CUMBERLAND COUNTY SCHOOL DISTRICT BENCHMARK ASSESSMENT CURRICULUM PACING GUIDE		
School: Cumberland County High School	Subject: Biology	Grade: 11
Benchmark Assessment 1		
Instructional Timeline: 5 weeks		
Topic(s): Inquiry & Science Practices		

Kentucky Core Academic Standards	Learning Targets (I Can Statements)	Key Vocabulary
1.1 Safely use laboratory equipment and techniques when conducting scientific investigations. 1.2 Appropriate SI units for length, mass, time, temperature, quantity, area, volume, and density, and describe the relationships among SI unit prefixes (e.g., centi-, milli-, kilo-) and how SI units are related to analogous English units 1.3 Calculate the mean of a set of values 1.4 Recognize and apply criteria that scientists use to evaluate the validity of scientific claims and theories 1.5 Explain why scientific explanations must meet certain criteria (e.g., be consistent with experimental/observational evidence about nature, be open to critique and modification, be subject to peer review, use ethical reporting methods and procedures) 1.6 Explain why all scientific knowledge is subject to change as new evidence becomes available to the scientific community 1.7 Compare the goals and procedures followed in basic science with the goals and procedures of applied science and technology; discuss the important contributions of each and how citizens need to understand the ramifications of funding both endeavors	1. I can safely use laboratory equipment and techniques during scientific investigations, using the correct units to obtain measurements. 2. I can calculate the mean of a set of values. 3. I can explain the criteria and process scientists use to obtain, validate, and update information, relating these to the fundamental assumptions of science. 4. I can differentiate between basic and applied science and identify the relationship between them. 5. I can correctly design an experiment, collect results, and write about my findings using (and citing) appropriate sources. 6. I can correctly use charts and graphs to display results and interpret/extrapolate information from figures & graphics.	Mean Peer Review Theory Applied Science Basic Science Good Lab Practice Independent Variable Dependent Variable Control Group SI Unit Hypothesis Law

1.8 Explain how the contributions of basic science drive the potential of applied science (e.g., advantages found in nature can be emulated for our own benefit/product development, such as observations of gecko feet suggesting new adhesives; understanding of basic cell biology leading to cancer treatments) 1.9 Use mathematics to enhance the scientific inquiry process (e.g., choosing appropriate units of measurement, graphing and manipulating experimental data) 1.10 I can describe the fundamental assumptions of science 2.1. I can identify and clarify biological research questions and design experiments 2.2. I can manipulate variables in experiments using appropriate procedures (e.g., controls, multiple trials) 2.4 I can collect, organize, and analyze data accurately and precisely (e.g., using scientific techniques and mathematics in experiments) 2.6 I can use a variety of appropriate sources (e.g., Internet, scientific journals) to retrieve relevant information; cite references properly 2.7 I can design and conduct investigations appropriately using essential processes of scientific inquiry 2.8 I can write and speak effectively to present and explain scientific results, using appropriate terminology and graphics 2.9 Use graphical models, mathematical models, and		

simple statistical models to express patterns and relationships determined from sets of scientific data 2.10 I can interpret results and draw conclusions, revising hypotheses as necessary and/or formulating additional questions or explanations		

CUMBERLAND COUNTY SCHOOL DISTRICT BENCHMARK ASSESSMENT CURRICULUM PACING GUIDE		
School: Cumberland County High School	Subject: Biology	Grade: 11
Benchmark Assessment 2		
Instructional Timeline: 9 weeks		
Topic(s): Biochemistry, Cells, Cell Transport, Cellular Respiration		
Kentucky Core Academic Standards	Learning Targets (I Can Statements)	Key Vocabulary
3.2. Identify subatomic particles and describe how they are arranged in atoms 3.3 Describe the difference between ions and atoms and the importance of ions in biological processes 3.4 Compare the types of bonding between atoms to form molecules 3.5 Show how chemical reactions (e.g., photosynthesis, fermentation, cellular respiration) can be represented by chemical formulas 3.6 Explain the difference between organic and inorganic compounds 3.7 Explain the fundamental principles of the pH scale and the consequences of having the different concentrations of hydrogen and hydroxide ions 3.8 Describe the general structure and function(s), including common functional groups, of monosaccharides, disaccharides, polysaccharides, carbohydrates, fatty acids, glycerol,	1. I can describe atomic structure and the changes which occur when bonds are formed. 2. I can match chemical reactions of biological processes to what is occurring. 3. I can explain the pH scale. 4. I can identify the structure of and give the function of carbohydrates, lipids, proteins, and nucleic acids. 5. I can explain the function and specificity of enzymes. 6. I can describe the differences in plant, animal, eukaryotic, and prokaryotic cells. 7. I can identify the function of cellular organelles, including the ones involved in protein synthesis and specialization. 8. I can explain cellular motility. 9. I can explain the structure and function of ATP.	Proton Neutron Electron pH scale isotope ion Covalent bond Ionic bond Enzyme Carbohydrate Protein Lipid Nucleic Acids Peptide Bond Amino Acid Eukaryote Prokaryote Nucleus ATP

