard cells, phloem, seed, stomata, and xylem.

Items will not address or assess mitosis or meiosis

Students will explain how the products of photosynthesis are used as reactants for cellular respiration and vice versa.

Students will explain how photosynthesis stores energy and cellular respiration releases energy.

Students will identify the reactants, products and/or the basic function of photosynthesis.

Students will identify the reactants, products and/or the basic functions of aerobic and anaerobic cellular respiration.

Students will connect the role of adenosine triphosphate (ATP) to energy transfers within the cell.

Content Limits :

Items will not require the memorization of the stages, specific events, or intermediate molecules produced during these processes.

Items will not require the balancing of equations.

Items will not assess plant structures.

Scales		**Sample Progress Monitoring and Assessment Activities**
4.0 *Knowledge Utilization*	Student(s) will be able to: I CAN: ● **Understand** the main functions of the cell types, tissues and organs of plants and relate them to physiological processes such as photosynthesis, cellular respiration, growth and reproduction. ● **Cite** examples of their interactions ● **Write** the Calvin cycle in detail	● Classification/ Plants Group Project_____ (W,I,C,O,R) ● Calvin Cycle _____ (W,I,C,O,R)
3.0 *Analysis* (Learning Goal)	Student(s) will be able to: I CAN: ● **Assess** the function of plant tissues and organs in the context of physiological processes. ● **Know** major plant organs; limited to roots, stems, leaves, flowers, fruits, and cones. ● **Understand** physiological processes such as photosynthesis, cellular respiration, transpiration, growth, + reproduction. ● **Identify** the plant tissues meristematic, ground, dermal, and vascular tissues. ● **Identify** and know function of plant structures such as cambium, guard cells, phloem, root hairs, root cap, seed, stomata, xylem, stamen, pistil, ovary, petals ● **Compare and contrast** monocots and dicots.	· Monocot/Dicot Activity ____(W,I,C,O,R) Seed Type Worksheet _____(W,C,O,R) ● Fermentation Lab_____ (W,I,C,O,R)

	• **Compare and contrast** angiosperms and gymnosperms. • **Compare and contrast** photosynthesis and cellular respiration • **Compare and contrast** aerobic and anaerobic respiration The student exhibits no major errors or omissions.	
2.0 *Comprehension*	Student(s) will be able to: I CAN: • **Recognize** that plants are made of different cell types but do not know the main functions of each. • **Understand** plant tissues but are unable to give an example of how they are related. • **Identify** the three parts of a seed. • **Recognize** the major parts of an external leaf diagram. • **Recognize** the major parts of an internal leaf diagram. • **Recognize** the major parts of a flower. • **Identify** plants as being either angiosperms or gymnosperms. • Know the definitions and examples of annuals, biennials and perennials. • **Recognize** the formula for photosynthesis in both words and symbols. • **Recall** the equation for photosynthesis • **Recall** the equation for cellular respiration **The student exhibits major errors or omissions.**	• Diagram of internal and external leaf ____(W,I,O,R) • Diagram of flower parts _____(W,I,C,O,R) • Notes on plant parts _____(W,I,C,O,R)
1.0 *Retrieval*	With help, a partial understanding of some of the simpler details and processes	
Suggested Resources		
Quick Lab: Rise up Chapter 10.3, pg 323 Interactivity (Pearson online resources) Cellular Respiration; The Stages of Cellular Respiration; Photosynthesis and Cellular Respiration;The Krebs Cycle; The Mechanics of Cellular Respiration;Exercise and Mitochondria;ATP and Batteries; A Model of Photosynthesis; Stages of Photosynthesis; The Details of Photosynthesis;Plant Taxonomic Diagram; Plant Diversity; Plant Structure and Function;How do Plant Adaptations Compare? Quick Lab: What is the Structure of a Flower? Pg 740 Quick Lab: How do Organisms Capture and Use Energy? Pg 284 Making a Better Bread Mastering Fermentation Assessment pgs 330-331 Modeling Lab: Make a Model of Cellular Respiration Chapter 10 pg 320		

