Walthall County School District
HS Biology Pacing Guide

Strand	DCI	Standard	Performance Objective	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY
Biology	BIO.1 Cells as a System	BIO.1A SWL the characteristics of life and biological organization.	**BIO.1A.1** Develop criteria to differentiate between living and non-living things.	3									
Biology	BIO.1 Cells as a System	BIO.1A SWL the characteristics of life and biological organization.	**BIO.1A.2** Describe the tenets of cell theory and the contributions of Schwann, Hooke, Schleiden, and Virchow.	3									
Biology	BIO.1 Cells as a System	BIO.1A SWL the characteristics of life and biological organization.	**BIO.1A.3** Using specific examples, explain how cells can be organized into complex tissues, organs, and organ systems in multicellular organisms.	3									
Biology	BIO.1 Cells as a System	BIO.1A SWL the characteristics of life and biological organization.	**BIO.1A.4** Use evidence from current scientific literature to support whether a virus is living or non-living.	3									
Biology	BIO.1 Cells as a System	BIO.1B SWL analyze the structure and function of the macromolecules that make up cells.	**BIO.1B.1** Develop and use models to compare and contrast the structure and function of carbohydrates, lipids, proteins, and nucleic acids (DNA and RNA) in organisms.	3									
Biology	BIO.1 Cells as a System	BIO.1B SWL analyze the structure and function of the macromolecules that make up cells.	**BIO.1B.2** Design and conduct an experiment to determine how enzymes react given various environmental conditions (i.e., pH, temperature, and concentration). Analyze, interpret, graph, and present data to explain how those changing conditions affect the enzyme activity and the rate of the reactions that take place in biological organisms.	3									
Biology	BIO.1 Cells as a System	BIO.1C SWL relate the diversity of organelles to a variety of specialized cellular functions.	**BIO.1C.1** Develop and use models to explore how specialized structures within cells (e.g., nucleus, cytoskeleton, endoplasmic reticulum, ribosomes, Golgi apparatus, lysosomes, mitochondria, chloroplast, centrosomes, and vacuoles) interact to carry out the functions necessary for organism survival.		4								
Biology	BIO.1 Cells as a System	BIO.1C SWL relate the diversity of organelles to a variety of specialized cellular functions.	**BIO.1C.2** Investigate to compare and contrast prokaryotic cells and eukaryotic cells, and plant, animal, and fungal cells.		4								
Biology	BIO.1 Cells as a System	BIO.1C SWL relate the diversity of organelles to a variety of specialized cellular functions.	**BIO.1C.3** Contrast the structure of viruses with that of cells, and explain why viruses must use living cells to reproduce.		4								
Biology	BIO.1 Cells as a System	BIO.1D SWL describe the structure of the cell membrane and analyze how the structure is related to its primary function of regulating transport in and out of cells to maintain homeostasis.	**BIO.1D.1** Plan and conduct investigations to prove that the cell membrane is a semi-permeable, allowing it to maintain homeostasis with its environment through active and passive transport processes.		4								
Biology	BIO.1 Cells as a System	BIO.1D SWL describe the structure of the cell membrane and analyze how the structure is related to its primary function of regulating transport in and out of cells to maintain homeostasis.	**BIO.1D.2** Develop and use models to explain how the cell deals with imbalances of solute concentration across the cell membrane (i.e., hypertonic, hypotonic, and isotonic conditions, sodium/potassium pump).		3								
Biology	BIO.1 Cells as a System	BIO.1E SWL develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.	**BIO.1E.1** Construct models to explain how the processes of cell division and cell differentiation produce and maintain complex multicellular organisms.			4							
Biology	BIO.1 Cells as a System	BIO.1E SWL develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.	**BIO.1E.2** Identify and describe the changes that occur in a cell during replication. Explore problems that might occur if the cell does not progress through the cycle correctly (cancer).			3							

