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Advanced Placement* CORRELATION GUIDE

Biology

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AP Biology, Effective Fall 2020

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Topic Name	Enduring Understanding	

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1.5: Structure and Function of Biological Macromolecules	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	SYI-1.C: Explain how a change in the subunits of a polymer may lead to changes in structure or function of the macromolecule.	SYI-1.C.1: Directionality of the subcompone 704 3188 (s)-90 (t)1 ructure and unc io of th 15478 (e)-3.2 (p)781 (o)5.9 l me				

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1.6: Nucleic Acids	IST-1: Heritable information provides for continuity of life.	IST-1.A: Describe the structural similarities and differences between DNA and RNA.	IST-1.A.1: DNA and RNA molecules have structural similarities and differences related to their function –	Chapter 3	50-51	2.A: Describe relationships between components of a visual representation (of a concept, process, or model).	Chapter 3, p. 54, AP Assessment, q. 7
			a. Both DNA and RNA have three components—sugar, a phosphate group, and a nitrogenous base—that form nucleotide units that are connected by covalent bonds to form a linear molecule with 5' and 3' ends, with the nitrogenous bases perpendicular to the sugar-phosphate backbone.	Chapter 3; Chapter 12	50-51; 203-205		
			b. The basic structural differences between DNA and RNA include the following-- i. DNA contains deoxyribose and RNA contains ribose. ii. RNA contains uracil and DNA contains thymine. iii. DNA is usually double stranded; RNA is usually single stranded. iv. The two DNA strands in double-stranded DNA are antiparallel in directionality.	Chapter 3			

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			SYI-1.D.6: Lysosomes are membrane-enclosed sacs that contain hydrolytic enzymes.				

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			SYI-1.F.4:Membranes contain chlorophyll pigments and electron transport proteins that comprise the photosystems.	Chapter 4; Chapter 7			

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			ENE-1.B.2: The surface area of the plasma membrane must be large enough to adequately exchange materials–	Chapter 4	Chapter 4		
			a. These limitations can restrict cell size and shape. Smaller cells typically have a higher surface area-to-volume ratio and more efficiently exchange materials with the environment.	Chapter 4	57		
			b. As cells increase in volume, the relative surface area decreases and the demand for internal resources increases.	Chapter 4; Chapter 25; Chapter 34	57; 457-458; 627-628		
			c. More complex cellular structures (e.g., membrane folds) are necessary to adequately exchange materials with the environment.	Chapter 4; Chapter 34	57, 60, 62, 65, 70; 627-628		
			d.				

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2.9: Mechanisms of Transport	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	ENE-2.J: Describe the processes that allow ions and other molecules to move across membranes.	ENE-2.J.1: A variety of processes allow for the movement of ions and other molecules across membranes, including passive and active transport, endocytosis and exocytosis.	Chapter 5	82-92	1.B: Explain biological concepts and/or processes.	Chapter 5, p. 91, Check Your Progress, q. 1
2.10: Cell Compartmentalization	ENE-2: Cells have membranes that allow them to establish and maintain internal environments that are different from their external environments.	ENE-2.K: Describe the membrane-bound structures of the eukaryotic cell.	ENE-2.K.1: Membranes and membrane-bound organelles in eukaryotic cells compartmentalize intracellular metabolic processes and specific enzymatic reactions.	Chapter 4	62-76	6.E.a: Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on biological concepts or processes.	Chapter 4, p. 78, AP Assessment, q. [redacted]

Unit 3: Cellular Energetics
12-16%

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
3.1: Enzyme Structure	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	ENE-1.D: Describe the properties of enzymes.	ENE-1.D.1: The structure of enzymes includes the active site that specifically interacts with substrate molecules.	Chapter 6	101-103	1.B: Explain biological concepts and/or processes.	Chapter 6, p. 105, Check Your Progress, q. 2, 3
			ENE-1.D.2: For an enzyme-mediated chemical reaction to occur, the shape and charge of the substrate must be compatible with the active site of the enzyme.	Chapter 6	103-105		
3.2: Enzyme Catalysis4 -0 0 8.04 27 39							

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Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
3.6: Cellular Respiration	ENE-1: The highly complex organization of living systems requires constant inp.005 Tc 0.001 onTzatin						

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		ENE-1.L:Explain how cells obtain energy from biological macromolecules in order to power					

Unit 4: Cell Communication and Cell Cycle
10-15%

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
4.2: Introduction to Signal Transduction	IST-3: Cells communicate by generating, transmitting, and receiving chemical signals.						

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Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
4.3: Signal Transduction	IST-3: Cells communicate by generating, transmitting, receiving, and responding to chemical signals.	IST-3.E: Describe the role of the environment in eliciting a cellular response.	IST-3.E.1:Signal transduction pathways influence how the cell responds to its en				

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4.7: Regulation of Cell Cycle	IST-1: Heritable information provides for continuity of life.	IST-1.D: Describe the role of checkpoints in regulating the cell cycle.	IST-1.D.1: A number of internal controls or checkpoints regulate progression through the cycle. IST-1.D.2:	Chapter 9	143-144, 152-155	6.E.b: Predict the causes or effects of a change in, or disruption to, one or more components in a biological system based on a visual representation of a biological concept, process, or model.	Chapter 9, p. 144, Question to Consider, q. 1

Unit 5:

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
			IST-1.J.3:Many traits are the product of multiple genes and/or physiological processes acting in combination; these traits therefore do not segregate in Mendelian patterns.	Chapter 11; Chapter 16	193-194; 280	5.A.b:	

Unit 6: Gene Expression and Regulation
12-16%

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Topic Name # of Class Periods	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
		IST-2.D: Explain the connection between the regulation of gene expression and phenotypic differences in cells and organisms.					

