AP Biology

Time : 103h 27m / Lessons : 128 / Activities : 232

Unit	Lesson	Lesson Objectives	Time
Biochemistry	Introduction to AP Biology	1. Describe the skills necessary to be successful in an AP Biology course.	5m
		2. Describe the components of the AP Biology course.	
	Reading Lesson - Chapter 2 (The Chemical Context of Life)		16m
	The Structure, Properties, and Bonding of Water	1. Describe how the bonds between water molecules lead to the properties of water.	20m
		2. Relate the molecular structure of water to its polar nature.	
		3. Explain how the properties of water are important to life on Earth.	
		4. Describe the effect of buffers, acids, and bases on organisms and their environment.	
	Reading Lesson - Chapter 3 (Carbon and the Molecular Diversity of Life)		16m
	The Elements of Life	1. Explain why organisms need to exchange matter with the environment.	22m
		2. Relate the structure of the atoms of an element to the element's properties.	
		3. Construct an explanation as to how chemical bonds affect the formation and function of molecules.	
		4. Differentiate elements and compounds.	
		5. Explain how molecules are formed and broken down.	
	An Introduction to Biological Macromolecules	1. Characterize the type of bond that forms between monomers.	12m
		2. Describe the properties of monomers.	
		3. Compare the reactions involved in the formation and breakdown of polymers.	
	The Properties of Biological Macromolecules	1. Describe the properties of nucleotides.	17m
		2. Relate the properties of lipids to its function.	
		3. Explain how the amino acid sequence of proteins affects the protein's shape and function.	
		4. Analyze how the characteristics of sugar monomers affect the properties and function of complex carbohydrates.	
	The Structure and Function of Biological Macromolecules	1. Compare the types of protein structure.	1h 48m
		2. Differentiate linear and branched carbohydrate polymers.	
		3. Determine how the structure of a protein affects its function.	
		4. Describe the structure and formation of nucleic acids.	
		5. Describe the structure of DNA.	
	The Structure of Nucleic Acids	1. Analyze how DNA and RNA are structurally similar.	22m
		2. Describe how the structural similarities and differences between DNA and RNA are related to their function.	
		3. Differentiate the structure of DNA and RNA.	
	Skills Lesson: Short Essay	1. Describe the skills necessary to be successful writing a short free response.	19m
		2. Practice writing a short free response.	
	Skills Lesson: Experimental Design	1. Evaluate scientific questions.	1h 48m
		2. Justify the selection of data in an inquiry investigation.	
		3. Design an inquiry investigation to answer a scientific question.	
		4. Develop a refined scientific question that guides an investigation.	
	Skills Lesson: Displaying and Analyzing Data	1. Justify the type of data and data analysis needed to answer a scientific question.	1h 55m
		2. Use charts to analyze data.	
		3. Describe the different ways to display data.	
		4. Create charts using a spreadsheet application.	
	Skills Lesson: Statistical Analysis of Data	1. Justify the type of data and data analysis needed to answer a scientific question.	2h 13m
		2. Analyze data collected in an investigation.	
		3. Describe different types of data.	
		4. Apply statistical models to analyze data.	
		1. Describe the properties of the monomers and the type of bonds that connect the monomers in biological macromolecules.	

	Unit 1 Test	2. Explain how a change in the subunits of a polymer may lead to changes in structure or function of the macromolecule.	40m
		3. Describe how a change in the subcomponents of a biological macromolecule can result in changes in its structure and/or function.	
		4. Explain how the properties of water that result from its polarity and hydrogen bonding affect its biological function.	
		5. Explain the composition of biological macromolecules.	
		6. Describe the structure, properties, and bonds that link monomers to create biological macromolecules.	
		7. Describe how the properties of water affect its biological function.	
Cells	Introduction to Unit 2		1m
	Reading Lesson – Chapter 4 (A Tour of the Cell)		31m
	Components of Cells	1. Describe the function of the extracellular matrix.	20m
		2. Explain how the structure of cells points to a common ancestor.	
		3. Examine the structure and/or function of cell components and organelles.	
		4. Compare plant and animal cells.	
		5. Distinguish prokaryotic and eukaryotic cells.	
	Structure and Function of Cells	1. Explain how organelles and subcellular structures support the functions of the cell.	35m
		2. Examine how the cell's structures allow organisms to capture, store, and use energy.	
	Cell Size	1. Explain how surface area-to-volume ratios affect cells, organisms, and biological systems.	27m