NCSD Biology and Biology Honors Curriculum Map 20-21

Unit 4- DNA

UNIT/ORGANIZING PRINCIPLE:	**Suggested PACING: 16-20 days**
ESSENTIAL QUESTION: ● What is a chromosome? ● Why is it important for DNA to copy itself? ● What is a mutation and what effect can it have on an organism? ● What are the different types of mutations? ● What is transcription and translation? ● Why is transcription and translation important?	**District Resources:** Miller and Levine Biology- s

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**Benchmarks**	**KEY TERMINOLOGY**
DNA RNA PROTEIN SYNTHESIS	● **Describe** the basic process of DNA replication and how it relates to the transmission and conservation of the genetic information. ● **Explain h**ow mutations in the DNA sequence may or may not result in phenotypic change. **Explain** how mutations in gametes may result in phenotypic changes in offspring. ● **Explain** the basic processes of transcription and translation and how they result in the expression of genes.	SC.912.L.16.3 SC.912.L.16.4 SC.912.L.16.5	1. Transformation 2. Bacteriophage 3. Base pairing 4. Replication 5. DNA polymerase 6. Telomere 7. RNA 8. mRNA 9. rRNA 10. tRNA 11. Transcription 12. RNA polymerase 13. Promoter 14. Intron 15. Exon 16. Polypeptide 17. Genetic code 18. Codon 19. Translation 20. Anticodon

			21. Operon 22. Operator 23. Differentiation 24. Homeotic gene 25. Homeobox gene 26. Hox gene 27. Mutation 28. Point mutation 29. Frameshift mutation 30. Mutagen 31. Polyploidy
	TEST ITEM SPECIFICATIONS ● Students will **describe** the process of DNA replication and/or its role in the transmission and conservation of genetic information. ● Students will **describe** gene and chromosomal mutations. ● Students will **explain** how mutations may or may not result in a phenotypic change. ● Students will **explain** the basic processes of transcription and/or translation and their roles in the expression of genes. ● Students will **explain** how or why the genetic code (mRNA codon chart) is common to almost all organisms. ● Students will **explain** how similarities in the genetic codes of organisms are due to common ancestry and the process of inheritance.		
	Scales	**Sample Progress Monitoring and Assessment Activities**	
4.0 *Knowledge Utilization*	Student(s) will be able to: **I CAN** ● Start with a DNA strand to make a mRNA strand by transcription and match the mRNA codon to its complementary t-RNA anticodon. Then use the mRNA codons to determine its correct amino acid using codon wheel or chart. Then determine the traits that are represented by the protein that was synthesized. ● Determine if any mutations occurred during this process.	● Transcription Activity _____ **(W,I,C,O,R)**	

3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** • **Explain** how mutations in the DNA sequence may or may not result in phenotypic change. • **Explain** how mutations in gametes may result in phenotypic changes in offspring. • **Explain** the basic processes of transcription and translation and how they result in the expression of genes. • **Compare and contrast** DNA and RNA.	• Mutation Worksheet _____ **(W,I,C,O,R)** • DNA Jeopardy Review _____ **(I,C,O)** • Venn Diagram of DNA vs. RNA _____ **(W,C,O,R)**
2.0 *Comprehension*	Student(s) will be able to: **I CAN** • Complete a complementary RNA strand to DNA template strand. • **Determine t**he appropriate amino acid by using a codon wheel or chart if given the mRNA sequence • **Define** the following: nucleotide, DNA, RNA, adenine, guanine, thymine, cytosine, uracil, helix, protein, amino acid, codon, anticodon, mRNA, tRNA, rRNA. • **Recognize** a DNA molecule. • **Recognize** an RNA molecule. • **Recognize** an amino acid. • **Recognize** a nucleotide. • Know the three parts of a nucleotide.	• Cornell notes on DNA and RNA _____ **(W,I,O,R)** • Draw and Label the DNA and RNA structures_____ **(W,I,C,O,R)** • Codon wheel worksheet _____ **(W,I,C,O,R)**
1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes and some of the more complex ideas and processes the student is able to:** • **Compare and contrast** DNA and RNA.	
Suggested Resources		

