Biology Pacing Guide ' (Grade: 9)
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Week#	***AL COS Objective***	***Labs/Activities*** (ASIM) Alabama Science in Motion *Textbook Activity (TPT) Teachers Pay Teachers (LTF) Laying the Foundation	***Textbook Sections***
1	Introduction to Biology; Lab Safety (per ASIM); Scientific Method; Familiarizing Students to the Lab	--Lab Safety Video & Contract (ASIM) --Graduated Cylinder Lab (Measurements) --Toilet Paper Strength Test (Scientific Method) (ASIM)	1.1 and 1.2--The Study of Life and Unifying Themes in Biology 1.3--Scientific Thinking and Processes 1.4--Biologists' Tools and Technology
2	COS1 Use models to compare and contrast how the structural characteristics of carbohydrates, nucleic acids, proteins, and lipids define their function in organisms. COS 5a Plan and carry out investigations to explain how the unique properties of water (e.g., polarity, cohesion, adhesion) are vital to maintaining homeostasis in organisms.	--Properties of Water Lab --pH Lab (ASIM)	2.1--Atoms, Ions, and Molecules 2.2--Properties of Water 2.3 Carbon-Based Molecules
3	COS2 Obtain, evaluate, and communicate information to describe the function and diversity of organelles and structures in various types of cells (e.g., muscle cells having a large amount of mitochondria, plasmids in bacteria, chloroplasts in plant cells.)	--Magna Cell (ASIM) --*Virtual Investigation: Virtual Tour of an Animal Cell --*Visual Concepts: Chloroplasts, ER, Mitochondrion, Nucleus, Vacuoles	3.1--Cell Theory 3.2--Cell Organelles 21.1--Plant Cells and Tissues

4	COS5 Plan and carry out investigations to explain feedback mechanisms (e.g., sweating and shivering) and cellular processes (e.g., active and passive transport) that maintain homeostasis.	--Cell Membrane Board Magnets --Egg Osmosis Demonstration (ASIM) --Homeostasis (exercise) Lab (ASIM)	3.3--Cell Membrane 3.4--Osmosis & Diffusion 3.5--Active Transport, Endocytosis, and Exocytosis 28.1--Levels of Organization 28.2--Mechanisms of Homeostasis 28.3--Interactions Among Systems
5	COS6 Analyze and interpret data from investigations to explain the role of products and reactants of photosynthesis and cellular respiration in the cycling of matter and the flow of energy. COS6a Plan and carry out investigations to explain the interactions among pigments, absorption of light, and reflection of light.	--*Rates of Photosynthesis ONLINE Lab --*Cellular Respiration ONLINE Lab	4.1--Chemical Energy and ATP 4.2--Overview of Photosynthesis 4.3--Photosynthesis in Detail 4.4--Overview of Cellular Respiration 4.5--Cellular Respiration in Detail
6	COS4 Develop and use models to explain the role of the cell cycle during growth and maintenance in cellular organisms (e.g., normal growth and/or uncontrolled growth resulting in tumors). COS12 Develop and use a model to analyze the structure of chromosomes and how new genetic combinations occur through the process of meiosis.	--Chromosocks (HudsonAlpha/ASIM) --Beginner's Microscope Lab (ASIM) --Onion Cell Mitosis (ASIM) --*STEM Lab Modeling Induction in Embryos	5.1--The Cell Cycle 5.2--Mitosis and Cytokinesis 5.3--Regulation of the Cell Cycle 6.1--Chromosomes and Meiosis 6.2--Process of Meiosiss
7 & 8	COS11 Analyze and interpret data collected from probability calculations to explain the variation of expressed traits within a population. COS11a Use mathematics and computation to predict phenotypic and genotypic ratios and	--Penny Probability --Rebop Genetics Lab --Dragon Genetics (ASIM) --Corn Genetics (Dihybrid Crosses) (ASIM) --Disorder Detectives	6.3--Mendel and Heredity 6.4--Traits, Genes, and Alleles 6.5--Traits and Probability 6.6--Meiosis and Genetic Variation 7.1--Chromosomes and

	percentages by constructing Punnett squares, including using both homozygous and heterozygous allele pairs. COS11b Develop and use models to demonstrate codominance, incomplete dominance, and Mendel's laws of segregation and independent assortment. COS11c Analyze and interpret data (e.g., pedigree charts, family and population studies) regarding Mendelian and complex genetic disorders (e.g., sickle-cell anemia, cystic fibrosis, type 2 diabetes) to determine patterns of genetic inheritance and disease risks from both genetic and environmental factors. COS 12a Analyze data to draw conclusions about genetic disorders caused by errors in meiosis (e.g., Down Syndrome, Turner Syndrome).	(HudsonAlpha/ASIM) --*STEM Lab Modeling Chromosomes in Meiosis	Phenotype 7.2--Complex Patterns of Inheritance 7.3--Gene Linkage and Mapping 7.4--Human Genetics and Pedigrees
9	COS3 Formulate an evidence-based explanation regarding how the composition of deoxyribonucleic acid (DNA) determines the structural organization of proteins. COS3a Obtain and evaluate experiments of major scientists and communicate their contributions to the development of the structure of DNA and to the development of the central dogma of molecular biology. COS3b Obtain, evaluate, and communicate	--Protein Synthesis Manipulative (board magnets) --Building DNA Models --color DNA --DNA Extraction --Genes and Consequences (HudsonAlpha/ASIM)	8.1--Identifying DNA as the Genetic Material 8.2--Structure of DNA 8.3--DNA Replication 8.4--Transcription 8.5--Translation 8.6--Gene Expression and Regulation 8.7--Mutations 9.1--Manipulating DNA 9.2--Copying DNA 9.4--Genetic Engineering