		2. Analyze the relationship between a cell's size and surface area-to-volume ratio.	
		3. Describe the structures and strategies used by organisms to efficiently exchange materials with the environment.	
	Lab: Cell Size	1. Apply mathematical models involving surface area to volume ratios.	1h 43m
		2. Explain the effect of cell size and shape on a cell's ability to maintain homeostasis.	
		3. Make predictions based upon the results of surface area to volume calculations.	
	Reading Lesson – Chapter 5 (Membrane Transport and Cell Signaling)		16m
	Cell Membrane	1. Explain how the components of the cell membrane help maintain the internal environment of the cell.	1h 39m
		2. Describe the structure of the cell membrane.	
	Cell Membrane Permeability	1. Explain how the permeability of the cell membrane affects the movement of materials across the membrane.	13m
		2. Relate the structure of the cell membrane to its permeability.	
		3. Describe the structure and function of cell walls.	
	Transport across Membranes	1. Describe how organisms maintain water and solute balance.	1h 43m
		2. Distinguish between endocytosis and exocytosis.	
		3. Explain how the permeability of membranes allows for the formation of concentration gradients.	
		4. Compare passive and active transport.	
	Facilitated Diffusion	1. Differentiate channel and carrier proteins.	19m
		2. Explain how the ability of a molecule to pass through the cell membrane is affected by the molecule's structure.	
		3. Compare active transport and facilitated diffusion.	
		4. Explain how ion pumps maintain membrane potential.	
		5. Examine how membrane proteins assist in the transport of molecules and ions across the cell membrane.	
	Osmoregulation	1. Describe how concentration gradients affect the transport of molecules across membranes.	1h 48m
		2. Differentiate the effect of hypotonic, hypertonic, and isotonic environments on cells.	
		3. Examine the relationship between solute and water potential.	
		4. Analyze the mechanisms that help organisms maintain internal environments.	
		5. Calculate the solute and water potential of solutions.	
	Lab: Tonicity and Osmoregulation	1. Apply mathematical models involving water potential.	1h 48m
		2. Investigate whether homeostasis is maintained by the movement of particles across membranes.	
		3. Predict the effect of cell size and shape on osmoregulation.	
	Transport Mechanisms	1. Examine how the knowledge of transport mechanisms has impacted medicine and technology.	19m
		2. Summarize the mechanisms involved in the movement of materials across the cell membrane.	
	Cell Compartmentalization	1. Describe cell compartmentalization.	21m

	Cell Compartmentalization	2. Explain how cell compartmentalization allows the organelles of the cell to perform their functions efficiently.	21m
	Evolution of Compartmentalization in Cells	1. Relate the functions of mitochondria and chloroplasts to their ancestral counterparts.	27m
		2. Compare prokaryotic and eukaryotic cell compartmentalization.	
		3. Describe the origins of cell compartmentalization.	
	Unit 2 Test	1. Describe the structural features of a cell that allow organisms to capture, store, and use energy.	40m
		2. Explain how concentration gradients affect the movement of molecules across membranes.	
		3. Describe the mechanisms that organisms use to transport large molecules across the plasma membrane.	
		4. Describe the mechanisms that organisms use to maintain solute and water balance.	
		5. Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms and the environment.	
		6. Explain how the structure of a molecule affects its ability to pass through the plasma membrane.	
		7. Explain how the structure of biological membranes influences selective permeability.	
		8. Explain the structure and function of subcellular components and organelles.	
		9. Describe similarities and/or differences in compartmentalization between prokaryotic and eukaryotic cells.	
		10. Describe the contributions of subcellular components and organelles to cell function.	
		11. Describe the role of the cell wall in maintaining cell structure and function.	
		12. Describe the Fluid Mosaic Model of cell membranes.	
Enzymes and Metabolism	Introduction to Unit 3		1m
	Reading Lesson - Chapter 6 (An Introduction to Metabolism)		16m
	Structure of Enzymes	1. Examine the importance of enzyme active site and substrate specificity.	21m
		2. Describe the structure and properties of enzymes.	
	Function of Enzymes	1. Describe enzymes.	19m
		2. Explain how enzymes facilitate chemical reactions.	
	Enzyme Activity	1. Explain the causes and effects of changes in the structure of enzymes.	19m
		2. Explain the effects of environmental conditions on enzyme activity.	
	Lab: Enzyme Activity	1. Analyze data and identify how molecular interactions affect structure and function.	1h 42m
		2. Design a plan for collecting data to show that all biological systems are affected by complex biotic and abiotic interactions.	
		3. Use models to predict and justify that changes in the subcomponents of a biological polymer affect the functionality of the molecule.	