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Biology	BIO.1 Cells as a System	BIO.1E SWL develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.	**BIO.1E.3** Relate the processes of cellular reproduction to asexual reproduction in simple organisms (i.e., budding, vegetative propagation, regeneration, binary fission). Explain why the DNA of the daughter cells is the same as the parent cell.			3							
Biology	BIO.1 Cells as a System	BIO.1E SWL develop and use models to explain the role of the cell cycle during growth, development, and maintenance in multicellular organisms.	**BIO.1E.4** Use an engineering design process to investigate the role of stem cells in regeneration and asexual reproduction, then develop applications of stem cell research to solve human medical conditions.			3							
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.1** Use models to demonstrate that ATP and ADP are cycled within a cell as a means to transfer energy.			3							
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.2** Develop models of the major reactants and products of photosynthesis to demonstrate the transformation of light energy into stored chemical energy in cells. Emphasize the chemical processes in which bonds are broken and energy is released, and new bonds are formed and energy is stored.			3							
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.3** Develop models of the major reactants and products of cellular respiration (aerobic and anaerobic) to demonstrate the transformation of the chemical energy stored in food to the available energy of ATP. Emphasize the chemical processes in which bonds are broken and energy is released, and new bonds are formed and energy is stored.				3						
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.4** Conduct scientific investigations or computer simulations to compare aerobic and anaerobic cellular respiration in plants and animals, using real world examples.				3						
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.5** Investigate variables (e.g., nutrient availability, temperature) that affect anaerobic respiration and current real-world applications of fermentation.				3						
Biology	BIO.2 Energy Transfer	BIO.2 SWL explain that cells transform energy through the processes of photosynthesis and cellular respiration to drive cellular functions.	**BIO.2.6** Use an engineering design process to manipulate factors involved in fermentation to optimize energy production.				3						
Biology	BIO.3 Reproduction and Heredity	BIO.3A SWL develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.	BIO.3A.1 Model sex cell formation (meiosis) and combination (fertilization) to demonstrate the maintenance of chromosome number through each generation in sexually reproducing populations. Explain why the DNA of the daughter cells is different from the DNA of the parent cell.				3						
Biology	BIO.3 Reproduction and Heredity	BIO.3A SWL develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.	**BIO.3A.2** Compare and contrast mitosis and meiosis in terms of reproduction.					4					
Biology	BIO.3 Reproduction and Heredity	BIO.3A SWL develop and use models to explain the role of meiosis in the production of haploid gametes required for sexual reproduction.	**BIO.3A.3** Investigate chromosomal abnormalities (e.g., Down syndrome, Turner's syndrome, and Klinefelter syndrome) that might arise from errors in meiosis (nondisjunction) and how these abnormalities are identified (karyotypes).					4					

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Biology	BIO.3 Reproduction and Heredity	BIO.3B SWL analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.	**BIO.3B.1** Demonstrate Mendel's law of dominance and segregation using mathematics to predict phenotypic and genotypic ratios by constructing Punnett squares with both homozygous and heterozygous allele pairs.					4					
Biology	BIO.3 Reproduction and Heredity	BIO.3B SWL analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.	**BIO.3B.2** Illustrate Mendel's law of independent assortment using Punnett squares and/or the product rule of probability to analyze monohybrid crosses.						4				
Biology	BIO.3 Reproduction and Heredity	BIO.3B SWL analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.	**BIO.3B.3** Investigate traits that follow non-Mendelian inheritance patterns (e.g., incomplete dominance, codominance, multiple alleles in human blood types, and sex-linkage).						3				
Biology	BIO.3 Reproduction and Heredity	BIO.3B SWL analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population.	**BIO.3B.4** Analyze and interpret data (e.g., pedigrees, family, and population studies) regarding Mendelian and complex genetic traits (e.g., sickle-cell anemia, cystic fibrosis, muscular dystrophy, color-blindness, and hemophilia) to determine patterns of inheritance and disease risk.						3				
Biology	BIO.3 Reproduction and Heredity	BIO.3C SWL construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.	**BIO.3C.1** Develop and use models to explain the relationship between DNA, genes, and chromosomes in coding the instructions for the traits transferred from parent to offspring						3				
Biology	BIO.3 Reproduction and Heredity	BIO.3C SWL construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.	**BIO.3C.2** Evaluate the mechanisms of transcription and translation in protein synthesis.						3				
Biology	BIO.3 Reproduction and Heredity	BIO.3C SWL construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.	**BIO.3C.3** Use models to predict how various changes in the nucleotide sequence (e.g., point mutations, deletions, and additions) will affect the resulting protein product and the subsequent inherited trait.						2	1			
Biology	BIO.3 Reproduction and Heredity	BIO.3C SWL construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.	BIO.3C.4 Research and identify how DNA technology benefits society. Engage in scientific argument from evidence over the ethical issues surrounding the use of DNA technology (e.g., cloning, transgenic organisms, stem cell research, and the Human Genome Project, gel electrophoresis).							3			