glycerides, lipids, amino acids, dipeptides, polypeptides, proteins, and nucleic acids 4.5 Describe the function of enzymes, including how enzyme-substrate specificity works, in biochemical reactions 4.1 I can analyze the similarities and differences among (a) plant versus animal cells and (b) eukaryotic versus prokaryotic cells. 4.2 I can describe the functions of all major cell organelles, including nucleus, ER, RER, Golgi apparatus, ribosome, mitochondria, microtubules, microfilaments, lysosomes, centrioles, and cell membrane 4.3 I can illustrate how all cell organelles work together by describing the step-by-step process of the translation of an mRNA strand into a protein and its subsequent processing by organelles so that the protein is appropriately packaged, labeled, and eventually exported by the cell 4.4 I can contrast the structure and function of subcellular components of motility (e.g., cilia, flagella, pseudopodia) 4.6 Define and explain the unique properties of water that are essential to living organisms 4.7 Explain how cells store energy temporarily as ATP 5.1 I can explain how the cell membrane controls movement of substances both into and out of the cell and within the cell 5.2 I can explain how the cell membrane maintains homeostasis 5.3 Describe and contrast these types of cell transport: osmosis,	10. I can describe the structure of the cellular membrane and how it maintains homeostasis. 11. I can identify the types of cellular transport. 12. I can outline the steps of aerobic and anaerobic cellular respiration and identify which organisms use this process. 13. I can explain the critical properties of water to living organisms.	Mitochondria Lysosome Ribosome Golgi Apparatus Cilia Flagella Pseudopodia Diffusion Facilitated diffusion Active transport Passive transport Protein pump Cellular Respiration Glycolysis Krebs Cycle Electron Transport Chain Aerobic Anaerobic

diffusion, facilitated diffusion, and active transport 5.4 I can identify the cellular sites of and follow through the major pathways of anaerobic and aerobic respiration, compare reactants and products for each process, and account for how aerobic respiration produces more ATP per monosaccharide 5.5 I can explain how photosynthetic organisms use the processes of photosynthesis and respiration		

CUMBERLAND COUNTY SCHOOL DISTRICT BENCHMARK ASSESSMENT CURRICULUM PACING GUIDE		
School: Cumberland County High School	Subject: Biology	Grade: 11
Benchmark Assessment 3		
Instructional Timeline: 12 weeks		
Topic(s): Genetics & Evolution		
Kentucky Core Academic Standards	Learning Targets (I Can Statements)	Key Vocabulary
6.1 I can describe the basic structure and function of DNA, mRNA, tRNA, amino acids, polypeptides, and proteins (e.g., replication, transcription, and translation) 6.2 I can describe the experiments of major scientists in determining both the structure of DNA and the central dogma 6.3 I can use mRNA codon charts to determine amino acid sequences of example polypeptides 6.4 I can use mRNA codon charts to determine the effects of different types of mutations on amino acid sequence and protein structure (e.g., sickle cell anemia resulting from base substitution mutation) 6.5 I can describe how gene expression is regulated in organisms such that specific proteins are synthesized only when they are needed by the cell (e.g., allowing cell specialization) 7.1 I can identify and explain Mendel's law of segregation and law of independent assortment 7.2 I can explain how the process of meiosis reveals the mechanism behind Mendel's conclusions about segregation and independent assortment on a molecular level 7.3 I can define and provide an example of the following: genotype, phenotype, dominant allele, recessive allele, codominant alleles, incompletely dominant alleles, homozygous, heterozygous, and carrier 7.4 I can explain sex-linked patterns of inheritance in terms of some	1. I can describe the structure and function of DNA and RNA. 2. I can describe the processes of replication, transcription, and translation. 3. I can use an mRNA codon chart to determine the amino acid sequence of an mRNA strand. 4. I can determine how mutations change the amino acid sequence of the resulting protein. 5. I can describe how organisms control gene expression. 6. I can differentiate between the processes of mitosis and meiosis. 7. I can describe Mendel's Laws of Segregation and Independent Assortment and their relation to the process of meiosis. 8. I can correctly use the terminology associated with genetics: genotype, phenotype, dominant allele, recessive allele, codominant alleles, incompletely dominant alleles, homozygous, heterozygous, and carrier 9. I can create and interpret Punnett	DNA RNA Nucleotide Codon Replication Transcription Translation Central Dogma Mutation Mitosis Meiosis Law of Segregation Law of Independent Assortment Genotype Phenotype Dominant allele Recessive allele Homozygous Heterozygous Carrier Codominance Incomplete dominance Sex-linked traits Punnett square Monohybrid cross