	Energy and Life	1. Analyze how energy is efficiently transferred in metabolic pathways.	34m
		2. Describe the role of energy in living organisms.	
		3. Explain why highly ordered systems do not violate the second law of thermodynamics.	
	Photosynthesis	1. Explain how the chemical energy from the light-dependent reactions is used to produce sugars in the light-independent reactions (Calvin cycle).	33m
		2. Examine how light energy is absorbed and transformed to chemical energy during the light-dependent reactions of photosynthesis.	
		3. Describe the importance of photosynthesis.	
		4. Support the claim that cyanobacterial photosynthesis created an oxygenated atmosphere.	
		5. Describe the evolution of photosynthesis.	
	Lab: Photosynthesis	1. Justify the scientific claim that organisms share many conserved core processes and features that evolved and are widely distributed among organisms today.	1h 44m
		2. Apply mathematical routines to describe interactions among living systems.	
		3. Justify the scientific claim that free energy is required for living systems.	
		4. Analyze data and identify how molecular interactions affect structure and function.	
		5. Construct explanations based on scientific evidence as to how interactions of subcellular structures provide essential functions.	
	Reading Lesson - Chapter 7 (Cellular Respiration and Fermentation)		16m
	Cellular Respiration	1. Explain the importance of cellular respiration.	2h
		2. Describe the stages of cellular respiration.	
		3. Examine alternative glucose breakdown pathways.	
	Variation and Fitness	1. Relate the variation of molecules within cells to the ability of organisms to survive and reproduce in different environments.	26m
		2. Account for the variation within and among cells.	
		1. Explain how changes to the structure of an enzyme may affect its function.	

	Unit 3 Test	2. Explain how cells capture energy from light and transfer it to biological molecules for storage and use.	40m
		3. Describe the properties of enzymes.	
		4. Describe the role of energy in living organisms.	
		5. Explain how the cellular environment affects enzyme activity.	
		6. Describe the photosynthetic processes that allow organisms to capture and store energy.	
		7. Describe the processes that allow organisms to use energy stored in biological macromolecules.	
		8. Explain how cells obtain energy from biological macromolecules in order to power cellular functions.	
		9. Explain how enzymes affect the rate of biological reactions	
		10. Explain the connection between variation in the number and types of molecules within cells to the ability of the organism to survive and/or reproduce in different	
Cell Communication and Cell Cycle	Introduction to Unit 4		1m
	Communication between Cells	1. Describe how cells communicate with one another over short and long distances.	13m
		2. Explain how cells that are in direct contact or are adjacent communicate.	
		3. Describe the importance of cell communication.	
	Reading Lesson - Concept 5.6 (Cell Signaling)		16m
	Introduction to Signal Transduction	1. Analyze how cells respond to signals.	15m
		2. Explain the function of signal transduction pathways in cell communication.	
		3. Describe the role of the components of a signal transduction pathway in cell communication.	
	Signal Transduction	1. Explain how signal transduction affects gene expression and cell function.	25m
		2. Describe how signal transduction pathways impact how a cell responds to its environment.	
	Alteration of Signal Transduction Pathways	1. Examine how chemicals interfere with signal transduction pathways.	1h 41m
		2. Analyze the effect of mutations on signal transduction.	
	Feedback	1. Explain the role of negative and positive feedbacks in organisms.	1h 40m
		2. Compare negative and positive feedback mechanisms.	
	Reading Lesson - Chapter 9 (The Cell Cycle)		16m
	Cell Cycle and Mitosis	1. Describe the stages and events of the cell cycle.	18m
		2. Explain the role of mitosis in the transmission of genetic information from one generation to the next.	
	Cell Cycle Regulation and Disruptions	1. Describe the effect of disruptions in the cell cycle.	13m
		2. Explain the importance of cell cycle regulation.	
		3. Examine the control system involved in the regulation of the cell cycle.	
	Skills Lesson: Long Essay	1. Be able to plan and a write a long free response answer.	1h 36m
		2. Understand the long free response question section of the AP exam.	
	Skills Lesson: Data-Based Essay	1. Practice writing a data-based essay.	1h 34m
		2. Describe the skills necessary to be successful writing a data-based essay.	
	Unit 4 Test	1. Explain how negative feedback helps to maintain homeostasis	40m
		2. Describe the different types of cellular responses elicited by a signal transduction pathway.	
		3. Explain how a change in the structure of any signaling molecule affects the activity of the signaling pathway.	
		4. Describe the role of components of a signal transduction pathway in producing a cellular response.	
		5. Describe the components of a signal transduction pathway.	
		6. Explain how cells communicate with one another over short and long distances.	
		7. Explain the method by which cells communicate.	
		8. Describe the events that occur in the cell cycle.	
		9. Describe the role of checkpoints in regulating the cell cycle.	
		10. Explain how mitosis results in the transmission of chromosomes from one generation to the next.	
		11. Describe the effects of disruptions to the cell cycle on the cell or organism.	
		1. Explain the effect of surface area-to-volume ratios on the exchange of materials between cells or organisms and the environment.	