Gene expression simulation DNA Virtual tutorial Guided Inquiry: Using DNA to Identify Species (Lesson 13.1) Open-Ended Inquiry Lab: The Effect of Mutations (Lesson 14.4)

Unit 5- Genetics and Reproduction

UNIT/ORGANIZING PRINCIPLE:	**Suggested PACING: 16-20 days**
ESSENTIAL QUESTION: 1. Who was Gregor Mendel and why is he considered the Father of Genetics? 2. What are examples of each type of complex inheritance found in human traits? 3. What symbols are used to illustrate ancestry and genetic history?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**BENCHMARKS**	**KEY TERMINOLOGY**
RNA Ribosomes and Protein Synthesis Gene Regulation and Expression Mutations	• Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. • **Discuss** observed inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, and mu… • **Evaluate** the impact of biotechnology on the individual, society and the environment, including medical and ethical issues. • **Compare and contrast** mitosis and meiosis and relate to the processes of sexual and asexual reproduction and their consequences for genetic variation. • **Describe the process** of meiosis, including independent assortment and crossing over. Explain how reduction division results in the formation of	SC.912.L.16.1 SC.912.L.16.2 SC.912.L.16.10 SC.912.L.16.17 SC.912.L.16.16	Genetics Fertilization Trait hybrid Gene Allele Principle of dominance Segregation Gamete Probability Homozygous Heterozygous Phenotype genotype Punnett square Independent assortment Incomplete dominance Codominance Multiple alleles Polygenic trait Transformation Bacteriophage Base pairing Replication DNA polymerase Telomere RNA Messenger RNA

			Ribosomal RNA Transfer RNA Transcription RNA polymerase Promoter Intron Exon Polypeptide Genetic code Codon Translation Anticodon Operon Operator Differentiation Homeotic gene Homeobox gene Hox gene Mutation Point mutation Frameshift mutation Mutagen Polyploidy

Test Item Specification

Students will use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance.

Students will identify, analyze, and/or predict inheritance patterns caused by various modes of inheritance.

Students will evaluate examples and/or explain the possible impact of biotechnology on the individual, society, and/or the environment.

Students will differentiate the processes of mitosis and meiosis.

Students will describe the role of mitosis in asexual reproduction, and/or the role of meiosis in sexual reproduction, including how these processes may contribute to or limit genetic variation.

Students will describe specific events occurring in each of the stages of the cell cycle and/or phases of mitosis.

Students will explain how mitosis forms new cells and its role in maintaining chromosome number during asexual reproduction.

Students will explain how cancer (uncontrolled cell growth) may result from mutations that affect the proteins that regulate the cell cycle.

Students will describe the process of meiosis, including independent assortment and crossing over.

Students will explain how meiosis results in the formation of haploid gametes or spores.

Content Limits :

Items referring to general dominant and recessive traits may address but will not assess the P and F1 generations.

Items addressing dihybrid crosses or patterns that include codominance, incomplete dominance, multiple alleles, sex-linkage, or polygenic inheritance may assess the P and F1 generations.

Items may assess current issues but will not require knowledge of specific biotechnologies or specific medical issues.

Items assessing the possible impacts of biotechnology will not assess monetary impacts.

Items will focus on the relationship between mutations and uncontrolled cell growth, rather than a specific mutation that may result in uncontrolled cell growth.

Items may address the presence and location of centrioles but may not require knowledge of the function of centrioles.

Items referring to mutation will focus on the general concepts of uncontrolled cell growth and not require specific knowledge of cancers or diseases resulting from that growth.

Items will not assess the specific proteins associated with regulating the cell cycle.

Items addressing mitosis or meiosis are limited to identification of phases, structures, and major events of each phase.