genes being absent from the smaller Y chromosome, and thus males (XY) having a different chance of exhibiting certain traits than do females (XX) 7.5 I can construct and interpret Punnett squares and pedigree charts (e.g., calculate and predict phenotypic and genotypic ratios and probabilities) 7.6 I can infer parental genotypes and phenotypes from offspring data presented in pedigree charts and from the phenotypic and genotypic ratios of offspring 7.7 I can describe the mode of inheritance in commonly inherited disorders (e.g., sickle cell anemia, Down syndrome, Turner's syndrome, PKU) 7.8I can describe the basic process of mitosis and contrast it with meiosis 8.1 Describe the experiments of Redi, Needham, Spallanzani, and Pasteur to support or falsify the hypothesis of spontaneous generation 8.2 Explain the biological definition of evolution 8.3 Differentiate among chemical evolution, organic evolution, and the evolutionary steps along the way to aerobic heterotrophs and photosynthetic autotrophs 8.4 Discuss Darwin's principle of survival of the fittest and explain what Darwin meant by natural selection 8.5 Explain the influences of other scientists (e.g., Malthus, Wallace, Lamarck, Lyell) and of Darwin's trip on HMS Beagle in formulating Darwin's ideas about natural selection 8.6 Contrast Lamarck's and Darwin's ideas about changes in organisms over time 8.7 Provide examples of behaviors that have evolved through natural	squares for monohybrid crosses, dihybrid crosses, and x-linked traits. 10. I can interpret pedigree charts. 11. I can explain the inheritance of common genetic disorders. 12. I can describe spontaneous generation and the experiments which supported or did not support it. 13. I can define evolution and differentiate between chemical and organic evolution. 14. I can explain the Theory of Endosymbiosis. 15. I can explain natural selection through survival of the fittest. 16. I can summarize the contributions of Malthus, Wallace, Lamarck, Lyell, and Darwin on the Theory of Evolution 17. I can define a species. 18. I can differentiate between gradualism, punctuated equilibrium, and catastrophism. 19. I can describe the types of selection as directional, stabilizing, or disruptive.	Dihybrid cross Pedigree chart Sickle cell anemia Down's syndrome PKU Spontaneous generation Organic evolution Chemical evolution Heterotrophs Autotrophs Natural Selection Survival of the fittest Migration Courtship behaviors Species Reproduction isolation Geographical isolation Disruptive selection Stabilizing selection Directional selection Convergent evolution Divergent evolution Coevolution Analogous structure Homologous structure Microevolution Macroevolution Crossing over Haploid cell Diploid cell

selection (e.g., migration, courtship rituals) 9.1 Design, perform, and analyze a laboratory simulation of natural selection on a working population (e.g., teacher chooses prey items [hard candy, marshmallows]; students choose feeding adaptation [fork , toothpick, spoon] and hunt; students record results and then change prey or adaptation; and students analyze results using statistical methods) 9.2 Specifically describe the conditions required to be considered a species (e.g., reproductive isolation, geographic isolation) 9.3 Describe the basic types of selection, including disruptive, stabilizing, and directional 9.4 Explain how natural selection and its evolutionary consequences (e.g., adaptation or extinction)provide a scientific explanation for the fossil record of ancient life-forms and the striking molecular similarities observed among the diverse species of living organisms 9.5 Discuss evidence from the fields of geology,biochemistry, embryology, comparative anatomy, and comparative physiology that points to shared evolutionary relationships 9.6 Explain how Earth's life-forms have evolved from earlier species as a consequence of interactions of (a) the potential of a species to increase its numbers and (b) genetic variability of offspring due to mutation and recombinations of DNA 9.7 Distinguish between catastrophism, gradualism, and punctuated equilibrium		