		2. Describe the structural features of a cell that allow organisms to capture, store, and use energy.	
		3. Explain the structure and function of subcellular components and organelles.	

Cumulative Exam I	Cumulative Exam I	4. Describe the mechanisms that organisms use to maintain solute and water balance.	1h 15m
		5. Describe the contributions of subcellular components and organelles to cell function.	
		6. Explain how specialized structures and strategies are used for the efficient exchange of molecules to the environment.	
		7. Explain how changes to the structure of an enzyme may affect its function.	
		8. Describe the processes that allow organisms to use energy stored in biological macromolecules.	
		9. Explain how cells capture energy from light and transfer it to biological molecules for storage and use.	
		10. Explain how cells obtain energy from biological macromolecules in order to power cellular functions.	
		11. Describe similarities and/or differences in compartmentalization between prokaryotic and eukaryotic cells.	
		12. Describe the role of energy in living organisms.	
		13. Explain how enzymes affect the rate of biological reactions	
		14. Explain how internal membranes and membrane-bound organelles contribute to compartmentalization of eukaryotic functions.	
		15. Explain the connection between variation in the number and types of molecules within cells to the ability of the organism to survive and/or reproduce in different	
		16. Explain how the cellular environment affects enzyme activity.	
		17. Describe the relationship between the functions of endosymbiotic organelles and their free-living ancestral counterparts.	
		18. Describe the photosynthetic processes that allow organisms to capture and store energy.	
		19. Describe the properties of enzymes.	
		20. Explain the method by which cells communicate.	
		21. Describe the role of checkpoints in regulating the cell cycle.	
		22. Describe the role of components of a signal transduction pathway in producing a cellular response.	
		23. Describe the components of a signal transduction pathway.	
		24. Explain how a change in the structure of any signaling molecule affects the activity of the signaling pathway.	
		25. Explain how mitosis results in the transmission of chromosomes from one generation to the next.	
		26. Describe positive and/or negative feedback mechanisms.	
		27. Describe the events that occur in the cell cycle.	
		28. Describe the role of the environment in eliciting a cellular response.	
		29. Explain how positive feedback affects homeostasis.	
		30. Describe the structure, properties, and bonds that link monomers to create biological macromolecules.	
		31. Describe how the properties of water affect its biological function.	
		32. Explain the structural similarities and differences between DNA and RNA.	
		33. Describe the roles of each of the components of the cell membrane in maintaining the internal environment of the cell.	
		34. Explain how the structure of biological membranes influences selective permeability.	
		35. Describe the role of the cell wall in maintaining cell structure and function.	
		36. Describe how a change in the subcomponents of a biological macromolecule can result in changes in its structure and/or function.	
		37. Explain the composition of biological macromolecules.	
		38. Describe the mechanisms that organisms use to transport large molecules across the plasma membrane.	
		39. Explain how the structure of a molecule affects its ability to pass through the plasma membrane.	
		40. Explain how concentration gradients affect the movement of molecules across membranes.	
		41. Explain how osmoregulatory mechanisms contribute to the health and survival of organisms.	
		42. Describe the membrane-bound structures of the eukaryotic cell.	
	Introduction to Unit 5		1m
	Reading Lesson - Chapter 10 (Meiosis and Sexual Life Cycles)		16m
	Meiosis	1. Explain the role of meiosis in heredity.	17m
		2. Compare meiosis and mitosis.	
		3. Describe the phases and outcome of meiosis.	
	Meiosis and Genetic Diversity	1. Analyze the meiotic processes that result in genetic diversity.	1h 52m
		2. Describe how fertilization contributes to genetic variation.	
		3. Explain how sexual reproduction in eukaryotes allows for genetic variation.	

Heredity	Lab: Mitosis and Meiosis	1. Explain the connection between meiosis and how genetic variation.	1h 43m
		2. Make predictions about natural phenomena occurring during the cell cycle.	
		3. Construct an explanation about how DNA is transmitted to the next generation via mitosis or meiosis.	
		4. Evaluate evidence provided by data sets to support the claim that inheritable information is passed from one generation to the next.	