Scales		**Sample Progress Monitoring and Assessment Activities**
4.0 *Knowledge Utilization*	Student(s) will be able to: I CAN: ● **Understand polygenic** inheritance and how it determines traits like eye color	● Alien Lab _____ **(W,I,C,O,R)**
3.0 *Analysis* (Learning Goal)	Student(s) will be able to: I CAN: ● Use Mendel's laws of segregation and independent assortment to analyze patterns of inheritance. ● **Identify, analyze, and/or predict** inheritance patterns caused by various modes of	● Genetic Worksheet II _____**(W,C,O,R)** ● Notes on Di hybrid crosses and tougher Punnett square problems ____**(W,O,R)** ● Smiley Face Genetics Lab _____**(W,I,C,O,R)**

	• **Discuss observed** inheritance patterns caused by various modes of inheritance, including dominant, recessive, codominant, sex-linked, polygenic, multiple alleles • **Understand** that inheritance outcomes may be expressed in percent, ratios, or fractions. **The student exhibits no major errors**	
2.0 *Comprehension*	Student(s) will be able to: I CAN: • Use a Punnett squares to predict outcomes of a monohybrid cross when given a genetic problem. • **Know and be able to use** vocabulary such as homozygous, heterozygous, genotype and phenotype to answer genetic cross problems. • **Define** the following: gene, purebred, allele, Punnett square, hybrid, homozygous, heterozygous, genotype, phenotype, monohybrid, dihybrid, polygenic, dominant, recessive. • **Determine** if an allele is dominant or recessive. • **Write** a homozygous or heterozygous allele. **The student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Notes on genetic vocabulary ____**(W,O,R)** • Genetic Worksheet I _____**(W,I,C,O,R)** • Notes on how to make a Punnett Square _____ **(W,C,O,R)**
1.0 *Retrieval*	With help, a partial understanding of some of the simpler details and processes	

Suggested Resources
Geniverse -(Honors level lab that covers all genetics standards) https://concord.org/our-work/research-projects/geniverse/ Meiosis: (CPALMS Video/Audio/Animation) DNA: Khan Academy video (CPALMS) DNA - The Double Helix Game: Virtual Manipulative (CPALMS) DNA Replication: Original Tutorial (CPALMS) Genetically Modified Organisms: (CPALMS)

Unit 6- Evolution

UNIT/ORGANIZING PRINCIPLE: **Classification**	**Suggested PACING: 10 days**
ESSENTIAL QUESTION: 1. How do current classification guidelines reveal evolutionary history? 2. Why do scientists use scientific names? 3. Why are fungi no longer grouped together with plants? 4. Why is Kingdom Protista often in quotation marks? 5. What is a dichotomous key?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**BENCHMARKS**	**KEY TERMINOLOGY**
Finding Order in Biodiversity Modern Evolutionary Classification Viruses, Prokaryotes, Protists, and Fungi Prokaryotes Protists	• **Describe** how and why organisms are hierarchically classified and based on evolutionary relationships. • **Explain** the reasons for changes in how organisms are classified. • **Discuss** distinguishing characteristics of the domains and kingdoms of living organisms. • **Describe** how and why organisms are hierarchically classified and based on evolutionary evidence. • **Explain** the basic functions of the human immune system, including specific and non-specific immune response, vaccines, • **Analyze** strategies for prevention, detection, and treatment of communicable and chronic diseases.	SC.912.L.15.4 SC.912.L.15.5 SC.912.L.15.6 SC.912.L.14.52 Honors Standards: SC.912.L.15.3 SC.912.L.16.16 SC.912.L.16.17	Taxonomy Binomial nomenclature Genus systematics Taxon Family Order Class Kingdom Domain Phylogeny Clade Cladogram Derived character Virus Capsid

Fungi			Lytic infection Bacteriophage Lysogenic infection Prophage Retrovirus Prokaryote Binary fission Endospore Conjugation Pathogen Vaccine Antibiotic Cilium Flagellum Alternation of generation Chitin Hyphae Fruiting body Mycelium Lichen Mycorrhiza

Test Item Specification

Students will classify organisms based on the distinguishing characteristics of the domains and/or kingdoms of living organisms.

Students will identify and/or describe how and/or why organisms are hierarchically classified based on evolutionary relationships.

Students will identify and/or explain the reasons for changes in how organisms are classified.

Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).