	information that explains how advancements in genetic technology (e.g., Human Genome Project, Encyclopedia of DNA Elements [ENCODE] project, 1000 Genomes Project) have contributed to the understanding as to how a genetic change at the DNA level may affect proteins, and in turn, influence the appearance of traits. COS3c Obtain information to identify errors that occur during DNA replication (e.g., deletion, insertion, translocation, substitution, inversion, frame-shift, point mutations).		9.5--Genomics and Bioinformatics
10	COS7 Develop and use models to illustrate examples of ecological hierarchy levels, including biosphere, biome, ecosystem, community, population, and organism. COS8 Develop and use models to describe the cycling of matter (e.g., carbon, nitrogen, water) and the flow of energy (e.g., food chains, food webs, biomass pyramids, ten percent law) between abiotic and biotic factors in ecosystems.	--Dissection of Owl Pellets (ASIM) --Web Lab (magnets for board) (ASIM) --Predator and Food Chain Bingo	13.1--Ecologists Study Relationships 13.2--Biotic and Abiotic Factors 13.4--Food Chains and Food Webs 13.5--Cycling of Matter 13.6--Pyramid Models
11	COS9 Use mathematical comparisons and visual representations to support or refute explanations of factors that affect population growth (e.g., exponential, linear, logistic). COS10 Construct an explanation and design a real-world solution to address changing conditions and ecological succession caused by density-dependent and/or density-independent factors.	--Random Sampling Activity --Good Buddies Lab (ASIM) --Mark and Recapture Lab (ASIM)	14.1--Habitat and Niche 14.2--Community Interactions 14.3--Population Density and Distribution 14.4--Population Growth Patterns 14.5--Ecological Succession

12	COS13 Obtain, evaluate, and communicate information to explain how organisms are classified by physical characteristics, organized into levels of taxonomy, and identified by binomial nomenclature (e.g., taxonomic classification, dichotomous keys). COS13a Engage in argument to justify the grouping of viruses in a category separate from living things.	--Practice: Norno Dichotomous Key (ASIM) --Practice: Pamishan Creatures Dichotomous Key (ASIM) --Lab: Biological Classification Cards and Dichotomous Key (ASIM) --*STEM Lab Modeling Viral Mutations	17.1--The Linnaen System of Classification 18.1--Studying Viruses and Prokaryotes 18.2--Viral Structure and Reproduction
13	COS14 Analyze and interpret data to evaluate adaptations resulting from natural and artificial selection that may cause changes in populations over time (e.g., antibiotic-resistant bacteria, beak types, peppered moths, pest-resistant crops). COS15 Engage in argument from evidence (e.g., mathematical models such as distribution graphs) to explain how the diversity of organisms is affected by overpopulation of species, variation due to genetic mutations, and competition for limited resources.	--Peppered Moth Lab (ASIM) --Fashion A Fish Lab (ASIM) --Which Beak is Best? Lab (ASIM) --Bead Bug Lab (ASIM) --*STEM Labs Populations Genetics --*STEM Lab Hardy Weinberg Equation --Bean Bunny Lab (w/ Hardy Weinberg)	10.1--Early Ideas About Evolution 10.2--Darwin's Observations 10.3--Theory of Natural Selection
14 & 15	COS16 Analyze scientific evidence (e.g., DNA, fossil records, cladograms, biogeography) to support hypotheses of common ancestry and biological evolution.	--*ONLINE Lab Constructing a Phylogenetic Tree --*ONLINE Lab Modeling DNA Hybridization --*ONLINE Lab Bioinformatics --*ONLINE Lab Comparing Hominoid Skulls --Stones & Bones (ASIM)	10.4--Evidence of Evolution 10.5--Evolutionary Biology Today 12.1--The Fossil Record 12.2--The Geologic Time Scale 12.3--Origin of Life 12.4--Early Single-Celled Organisms 12.5--Radiation of Multicellular Life 17.2--Classification Based on

			Evolutionary Relationships 17.3--Molecular Clocks
16	REVIEW (COS#): --Classification (13) --Diversity in Populations (14, 15) --Phylogenetic Trees (16) --Scientific Method --Lab Safety --Lab Equipment	--What An Animal! Lab (development and structure) (LTF) --Animal Behavior Choice Chambers Lab --Living Earthworm Lab	23.1--Animal Characteristics 23.2--Animal Diversity 27.1--Adaptive Value of Behavior 27.2--Instinct and Learning 27.3--Evolution of Behavior
17	REVIEW (COS#): --Ecological Relationships (9) --Biotic & Abiotic Factors (7, 8) --Habitats (7) --Community Interactions (8) --Population Growth Patterns (9, 14) --Ecological Succession (10)	--*Modeling Biomagnification --Literature in Science: Rachel Carson's *Silent Spring* --*Open Inquiry Lab: Water Quality --*Water Quality Testing	16.1--Human Population Growth and Natural Resources 16.2--Air Quality 16.3--Water Quality 16.4--Threats to Biodiversity 16.5--Conservation
18 **&** FINAL EXAM	REVIEW(COS#): --Cells(2, 3, 4, 5, 6, 12) --Genetics (1, 3, 11, 12)	--Reading & Writing Skills	--Pages 156-158 Stem Cell Research--Potential Solutions, Practical Challenges --Pages 280-282 Medical Technology--The Genetic Forefront --Pages 664-666 Genetically Modified Foods--Do Potential Problems Outweigh Benefits?

	--Populations (14, 15) --Ecological Interactions (7, 8) --Ecological Relationships (8)		--Pages 810-812 The Loss of Biodiversity