		5. Construct a representation that connects the process of meiosis to the passage of traits from parent to offspring.	
	Reading Lesson – Chapter 11 (Mendel and the Gene Idea)		16m
	Mendelian Inheritance	1. Use the chi-square test to analyze data.	1h 56m
		2. Describe features and processes that support the idea of common ancestry for all organisms.	
		3. Analyze transmission of traits using probability rules.	
		4. Examine Gregor Mendel's experiments.	
		5. Explain Mendel's laws of inheritance.	
	Reading Lesson – Chapter 12 (The Chromosomal Basis of Inheritance)		16m
	Non-Mendelian Inheritance	1. Use statistical analysis to show the trait ratios of non-Mendelian inheritance patterns.	1h 57m
		2. Describe inheritance patterns that deviate from the Mendelian model of inheritance.	
		3. Describe how non-nuclear genes are transmitted.	
		4. Examine sex-linked inheritance.	
	Effect of the Environment on Phenotype	1. Describe how environmental conditions affect gene expression.	8m
		2. Examine examples of how the environment affects phenotype.	
	Chromosomal Inheritance	1. Examine the effect of changes in the structure and number of human chromosomes.	1h 55m
		2. Connect chromosomal behavior to the transmission pattern of genes.	
		3. Explain how chromosomal inheritance produces genetic variation in sexual reproduction.	
	Unit 5 Test	1. Describe similarities and/or differences between the phases and outcomes of mitosis and meiosis.	40m
		2. Explain how meiosis results in the transmission of chromosomes from one generation to the next.	
		3. Explain how the same genotype can result in multiple phenotypes under different environmental conditions.	
		4. Explain how shared, conserved, fundamental processes and features support the concept of common ancestry for all organisms.	
		5. Explain the inheritance of genes and traits as described by Mendel's laws.	
		6. Explain how the process of meiosis generates genetic diversity.	
		7. Explain how chromosomal inheritance generates genetic variation in sexual reproduction.	
		8. Explain deviations from Mendel's model of the inheritance of traits (i.e., non-Mendelian genetics).	
	Introduction to Unit 6		1m
	DNA and RNA Structure	1. Relate the structure and characteristics of the inheritance molecules to their function.	19m
		2. Compare the inheritance structures of prokaryotic and eukaryotic organisms.	
		3. Describe how scientists identified the main molecules involved in the inheritance of genetic information.	
	Reading Lesson – Chapter 13 (The Molecular Basis of Inheritance)		16m
	DNA Replication	1. Describe the mechanisms involved in DNA replication.	1h 54m
		2. Explain how errors in the DNA replication process are corrected.	
		3. Differentiate DNA replication models.	
	Transcription and RNA Processing	1. Outline the flow of genetic information in protein synthesis.	23m
		2. Describe the structures of DNA and RNA.	
		3. Outline the flow of genetic information in protein synthesis.	
		4. Describe the steps involved in transcription.	
		5. Explain how mRNA is processed in eukaryotic cells.	
		6. Distinguish the three types of RNA in protein synthesis.	
	Reading Lesson – Chapter 14 (Gene Expression from Gene to Protein)		16m
	Translation	1. Explain how genetic information flows in retroviruses.	1h 52m
		2. Compare prokaryotic and eukaryotic translation.	
		3. Describe the features and steps of translation.	

Gene Expression	Reading Lesson – Chapter 15 (Regulation of Gene Expression)		16m
	Gene Expression Regulation	1. Explain the interactions involved in gene expression regulation.	38m
		2. Describe prokaryotic and eukaryotic gene expression regulation.	
	Cell Specialization	1. Relate gene expression regulation to phenotypic differences in cells and organisms.	31m
		2. Describe how transcription factors and promoters affect gene expression and the phenotype of an organism.	
	Mutations	1. Explain how mutations occur.	1h 59m
		2. Differentiate the types of mutations.	
		3. Analyze how mutations influence an organism's ability to survive and reproduce.	
		4. Describe how mutations affect the phenotypes of organisms.	
	Biotechnology	1. Explain how common genetic engineering techniques are used.	13m
		2. Describe the importance of biotechnology.	
	Lab: Biotechnology	1. Justify the claim that heritable information can be manipulated.	1h 39m
