



AP Biology
Year at a Glance (YAG)
2023-2024



| First Semester | | Second Semester | |
|---|---|--|---|
| 1 st Nine Weeks | | 3 rd Nine Weeks | |
| <p>Big Idea 2: 2B1, 2B2, 2B3, 2C1, 2C2, 2E2</p> <p>Big Idea 3: 3D1, 3D2, 3D3, 3D4, 3E1</p> <p>Big Idea 4: EK: 4A1, 4A2, 4A3, 4A4, 4C1, 4B4, 4C3, 4C4</p> | <p>Unit 1 : Chemistry of Life: Biochemistry Identify the 6 major elements found in living things. Describe the role of carbon in molecular diversity, its characteristics, and its forms of organization structures. Define monomer, polymer, hydrolysis, and dehydration synthesis and give specific examples from each of the 4 macromolecule groups. Distinguish between endergonic/exergonic reactions, anabolic/catabolic pathways, kinetic/potential energy, and open/closed systems. Describe an enzyme in terms of its function in chemical reactions and substrate/product relationships.</p> <p>Unit 2: Cell Structure and Function Identify the structure, composition, and function of cell organelles. Compare and contrast the structures of eukaryotic and prokaryotic cells. Identify the components of the fluid mosaic model of the cell membrane. Compare isotonic (isosmotic), hypertonic (hyperosmotic), and hypotonic (hypoosmotic) solutions and predict the path of movement of water and solutes in given examples. Relate osmotic potential to solute concentration and water potential. Describe the three main stages of cell signaling. Describe how signal information is transduced into cellular responses in the cytoplasm and in the nucleus.</p> | <p>Big Idea 1: 1A1, 1A2, 1A3, 1A4, 1C2, 1C3, 1D1, 1D2</p> <p>Big Idea 2: 2C1, 2C2, 2D1, 2D2, 2D3, 2D4, 2E1, 2E2, 2E3</p> <p>Big Idea 3: 3A1, 3B1, 3B2, 3C2, 3C3</p> <p>Big Idea 4: 4C2</p> | <p>Unit 5: Heredity Describe Mendel's law of segregation.. Distinguish between genotype and phenotype, heterozygous and homozygous, dominant and recessive traits. Use the laws of probability to calculate the chances of an individual having a specific genotype or phenotype. Complete genetics problems related to the condition and patterns of inheritance discussed. Understand the use of the Chi Square test in studying data from genetic crosses.</p> <p>Unit 6: Gene Expression and Regulation Describe the structure of DNA and explain what kind of chemical bond connects the nucleotides of each strand and what holds the two strands together. Describe the process of DNA replication. Explain the processes of transcription, translation and mRNA editing. Given a sequence of bases in DNA, predict the corresponding codons transcribed on mRNA and the corresponding anticodons of tRNA. Explain how the genetic code is redundant and universal. Using the <i>trp operon</i> as an example, explain the concept of an operon and the function of the operator, repressor and corepressor. Distinguish between structural and regulatory genes. Describe the <i>lac operon</i> functions. Understand how restriction enzymes and gel electrophoresis are used to isolate DNA fragments</p> <p>Unit 7: Natural Selection Students will be able to: State the two major points Darwin made in <i>The Origin of Species</i> concerning the Earth's biota. Explain what Darwin meant by the principle of common descent and "descent with modification". Explain what evidence convinced Darwin that species change over time. Using some contemporary examples, explain how natural selection results in evolutionary change.</p> |



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| 2 nd Nine Weeks | 4 th Nine Weeks | |
|---|--|--|
| <p>Big Idea 2: 2A1, 2A2, 2A3, 2C1, 2C2, 2D1, 2D2, 2D3</p> <p>Big Idea 3: 3A1, 3A2, 3A3, 3A4, 3C1, 3C2</p> | <p>Unit 3: Cellular Energetics Describe the role of respiration in the cell's energy cycle. Define cellular respiration, glycolysis, citric acid cycle, and electron transport. Identify the general reactants and products of glycolysis, citric acid cycle and oxidative phosphorylation. Compare the end products of aerobic and anaerobic respiration and identify the types of organisms employing each. Summarize the light reactions with an equation and describe where they occur. Describe important differences in chemiosmosis between oxidative phosphorylation in mitochondria and photophosphorylation in chloroplasts. Summarize the carbon-fixing reactions of the Calvin-Benson cycle and describe changes that occur in the carbon skeleton of the intermediates.</p> <p>Unit 4: Cellular Communication and Cell Cycle List the stages of the cell cycle and describe the sequence of events and activities of these stages. List the phases of mitosis proper; describe the events characteristic of each phase and be able to recognize a diagram or micrograph of each stage. Identify factors which stimulate or inhibit cell division. Explain how cancerous cell division is different from normal cell activity. Distinguish between sexual and asexual reproduction. Compare the chromosomal contents of haploid and diploid cells. Indicate where mitosis and meiosis would occur in a given organism. List the phases of meiosis, describe the events that characterize each phase and be able to recognize these phases in diagrams.</p> <p>Fall Semester Final Exam Review and Exams</p> | <p>Big Idea 2: 2C1, 2C2, 2D1, 2D2, 2D3, 2D4, 2E1, 2E2, 2E3</p> <p>Big Idea 4: 4A5, 4A6, 4B1, 4B2, 4B3, 4B4, 4C3, 4C4</p> <p>Big Idea 1: Essential Knowledge (EK): 1A1, 1A2, 1A3, 1A4, 1B1, 1B2, 1C1, 1C2, 1C3</p> <p>Unit 7: Natural Selection (cont'd) Distinguish between phylogeny and systematics. Distinguish between systematics and taxonomy. Define the parts and describe the interrelationships within a cladogram. Explain how a cladogram is constructed. Compare DNA and RNA viruses; identify the structural components and compare the reproductive cycles of viruses. Describe the general characteristics of bacteria. Explain the significance of bacteria in the earth's ecosystem. Population Genetics: Write the general Hardy-Weinberg theorem, use it to calculate allele and genotype frequencies. Explain how genetic drift, gene flow, mutation, nonrandom mating and natural selection can cause microevolution. Give the cause of genetic variation in a population. Explain the concept of relative fitness and its role in adaptive evolution. Describe what selection acts on and what factors contribute to the overall fitness of a genotype. Distinguish between anagenesis and cladogenesis. Distinguish between prezygotic and postzygotic isolating mechanisms.</p> <p>Unit 8: Ecology Distinguish between the six increasingly comprehensive levels of ecological study. Distinguish between the exponential model and the logistical model of population growth (include a graph that illustrates both models). Compare and contrast K-selection and r-selection with reference to selection for life history traits. Explain how age structure, generation time, and sex structure of populations can effect population growth. Describe the recorded human population growth and discuss the estimates for human carrying capacity. Discuss the modes of interspecific interactions between species and how they affect population density. Distinguish between a food chain and a food web. Include a list of the 5 trophic levels. Compare a "dominant species" to a "keystone species" and give an example how each can impact a community. Compare and contrast primary succession and secondary succession. Explain the two components that contribute to the biodiversity of a community. List the 4 biogeochemical cycles and describe the importance of each within an ecosystem. Explain 3 impacts humans have on ecosystems and describe what is meant by biological magnification with reference to toxins.</p> <p>Advanced Placement Exam Preparation and Exam</p> <p>Spring Semester Final Exam Review and Exams</p> |