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Biology	BIO.3 Reproduction and Heredity	BIO.3C SWL construct an explanation based on evidence to describe how the structure and nucleotide base sequence of DNA determines the structure of proteins or RNA that carry out essential functions of life.	**BIO.3C.5** Investigate current biotechnological applications in the study of the genome (e.g., transcriptome, proteome, individualized sequencing, and individualized gene therapy).							4			
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.1** Use models to differentiate between organic and chemical evolution, illustrating the steps leading to aerobic heterotrophs and photosynthetic autotrophs.							4			
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.2** Evaluate empirical evidence of common ancestry and biological evolution, including comparative anatomy (e.g., homologous structures and embryological similarities), fossil record, molecular/biochemical similarities (e.g., gene and protein homology), and biogeographic distribution.							4			
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.3** Construct cladograms/phylogenetic trees to illustrate relatedness between species.							3			
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.4** Design models and use simulations to investigate the interaction between changing environments and genetic variation in natural selection leading to adaptations in populations and differential success of populations.								3		
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.5** Use Darwin's Theory to explain how genetic variation, competition, overproduction, and unequal reproductive success acts as driving forces of natural selection and evolution.								3		
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.6** Construct explanations for the mechanisms of speciation (e.g., geographic and reproductive isolation).								4		
Biology	BIO.4 Adaptations and Evolution	BIO.4 SWL analyze and interpret evidence to explain the unity and diversity of life.	**BIO.4.7** Construct explanations for how various disease agents (bacteria, viruses, chemicals) can influence natural selection.								3		
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.1** Illustrate levels of ecological hierarchy, including organism, population, community, ecosystem, biome, and biosphere.									4	
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.2** Analyze models of the cycling of matter (e.g., carbon, nitrogen, phosphorus, and water) between abiotic and biotic factors in an ecosystem and evaluate the ability of these cycles to maintain the health and sustainability of the ecosystem.									4	
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.3** Analyze and interpret quantitative data to construct an explanation for the effects of greenhouse gases on the carbon dioxide cycle and global climate									4	
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.4** Develop and use models to describe the flow of energy and amount of biomass through food chains, food webs, and food pyramids.									3	

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Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.5** Evaluate symbiotic relationships (e.g., mutualism, parasitism, and commensalism) and other co- evolutionary (e.g., predator-prey, cooperation, competition, and mimicry) relationships within specific environments.									3	
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.6** Analyze and interpret population data, both density-dependent and density-independent, to define limiting factors. Use graphical representations (growth curves) to illustrate the carrying capacity within ecosystems									2	1
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.7** Investigate and evaluate factors involved in primary and secondary ecological succession using local, real world examples.										3
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.8** Use an engineering design process to create a solution that addresses changing ecological conditions (e.g., climate change, invasive species, loss of biodiversity, human population growth, habitat destruction, biomagnification, or natural phenomena).										3
Biology	BIO.5 Interdependence of Organisms and Their Environments	BIO.5 SWL Investigate and evaluate the interdependence of living organisms and their environment.	**BIO.5.9** Use an engineering design process to investigate and model current technological uses of biomimicry to address solutions to real-world problems.										3