		2. Explain how heritable information can be manipulated using common genetic engineering techniques.	
		3. Use genetic engineering techniques to analyze genetic fingerprints.	
		4. Apply mathematical processes to solve a problem.	
		5. Identify and question ethical, social, or medical issues surrounding human genetic disorders.	
	Unit 6 Test	1. Describe the types of interactions that regulate gene expression	40m
		2. Describe the structures involved in passing hereditary information from one generation to the next	
		3. Describe the mechanisms by which genetic information flows from DNA to RNA to protein.	
		4. Describe the characteristics of DNA that allow it to be used as the hereditary material.	
		5. Describe the mechanisms by which genetic information is copied for transmission between generations.	
		6. Describe how the phenotype of an organism is determined by its genotype.	
		7. Describe the various types of mutation.	
		8. Explain how the location of regulatory sequences relates to their function.	
		9. Describe the various types of mutation.	
		10. Explain the connection between the regulation of gene expression and phenotypic differences in cells and organisms.	
		11. Explain how the binding of transcription factors to promoter regions affects gene expression and/or the phenotype of the organism.	
		12. Explain how changes in genotype may result in changes in phenotype.	
		13. Explain the use of genetic engineering techniques in analyzing or manipulating DNA.	
		14. Explain how alterations in DNA sequences contribute to variation that can be subject to natural selection.	
	Introduction to Unit 7		1m
	Introduction to Natural Selection	1. Analyze how populations are affected by natural selection	17m
		2. Describe the conditions necessary for natural selection to occur.	
		3. Characterize evolution.	
	Natural Selection	1. Explain how natural selection acts on phenotypic variations in populations.	20m
		2. Explain how phenotypic variations affect the fitness of organisms in particular environments.	
		3. Describe how environmental changes apply selective pressures on populations.	
	Artificial Selection	1. Describe how humans change the diversity within populations.	16m
		2. Connect environmental changes to evolutionary changes in populations.	
	Virtual Lab: Artificial Selection	1. Model natural and artificial selection.	2h 7m
		2. Use data to support the claim that natural and artificial selection are mechanisms of evolution.	
		3. Analyze how natural selection affects populations.	
		4. Describe how humans can affect diversity within a population.	
		5. Relate evolutionary changes to changes in the environment.	
		6. Apply mathematical methods and conceptual knowledge to investigate the cause and effect of natural and artificial selection.	
	Reading Lesson – Chapter 21 (The Evolution of Populations)		16m
	Evolution of Populations	1. Analyze how random occurrences cause the evolution of populations.	27m

Evolution and Genetic Diversity	Evolution of Populations	2. Describe how changes in genetic variation affect populations.	27m
	Hardy-Weinberg Equilibrium	1. Use the Hardy Weinberg equation to calculate allele frequencies.	38m
		2. Describe the effects of disturbing a population in Hardy-Weinberg equilibrium.	
		3. Characterize a population in Hardy-Weinberg equilibrium.	
	Virtual Lab: Hardy-Weinberg	1. Model a population in Hardy-Weinberg equilibrium.	1h 48m
		2. Use data from a simulation to analyze how natural selection, migration, and genetic drift affect allele and genotype frequencies.	
		3. Use data as evidence to justify that natural selection, migration, and genetic drift are mechanisms of evolution.	
		4. Analyze the mechanisms that disrupt a population in Hardy-Weinberg equilibrium.	
	Evidence for Evolution	1. Relate the shared features of the domains of life to common ancestry.	1h 54m
		2. Describe the types of data used to support evolution.	
		3. Analyze how data serves as evidence that evolution has occurred.	
	Reading Lesson-Chapter 23 (Broad Patterns of Evolution)		16m
	Common Ancestry	1. Differentiate the domains of life.	21m
		2. Provide evidence for common ancestry in eukaryotes.	
	Continuing Evolution	1. Create a timeline to represent evolutionary history.	1h 51m
		2. Analyze evidence that shows that life on Earth continues to evolve.	
	Reading Lesson - Chapter 20 (Phylogeny)		16m
	Phylogeny	1. Analyze phylogenetic trees and cladograms.	1h 58m
		2. Describe phylogenetic trees and cladograms.	
		3. Create phylogenetic trees and cladograms.	
	Reading Lesson - Chapter 22 (The Origin of Species)		16m
	Speciation	1. Describe conditions that lead to the appearance of new species.	23m
		2. Define species and speciation.	
		3. Examine the effect of ecological conditions on evolution and speciation.	
		4. Describe the mechanisms involved in speciation.	
	Extinction	1. Analyze how extinction affects species diversity.	1h 45m
		2. Examine the causes and effects of extinctions.	
	Variations in Populations	1. Explain how different selective pressures affect populations in varying environmental conditions.	34m
		2. Analyze the role genetic diversity plays in a population's ability to survive environmental changes.	
	Origin of Life on Earth	1. Analyze the scientific evidence that supports the origin of life models.	1h 47m
		2. Describe the models used to explain the origin of life on Earth.	
	Unit 7 Test	1. Describe the scientific evidence that provides support for models of the origin of life on Earth.	40m
		2. Explain how the risk of extinction is affected by changes in the environment.	
		3. Describe the fundamental molecular and cellular features shared across all domains of life, which provide evidence of common ancestry.	