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers

Unit 7: Natural Selection
13-20%

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
7.1: Introduction to Natural Selection	EVO-1: Evolution is characterized by a change in th9.2 (i)-1T4S6d8 147.6 814.8 (v)47.6 81 (s.2 (i)--0 0 8.0(h)-5.2 (an)-6O)]TJ ETf k.6 (u).2 (i)-2.5 (t)-p3.3 (u of3 (Q qaBT /T10 1 (l19 TD (hp6 814.op6 814.2.5 (t)-9.2 (8u)-6.2 (on)-6.2 ( )15.1 (t)-9o.9 BT /).2 (i)--3.9 (S -0 0 8.0(						

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Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
7.5: Hardy-Weinberg Equilibrium	EVO-1: Evolution is characterized by a change in the genetic makeup of a population over time and is supported by multiple lines of evidence.	EVO-1.K: Describe the conditions under which allele and genotype frequencies will change in populations.	Illustrative Example– · Graphical analysis of allele frequencies in a population.	Chapter 16	275-276	1.C: Explain biological concepts, processes, and/or models in applied contexts.	Chapter 16, p. 279, Check Your Progress, q. 1
		EVO-1.L: Explain the impacts on the population if any of the conditions of Hardy-Weinberg are not met.	EVO-1.L.1: Changes in allele frequencies provide evidence for the occurrence of evolution in a population.	Chapter 16	274-287	5.A.a: Perform mathematical calculations, including mathematical equations in the curriculum.	Chapter 16, p. 288, AP Assessment, q. 2
			EVO-1.L.2: Small populations are more susceptible to random environmental impact than large populations.	Chapter 15; Chapter 16	256-270; 274-287	1.C: Explain biological concepts, processes, and/or models in applied contexts.	Chapter 16, p. 288, AP Assessm6

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7.13: Origins of Life on Earth	SYI-3: Naturally occurring diversity						

Unit 8: Ecology
10-15%

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8.1: Responses to the Environment	ENE-3: Timing and coordination of biological mechanisms involved in growth, reproduction, and homeostasis depend on organisms responding to environmental cues.	ENE-3.D: Explain how the behavioral and/or physiological response of an organism is related to changes in internal or external environment.	ENE-3.D.1: Organisms respond to changes in their				

Topic Name	

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8.2: Energy Flow through Ecosystems	ENE-1: The highly complex organization of living systems requires constant input of energy and the exchange of macromolecules.	ENE-1.M: Describe the strategies organisms use to acquire and use energy.	ENE-1.M.1: Organisms use energy to maintain organization, grow, and reproduce– a. Organisms use different strategies to regulate body	Chapter 4; Chapter 6; Chapter 45	71-72; 97-98; 842-847	6.D: Explain the relationship between experimental results and larger biological concepts, processes, or theories.	Chapter 43, p. 805, AP Assessment, q. 9

Topic Name	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
			ENE-1.N.2: Changes in energy availability can result in disruptions to an ecosystem–	Chapter 45	844-847	6.D: Explain the relationship between experimental results and larger biological concepts, processes, or theories.	Chapter 45, p. 856, AP Assessment, q. 11
			a. A change in energy resources such as sunlight can affect the number and size of the trophic levels.	Chapter 45; Chapter 46	845-846; 875		
			b. A change in the producer level can affect the number and size of other trophic levels.	Chapter 45	844-846		
		ENE-1.O: Explain how the activities of autotrophs and heterotrophs enable the flow of energy within an ecosystem.	ENE-1.O.1: Autotrophs capture energy from physical or chemical sources in the environment–	Chapter 7; Chapter 45	110; 843, 845		Chapter 22, p. 401, AP Assessment, q. 4
			a. Photosynthetic organisms capture energy present in sunlight.	Chapter 7	110-112		
			b. Chemosynthetic organisms capture energy from small inorganic molecules present in their environment, and this process can occur in the absence of oxygen.	Chapter 18; Chapter 45	315; 843		
			ENE-1.O.2: Heterotrophs capture energy present in carbon compounds produced by other organisms–	Chapter 7; Chapter 45	110; 843-844		
			a. Heterotrophs may metabolize carbohydrates, lipids, and proteins as sources of energy by hydrolysis.	Chapter 3	36-37		
8.3: Population Ecology	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	SYI-1.G: Describe factors that influence growth dynamics of populations.	SYI-1.G.1:				

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			i. Reproduction without constraints results in the exponential growth of a population.	Chapter 44	813-817	4.A: Construct a graph, plot, or chart.	Chapter 44, p. 815, Check Your Progress q. 1; Chapter 44, p. 829, AP Assessment, q. 9
8.4: Effect of Density on Populations	SYI-1: Living systems are organized in a hierarchy of structural levels that interact.	SYI-1.H: Explain how the density of a population affects and is determined by resource availability in the environment.	SYI-1.H.1: A population can produce a density of individuals that exceeds the system's resource availability.	Chapter 44	816-817		

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Topic Name # of Class Periods	Enduring Understanding	Learning Objective	Essential Knowledge	Chapter	Page Numbers	Suggested Skills	Page Numbers
	SYI-2: Competition and cooperation are important aspects of biological						