Students will describe how scientific inferences are made from observations and identify examples from biology.

Content Limits :

Items referring to distinguishing characteristics of living organisms are limited to the domains of Archea, Bacteria, and Eukarya and the kingdoms of Protista, Fungi, Plantae, and Animalia.

Items will not require specific knowledge of organisms classified in any domain or kingdom; items should describe the characteristics of an organism and assess its

classification.

Items may refer to prokaryotic, eukaryotic, unicellular and/or multicellular organisms, autotrophs, and/or heterotrophs, but they will not assess the definition of those terms.

Items referring to changes in classification systems should be conceptual and will not require specific knowledge of those changes.

Items may address evolutionary classification, phylogeny, and the use of cladograms, but they may not assess the definition of those terms.

Items assessing a scientific claim are limited to the classification of organisms.

Scales		Sample Progress Monitoring and Assessment Activities
4.0 *Knowledge Utilization*	**IN ADDITION TO SCORE 3.0, IN –DEPTH INFERENCES AND APPLICATIONS THAT GO BEYOND WHAT WAS TAUGHT** Student(s) will be able to: **I CAN** ● **Construct** a cladogram and show evolutionary history of common organisms ● Address evolutionary classification, phylogeny and the use of cladograms	● Construct a cladogram mini-lab _____(W,I,C,O,R) ● Classification Group Project _____ (W,I,C,O,R)
3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** ● **Correctly** place any organism into the correct kingdom using the common characteristics ● Use **manipulatives** to place example of each domain and kingdom into the correct classification ● Correctly **complete** a graphic organizer for the six kingdoms for the following terms: prokaryotic, eukaryotic, unicellular and multicellular organisms, autotrophs and/or heterotrophs. ● **Explain** the reason why the "domain" was added to the kingdom system ● **Classify** organisms based on the distinguishing characteristics of the domains and kingdoms of living organisms ● **Identify** and/or describe how and why organisms are hierarchically classified based on evolutionary relationships ● **Identify** and/or explain the reasons for changes in how organism are classified	● Create a dichotomous key _____ (W,I,C,O,R)

2.0 *Comprehension*	Student(s) will be able to: I CAN ● Complete parts of the graphic organizer for the six kingdoms ● Know the vocabulary: domain, kingdom, phylum, class, order, family, genus, species ● **Define**: prokaryote, eukaryote, unicellular, multicellular, autotroph, heterotroph ● Use manipulatives to classify common examples of organisms into the correct kingdoms ● **Classify** organisms as plants and animals correctly as well as some of the fungi and protista ● Know traits of viruses and bacteria ● Draw basic shapes of bacteria ● **Understand** why viruses are not classified as living **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• Chart on kingdoms _____ (W,I,C,O,R) • Cornell Notes on classification _____ (W,I,C,O,R)
1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes**	
Suggested Resources		
Quick Lab: Using a Dichotomous Key Text p. 616 Interactivity: Classifying Organisms Text p. 618 Modeling Lab: Construct a Cladogram Text p. 628		

Unit 7- Ecology

UNIT/ORGANIZING PRINCIPLE:	**Suggested PACING: 16-20 days**
ESSENTIAL QUESTION: 1. How do organisms interact with each other and their surroundings? 2. What is the rate of energy transfer in a community's feeding relationship? 3. Differentiate between biotic and abiotic factors. 4. What are examples of producers, consumers and decomposers? 5. How does water cycle through the ecosystem? 6. What is the current pattern of population growth? 7. Should humans care about the environment? 8. What are some steps you can take to "live green"? 9. What is meant by sustainability?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	**LEARNING TARGETS/GOALS**	**BENCHMARKS**	**KEY TERMINOLOGY**
	• **Use** a food web to identify and distinguish producers, consumers and decomposers. • **Explain** the pathway of energy transfer through trophic levels and the reduction of available energy at successive trophic levels. • **Analyze** the movement of matter and energy through the different biogeochemical cycles. • **Analyze** how population size is determined by birth and deaths, immigration, emigration and limiting factors that determine carrying capacity. • **Recognize the consequences** of the losses of biodiversity due to catastrophic events, climate changes, human activity and the introduction of invasive, non-native species. • **Predict** how the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. • **Evaluate** the costs and benefits of renewable and nonrenewable resources. • **Discuss** the needs for adequate monitoring of environmental parameters when making policy decision. • **Analyze** the movement of matter and energy through the different biogeochemical cycles, including water and carbon. • **Explain** the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and publi…	SC.912.E.7.1 SC.912.L.14.6 SC.912.L.17.2 SC.912.L.17.4 SC.912.L.17.5 SC.912.L.17.8 SC.912.L.17.9 SC.912.L.17.11 SC.912.L.17.16 SC.912.L.17.20	