		4. Describe the conditions under which new species may arise.	
		5. Explain how morphological, biochemical, and geologic data provide evidence that organisms have changed over time.	
		6. Explain how a phylogenetic tree and/or cladogram can be used to infer evolutionary relatedness.	
		7. Explain the processes and mechanisms that drive speciation.	
		8. Describe the change in the genetic makeup of a population over time.	
		9. Describe the importance of phenotypic variation in a population	
		10. Explain how random occurrences affect the genetic makeup of a population	
		11. Explain how natural selection affects populations	
		12. Explain the impacts on the population if any of the conditions of Hardy-Weinberg are not met.	
		13. Describe the conditions under which allele and genotype frequencies will change in populations	
		14. Describe the types of evidence that can be used to infer an evolutionary relationship	
		15. Explain the relationship between changes in the environment and evolutionary changes in the population.	
		16. Describe the rate of evolution and speciation under different ecological conditions.	

		17. Explain how evolution is an ongoing process in all living organisms.	
		18. Explain how the genetic diversity of a species or population affects its ability to withstand environmental pressures	
		19. Describe the causes of natural selection.	
Ecology	Introduction to Unit 8		1m
	Responses	1. Describe ways organisms respond to stimuli, and how specific responses increase fitness.	31m
		2. Describe ways organisms respond to stimuli, and how specific responses increase fitness.	
		3. Explain the ways that organisms learn and cooperate, and how these behaviors increase fitness.	
	Lab: Response to the Environment	1. Design a controlled experiment to determine how an organism responds to environmental changes.	1h 42m
		2. Investigate the relationship between the behavior of an organism and its environment.	
		3. Describe how the behavioral and physiological responses of an organism affect its overall fitness.	
	Reading Lesson - Chapter 42 (Ecosystems and Energy)		16m
	Energy Flow	1. Describe the role of autotrophs and heterotrophs in the flow of energy within an ecosystem.	29m
		2. Analyze how changes in energy availability affect organisms, populations, and ecosystems.	
		3. Explain the strategies used by organisms to obtain and use energy.	
	Lab: Energy Flow through Ecosystems	1. Analyze energy flow using mathematical models.	3h 10m
		2. Explain energy dynamics including productivity and community interactions.	
		3. Design and conduct an experiment to investigate energy flow through ecosystems.	
	Reading Lesson - Chapter 40 (Population Ecology and the Distribution of Organisms)		16m
	Population Ecology	1. Examine the factors that influence population growth dynamics.	1h 54m
		2. Use mathematical and graphical models to analyze population growth.	
	Density of Populations	1. Examine the relationship between the density of a population and resource availability.	26m
		2. Use a mathematical model to show a change in a population size over time.	
	Reading Lesson - Chapter 41 (Ecological Communities)		16m
	Community Ecology	1. Analyze how interactions within and between populations affect community structure.	50m
		2. Explain the relationship between community structure and energy availability.	
		3. Describe the structure of a community based on its species composition and diversity.	
	Reading Lesson-Chapter 43 (Conservation Biology and Global Change)		16m
	Biodiversity	1. Describe factors that help maintain diversity in an ecosystem.	31m
		2. Explain how a change in a component of an ecosystem affects the structure of the ecosystem.	
		3. Relate the diversity of an ecosystem to its ability to withstand environmental changes.	
	Changes in Ecosystems	1. Explain how ecosystems change as a result of geological and meteorological events.	1h 58m
		2. Examine the effect of invasive species on ecosystems.	
		3. Analyze how human activities affect ecosystems.	
		4. Describe the interaction between the environment and variations in populations.	
	Unit 8 Test	1. Explain how the behavioral responses of organisms affect their overall fitness and may contribute to the success of the population.	40m
		2. Explain how the behavioral and/or physiological response of an organism is related to changes in internal or external environment	
		3. Describe the relationship between ecosystem diversity and its resilience to changes in the environment.	
		4. Explain how geological and meteorological activity leads to changes in ecosystem structure and/or dynamics.	
		5. Explain how the addition or removal of any component of an ecosystem will affect its overall short-term and long-term structure.	
