

Biology II Pacing Guide

First Nine Weeks		
Week(s)	Topics & Objectives	Standards
1	Apply inquiry-based and problem-solving processes and skills to scientific investigations. a. Use current technologies such as CD-ROM, DVD, Internet, and on-line data search to explore current research related to a specific topic	1a
2	Clarify research questions and design laboratory investigations. Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). Organize data to construct graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs), draw conclusions, and make inferences	1b,c,d
3	Evaluate procedures, data, and conclusions to critique the scientific validity of research	1e
4	Formulate and revise scientific explanations and models using logic and evidence (data analysis). Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g., computers, calculators, SmartBoard, CBL's, etc.)	1f, g
5	Describe and contrast the structures, functions, and chemical processes of the cell. a. Relate the structure and function of a selectively permeable membrane to its role in diffusion and osmosis	2a
6	Summarize how cell regulation controls and coordinates cell growth and division	2b
7	Analyze and describe the function of enzymes in biochemical reactions. (DOK 2) • The impact of enzymatic reactions on biochemical processes • Factors that affect enzyme function (e.g., pH, concentration, temperature	2c
8	d. Differentiate between photosynthesis and cellular respiration. (DOK 2) • Cellular sites and major pathways of anaerobic and aerobic respiration (with reactants, products, and ATP per monosaccharide) • Cellular respiration with respect to the sites at which they take place, the reactions involved, and the energy input and output in each stage (e.g., glycolysis, Krebs cycle, electron transport chain) • Pigments, absorption, reflection of light, and light-dependent and light-independent reactions of photosynthesis • Oxidation and reduction reactions	2d

9	<p>3. Investigate and discuss the molecular basis of heredity.</p> <p>a. Explain how the process of meiosis clarifies the mechanism underlying Mendel's conclusions about segregation and independent assortment on a molecular level.</p>	3a
Second Nine Weeks		
Week(s)	Topics & Objectives	Standards
10	<p>Research and explain how major discoveries led to the determination of DNA structure Relate gene expression (e.g., replication, transcription, translation) to protein structure and function. (DOK 2)</p> <ul style="list-style-type: none"> • Translation of a messenger RNA strand into a protein • Processing by organelles so that the protein is appropriately packaged, labeled, and eventually exported by the cell • Messenger RNA 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) • Gene expression regulated in organisms so that specific proteins are synthesized only when they are needed by the cell (e.g., allowing cell specialization) 	3b, c
11	<p>Assess the potential implications of DNA technology with respect to its impact on society. (DOK 3)</p> <ul style="list-style-type: none"> • Modern DNA technologies (e.g., polymerase chain reaction (PCR), gene splicing, gel electrophoresis, transformation, recombinant DNA) in agriculture, medicine and forensics <p>Develop a logical argument defending or refuting bioethical issues arising from applications of genetic technology (e.g., the human genome project, cloning, gene therapy, stem cell research).</p>	3d, e
12	<p>Demonstrate an understanding of the factors that contribute to evolutionary theory and natural selection.</p> <p>a. Explain the history of life on Earth and infer how geological changes provide opportunities and constraints for biological evolution. (DOK 2)</p> <ul style="list-style-type: none"> • Main periods of the geologic timetable of Earth's history • Roles of catastrophic and gradualistic processes in shaping planet Earth 	4a
13	<p>Provide support for the argument based upon evidence from anatomy, embryology, biochemistry, and paleontology that organisms descended with modification from common ancestry</p>	4b
14	<p>Identify and provide supporting evidence for the evolutionary relationships among various organisms using phylogenetic trees and cladograms</p>	4c
15	<p>Formulate a scientific explanation based on fossil records of ancient life-forms and describe how new species could originate as a result of geological isolation and reproductive isolation</p>	4d

16	Compare and contrast the basic types of selection (e.g., disruptive, stabilizing, directional, etc.) Cite examples to justify behaviors that have evolved through natural selection (e.g., migration, parental care, use of tools, etc.)	4e, f
17	Research and explain the contributions of 19th century scientists (e.g., Malthus, Wallace, Lyell, Darwin) on the formulation of ideas about evolution. Develop a logical argument describing ways in which the influences of 20th century science have impacted the development of ideas about evolution (e.g., synthetic theory of evolution, molecular biology)	4g, h
18	Analyze changes in an ecosystem resulting from natural causes (succession), changes in climate, human activity (pollution and recycling), or introduction of non-native species.	4i

Third Nine Weeks

Week(s)	Topics & Objectives	Standards
19	Develop an understanding of organism classification. a. Classify organisms according to traditional Linnaean classification characteristics (e.g., cell structure, biochemistry, anatomy, fossil record, methods of reproduction) and the cladistic approach	5a
20	b. Categorize organisms according to the characteristics that distinguish them as Bacteria, Archaea, or Eucarya. (DOK 1) • Bacteria, fungi, and protists	5b
21	Characteristics of invertebrates (e.g., habitat, reproduction, body plan, locomotion) as related to phyla (e.g., Porifera, Cnidarians, Nematoda, Annelida, Platyhelminthes, and Arthropoda) and classes (e.g., Insecta, Crustacea, Arachnida, Mollusca, Echinodermata) • Characteristics of vertebrates (e.g., habitat, reproduction, body plan, locomotion) as related to classes (e.g., Agnatha, Chondrichthyes, Osteichthyes, Amphibia, Reptilia, Aves, Mammalia) • Nomenclature of various types of plants (e.g., Bryophyta, Tracheophyta, Gymnospermae, Angiospermae, Monocotyledonae, Dicotyledonae, vascular plants, nonvascular plants).	5c
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Fourth Nine Weeks

Week(s)	Topics & Objectives	Standards
28		
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