	• • **Explain** the general distribution of life in aquatic systems as a function of chemistry, geography, light, depth, salinity, and temperature. • **Describe** changes in ecosystems resulting from seasonal variations, climate change and succession. • **Analyze** how population size is determined by births, deaths, immigration, emigration, and limiting factors (biotic and abiotic) that determine carryin… • **Recognize the consequences** of the losses of biodiversity due to catastrophic events, climate changes, human activity, and the introduction of invasive… • **Use** a food web to identify and distinguish producers, consumers, and decomposers. Explain the pathway of energy transfer through trophic levels and th… • **Evaluate** the costs and benefits of renewable and nonrenewable resources, such as water, energy, fossil fuels, wildlife, and forests. • **Discuss** the large-scale environmental impacts resulting from human activity, including waste spills, oil spills, runoff, greenhouse gases, ozone deple… • **Predict** the impact of individuals on environmental systems and examine how human lifestyles affect sustainability. •		Ecology Community Ecosystem Biome Biotic Abiotic Biodiversity Keystone Species Producers Autotrophs Consumers Heterotrophs Food Chain Herbivores,etc. Trophic Levels Food Web Biogeochemical cycle Biomass Energy Pyramid Habitat Niche Mutualism Commensalism Parasitism Caring Capacity Succession Biosphere, etc. Biomes Non-renewable Renewable Acid Rain Greenhouse Effect Global Warming Sustainable Development
Test Item Specification **Students will use data and information about population dynamics, abiotic factors, and/or biotic factors to explain and/or analyze a change in carrying capacity**			

and its effect on population size in an ecosystem.

Students will explain that different types of organisms exist within aquatic systems due to chemistry, geography, light, depth, salinity, and/or temperature.

Students will describe the potential changes to an ecosystem resulting from seasonal variations, climate changes, and/or succession.

Students will identify positive and/or negative consequences that result from a reduction in biodiversity.

Students will assess the reliability of sources of information according to scientific standards.

Students will describe the energy pathways through the different trophic levels of a food web or energy pyramid.

Students will analyze the movement of matter through different biogeochemical cycles.

Content Limits :

Items referring to chemical factors in aquatic systems are limited to pH, oxygen, carbon dioxide, nitrogen, phosphorous, and salinity.

Items referring to geography in aquatic systems are limited to water depth, latitude, temperature, underwater topography, and proximity to land.

Items will not require the identification of oceanic zones.

Items referring to reduction in biodiversity may include examples of catastrophic events, climate changes, human activities, and the introduction of invasive and nonnative species, but they will not assess specific knowledge of these.

Items referring to reduction in biodiversity will focus on the consequence and not require knowledge of the specific event that led to the reduction.

Items addressing climate change are limited to biodiversity and population dynamics contexts.

Items referring to organisms in food webs are limited to the impact of changes in matter or energy in trophic levels.

Items addressing food webs will require application of the knowledge of roles of organisms in a food web to describe energy pathways rather than the identification of producers, consumers (primary, secondary, tertiary), and decomposers.

Items will not require knowledge of specific organisms or their feeding habits.

Items assessing biogeochemical cycles are limited to the water cycle and the carbon cycle.

Items referring to the biogeochemical cycles may address but will not assess photosynthesis and cellular respiration in isolation.