		6. Describe human activities that lead to changes in ecosystem structure and/or dynamics.	
		7. Explain how the density of a population affects and is determined by resource availability in the environment.	
		8. Explain how interactions within and among populations influence community structure	
		9. Describe factors that influence growth dynamics of population	
		10. Explain how the activities of autotrophs and heterotrophs enable the flow of energy within an ecosystem.	
		11. Explain how community structure is related to energy availability in the environment.	
		12. Explain the interaction between the environment and random or preexisting variations in populations.	
		13. Explain how invasive species affect ecosystem dynamics.	

		14. Explain how changes in energy availability affect populations and ecosystems	
		15. Describe the structure of a community according to its species composition and diversity.	
		16. Describe the strategies organisms use to acquire and use energy.	
Cumulative Exam II	Cumulative Exam II	1. Describe the types of interactions that regulate gene expression.	1h 15m
		2. Explain how shared, conserved, fundamental processes and features support the concept of common ancestry for all organisms.	
		3. Explain the inheritance of genes and traits as described by Mendel's laws.	
		4. Explain how humans can affect diversity within a population.	
		5. Explain how changes in genotype may result in changes in phenotype.	
		6. Explain how meiosis results in the transmission of chromosomes from one generation to the next.	
		7. Explain how the location of regulatory sequences relates to their function.	
		8. Explain how alterations in DNA sequences contribute to variation that can be subject to natural selection.	
		9. Describe the role of random processes in the evolution of specific populations.	
		10. Describe the types of data that provide evidence for evolution.	
		11. Describe the structures involved in passing hereditary information from one generation to the next.	
		12. Describe the mechanisms by which genetic information flows from DNA to RNA to protein.	
		13. Explain how the process of meiosis generates genetic diversity.	
		14. Explain the use of genetic engineering techniques in analyzing or manipulating DNA.	
		15. Describe the mechanisms by which genetic information is copied for transmission between generations.	
		16. Explain how morphological, biochemical, and geologic data provide evidence that organisms have changed over time.	
		17. Explain deviations from Mendel's model of the inheritance of traits (i.e. non-Mendelian genetics).	
		18. Describe how the phenotype of an organism is determined by its genotype.	
		19. Explain the impacts on the population if any of the conditions of Hardy-Weinberg are not met.	
		20. Explain the connection between the regulation of gene expression and phenotypic differences in cells and organisms.	
		21. Explain how the binding of transcription factors to promoter regions affects gene expression and/or the phenotype of the organism.	
		22. Explain how chromosomal inheritance generates genetic variation in sexual reproduction.	
		23. Describe the conditions under which allele and genotype frequencies will change in populations.	
		24. Describe the conditions under which new species may arise.	
		25. Explain how the density of a population affects and is determined by resource availability in the environment.	
		26. Explain how invasive species affect ecosystem dynamics.	
		27. Describe human activities that lead to changes in ecosystem structure and/or dynamics.	
		28. Explain how a phylogenetic tree and/or cladogram can be used to infer evolutionary relatedness.	
		29. Describe the types of evidence that can be used to infer an evolutionary relationship.	
		30. Explain how changes in energy availability affect populations and ecosystems.	
		31. Describe factors that lead to the extinction of a population.	
		32. Explain how the behavioral responses of organisms affect their overall fitness and may contribute to the success of the population.	
		33. Describe factors that influence growth dynamics of population.	
		34. Explain species diversity in an ecosystem as a function of speciation and extinction rates.	
		35. Explain how extinction can make new environments available for adaptive radiation.	
		36. Describe the scientific evidence that provides support for models of the origin of life on Earth.	
		37. Describe structural and functional evidence on cellular and molecular levels that provides evidence for the common ancestry of all eukaryotes.	
		38. Describe the relationship between ecosystem diversity and its resilience to changes in the environment.	
		39. Describe the rate of evolution and speciation under different ecological conditions.	
		40. Explain how the activities of autotrophs and heterotrophs enable the flow of energy within an ecosystem.	
		41. Explain how the behavioral and/or physiological response of an organism is related to changes in internal or external environment.	
		42. Explain the interaction between the environment and random or preexisting variations in populations.	
		43. Describe the strategies organisms use to acquire and use energy.	
		1. List the components of the AP Biology exam.	

Review	Taking the AP Exam	2. Describe how to prepare for the AP Biology exam.	16m
		3. Analyze exam questions.	
	Review Units 1 - 2		21m
	Review Units 3 - 4		19m
	Review Units 5 - 6		11m
	Review Units 7 - 8		11m
	AP Biology Practice Exam I		1h 48m
	AP Biology Practice Exam II		1h 48m