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School: Cumberland County High School	Subject: Biology	Grade: 11
Benchmark Assessment 4		
Instructional Timeline: 9 weeks		
Topic(s): Taxonomy, Animals, Plants, Ecology		
Kentucky Core Academic Standards	Learning Targets (I Can Statements)	Key Vocabulary
10.1 Identify major types of animal cells and tissues 10.2 Describe the major components and functions of physiological systems, including skeletal, muscle, circulatory, respiratory, digestive, urinary, endocrine, nervous, reproductive, and immune 10.3 Describe the basic mechanisms of plant processes, especially movement of materials and plant reproduction 10.4Explain the functions of unique plant structures, including the cell wall, chloroplasts, and critical parts of the flower and the seed 10.5 Explain the interaction between pigments, absorption of light, and reflection of light 10.6 Describe the light-dependent and light-independent reactions of photosynthesis 10.7 Relate the products of the light-dependent reactions to the products of	1. I can describe the structure and function of the major tissues and systems of the human body. 2. I can explain how plants reproduce and move materials internally. 3. I can explain the process of photosynthesis. 4. I can describe the levels of taxonomy and the criteria used to separate organisms into their groups. 5. I can describe the binomial nomenclature system. 6. I can create and use a dichotomous key. 7. I can describe the classifications of bacteria, viruses, protists, fungi, plants, and animals. 8. I can describe the major divisions of invertebrates and vertebrates. 9. I can use terminology relevant to Ecology: ecosystem, biotic, abiotic, community, population, biome, biosphere, species, habitat, niche. 10. I can explain the role of beneficial bacteria to the recycling of nutrients and energy in ecosystems. 11. I can describe the types of relationships organisms have developed. 12. I can describe the flow of energy through ecosystems. 13. I can identify the patterns of population growth and describe the concept of carrying capacity. 14. I can describe ecological succession (primary/secondary) 15. I can describe the effects of human impact on currently existing ecosystems.	Tissue Xylem Phloem Seed Chloroplast Light Dependent Reactions Light Independent Reactions Taxonomy Kingdom Phylum Class Order Family Genus Species Cell Wall Ecosystem Biotic Abiotic Community Population Biome Biosphere Species Habitat Niche

the light-independent reactions 11.1 Explain how organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their evolutionary relationships 11.2 List each of the major levels in the hierarchy of taxa: kingdom, phylum, class, order, family, genus, and species 11.3 Explain the binomial nomenclature system 11.4 Construct and use a dichotomous taxonomic key 11.5 Distinguish between and among viruses, bacteria, and protists, and give examples of each 11.6 Explain classification criteria for fungi, plants, and animals 11.7 Compare the major divisions of animals 12.1 Define and provide examples of biosphere, biome, ecosystem, community, population, species, habitat, and niche 12.2 Discuss biotic and abiotic factors that affect land and aquatic biomes 12.3 Discuss the role of beneficial bacteria (e.g., in the recycling of nutrients) 12.4 Explain how energy flows		Beneficial bacteria Competition Mutualism Parasitism Commensalism Predation Primary Producer Consumer Trophic Level Primary succession Secondary succession Carrying capacity Rule of 10% Archaebacteria Eubacteria Virus Protist Fungi Plant Animal Angiosperm Carpel/Pistil Stamen Chlorophyll Photosynthesis Transpiration

through ecosystems in one direction, from photosynthetic organisms to herbivores to carnivores and decomposers 12.5 Explain how the amount of life any environment can support is limited by the available matter and energy and by the ability of ecosystems to recycle the residue of dead organic materials 12.6 Explain how organisms cooperate and compete in ecosystems and how interrelationships and interdependencies of organisms may generate ecosystems that are stable for thousands of years 12.7 Diagram the flow of energy using food webs, food chains, and pyramids (e.g., pyramid of energy, pyramid of biomass, and pyramid of numbers) 12.8 Describe examples of competition, symbiosis, and predation 12.9 Explain the concept of carrying capacity 12.10 Describe the growth of populations, including exponential and logistic growth (e.g., design and conduct an experiment		

investigating bacterial growth using appropriate calculations) 12.11 Explain the process of ecological succession, and describe the different communities that result 12.12 Read and describe current journal articles relating to environmental concerns (e.g., loss of biodiversity, habitat loss, pollution) 12.13 Discuss and evaluate the significance of human interference with major ecosystems (e.g., the loss of genetic diversity in cloned crops or animals)		