Scales		Sample Progress Monitoring and Assessment Activities
4.0 *Knowledge Utilization*	**IN ADDITION TO SCORE 3.0, IN –DEPTH INFERENCES AND APPLICATIONS THAT GO BEYOND WHAT WAS TAUGHT** Student(s) will be able to: **I CAN** ● **Estimate** the amount of energy transferred to each trophic level and can predict the impact on the food web if one or more organisms are eliminated ● **Analyze** the movement of matter and energy through biogeochemical cycles ● **Construct** a population size graph with the carrying capacity for the population clearly labeled and explained ● **Research** one human impact on environmental systems	● Construct a Florida food web _____(W,I,C,O,R) ● Complete diagrams of water, carbon and nitrogen cycles _____(W,I,C,O,R)
3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** ● **Analyze** how population size is determined by births, deaths, immigration, emigration, and limiting factors ● **Recognize** the consequences of the losses of biodiversity due to catastrophic events due to climate changes, human activity and the introduction of invasive, nonnative species ● **Predict the impact** of individuals on environmental systems ● **Examine** how human lifestyles affect sustainability	● EOC Coach _____(W,O,R) ● Review Game _____(W,I,C,O,R)
2.0 *Comprehension*	Student(s) will be able to: **I CAN** ● **Differentiate** between immigration and emigration ● **Identify** abiotic and biotic factors ● **Read** a population chart ● **Recognize** examples of herbivores, carnivore and omnivores ● **Give examples** of renewable and nonrenewable resources ● **Define** the following: producers, consumers, decomposers, food web, energy pyramid, trophic level, herbivore, carnivore, omnivore, carrying capacity, density dependent, density independent, pollution, renewable, nonrenewable, greenhouse effect, deforestation, desertification, sustainable	● Biotic/Abiotic Worksheet ____(W,I,C,O,R) ● Vocabulary_____ (W,I,C,O,R)

	● **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	
1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes**	

Suggested Resources
Pg 79 (3.1) - Levels of Organization Interactivity - digital resource
Pg 81 (3.1) - Factors Affecting Growth Interactivity - digital resource
Pg 83 (3.1) - Abiotic Factors and Plant Selection Lab - digital resource {editable}
Pg 87 (3.2) - Why Do Difference Earth Surfaces Have Different Temperatures Lab - digital resource {editable}
Pg 99 (3.3) - Characteristics of Aquatic Ecosystems Interactivity - digital resource
Pg 111 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions
Pg 119 (4.2) - Food Web and Invasives Interactivity - digital resource
Pg 122 (4.2) - Ecological Pyramids Interactivity - digital resource
Pg 128 (4.3) - Biogeochemical Cycles Interactivity - digital resource
Pg 130 (4.3) - The Effect of Fertilizer on Algae Exploration Lab - digital resource {editable}
Pg 141 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions
Pg 154 - Limiting Factors Interactivity - digital resource
Pg 171 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions
Pg 180 (6.1) - Symbiotic Relationships Interactivity - digital resource
Pg 184 (6.2) - Comparing Types of Succession Interactivity - digital resource
Pg 199 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions
Pg 224 (7.4) - Sustainable Development Interactivity - digital resource
Pg 235 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions

Unit 8- Body Systems

UNIT/ORGANIZING PRINCIPLE:	**Suggested PACING: 6 days**
ESSENTIAL QUESTION: 1. What is a vaccine? 2. What pathogens cause diseases? 3. How does the immune system function to prevent and attack to eliminate disease? 4. What are the main parts of the brains? 5. Other than exercise, what types of factors can affect blood flow through the body? 6. How does a human fetus develop? 7. What are parts of the human reproductive system and how do they function?	**District Resources:** Miller and Levine Biology-

CONCEPTS /CONTENT	LEARNING TARGETS/GOALS	BENCHMARKS	KEY TERMINOLOGY
	• **Explain** the basic functions of the human immune system, including specific and nonspecific immune response, vaccines and antibiotics • **Identify** the major parts of the brain on a diagram or model • **Describe** the factors affecting blood flow through the cardiovascular system • **Describe** the basic anatomy and physiology of the human reproductive system • **Describe** the processes of human development from fertilization to birth and the major changes that happen each trimester • **Explain** the basic functions of the immune system. •	SC.912.L.14.52 SC.912.L.16.13 SC.912.L.14.26 Honors SC.912.L.14.27 SC.912.L.14.36	Brain Cerebrum Cerebellum Pons Midbrain Medulla Oblongata Brain Stem Frontal Lobe Temporal Lobe Occipital lobe Parietal lobe

			Fertilization Crossing Over Reproductive System Seminal vesicle Prostate gland Vas deferens Urethra Epididymis Scrotum Penis Testes Ovaries Oviduct(fallopian tube) Uterus Cervix Vagina Placenta Umbillical cord Amniotic sac Amniotic fluid Immune System Pathogen Passive Immunity Active Immunity Phagocyte Antibody T Cell B Cell Antigen Memory Cell Cellular Immunity Humoral Immunity

Test Item Specifications

Items are limited to the cerebrum, cerebellum, pons, medulla oblongata, brain stem, frontal lobe, parietal lobe, occipital lobe, and temporal lobe.

Items will not assess the function of the major parts of the brain.

Students will identify factors that affect blood flow and/or describe how these factors affect blood flow through the cardiovascular system. Items may address factors such as blood pressure, blood volume, resistance, disease, and exercise.

Students will identify and/or explain the basic functions of the human immune system, including specific and nonspecific immune responses.

Students will describe how the human immune system responds to vaccines and/or antibiotics.

Students will explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspective of both individual and public health.

Items assessing the significance of genetic factors, environmental factors, and pathogenic agents to health are limited to a conceptual understanding.

Scales		Sample Progress Monitoring and Assessment Activities
4.0 *Knowledge Utilization*	**IN ADDITION TO SCORE 3.0, IN –DEPTH INFERENCES AND APPLICATIONS THAT GO BEYOND WHAT WAS TAUGHT** Student(s) will be able to: **I CAN** ● Correctly **identify** the major systems of the human body and explain their functions ● Be able to **explain** the role of major organs in their organ systems and how they maintain a healthy body. ● **Construct** a dichotomous key of human viral and bacterial diseases ● **Design** an experiment that would test factors affecting blood flow of the cardiovascular system	● Student led presentations on immune, reproductive, circulatory, and nervous systems_____ (W,I,C,O,R) ● Make a dichotomous key of diseases_____(W,I,C,O,R)
3.0 *Analysis* (Learning Goal)	Student(s) will be able to: **I CAN** ● **Correctly label** the major lobes and parts of the human brain ● **Identify** factors that affect blood flow or describe how these factors affect blood flow through the cardiovascular system ● **Explain** the basic functions of the human immune system, including specific and nonspecific immune response ● **Describe** the basic function of vaccines and antibiotics	● Draw and label parts of heart_____(W,I,C,O,R) ● Vocabulary_____(W,O,R) ● EOC Coach_____ (W,O,R)
2.0 *Comprehension*	Student(s) will be able to: I CAN ● **Differentiate** between viruses and bacteria	● Draw and label parts of heart_____(W,I,C,O,R) ● Vocabulary_____(W,O,R)

	• **Define** the following: vaccine, immunity, pathogen, antibiotics, T cells, B cells, antibody, passive immunity, active immunity, infectious diseases, parasites, toxins, veins, arteries, capillaries • **Recognize** that there are different parts of the immune system **However, the student exhibits major errors or omissions regarding the more complex ideas and processes.**	• EOC Coach_____ (W,O,R)
1.0 *Retrieval*	**WITH HELP** **A partial understanding of some of the simpler details and processes**	

Suggested Resources
Pg. 917 - Exercise and Heart Rate Virtual Lab - digital resource {editable} Pg 917 - Blood Vessel Interactivity - digital resource Pg 939 - Immune Responses Interactivity - digital resource Pg 942 - Leukemia and Blood Cell Counts Virtual Lab - digital resource Pg 953 - FL EOC TEST PRACTICE - digital resource {editable} w/ additional questions