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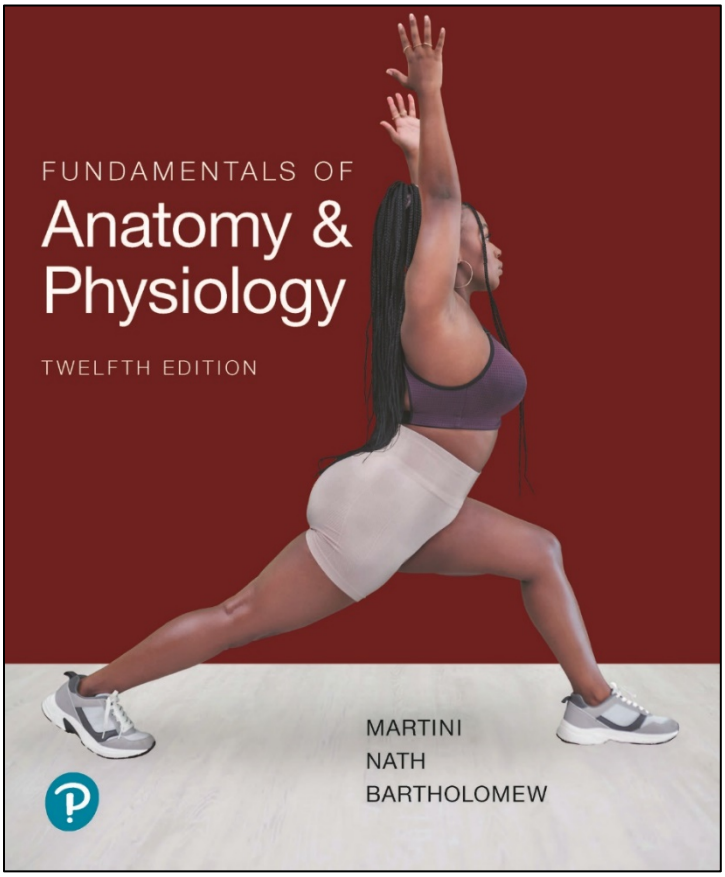

To the

Next Generation Science Standards Performance Expectation for Life Science High School

Pearson

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A Correlation of *Fundamentals of Anatomy & Physiology, 12th Edition,* © 2024 to the NGSS Performance Expectations for Life Science, High School

NGSS Performance Expectations for Life Science, High School	*Fundamentals of Anatomy & Physiology, 12th Edition,* © 2024
(HS-LS1) From Molecules to Organisms: Structures and Processes	
(HS-LS1-1) Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	**Chapter 2 The Chemical Level of Organization** Lesson 2- 13 DNA and RNA are nucleic acids, pp. 57-59 **Chapter 3 The Cellular Level of Organization** Lesson 3- 2 Organelles within the cytoplasm perform particular Functions, pp. 71-83 Lesson 3- 3 The nucleus contains DNA and enzymes essential for controlling cellular activities, pp. 83-85 Lesson 3- 4 DNA controls protein synthesis, cell structure, and cell function, pp. 85-90
(HS-LS1-2) Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**Chapter 1 An Introduction to Anatomy and Physiology** Lesson 1- 3 Levels of organization progress from chemicals to a complete organism, pp. 6-7 **Chapter 3 The Cellular Level of Organization** Lesson 3- 2 Organelles within the cytoplasm perform particular functions, pp. 71-83
(HS-LS1-3) Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	**Chapter 1 An Introduction to Anatomy and Physiology** Lesson 1- 7 Physiological processes continuously regulate homeostasis, pp. 18-19 Lesson 1- 8 Negative feedback opposes variations from normal, whereas positive feedback enhances them, pp. 19-23 **Chapter 2 The Chemical Level of Organization** Lesson 2- 7 Body fluid pH is vital for homeostasis, pp. 43-44 **Chapter 18 The Endocrine System** Lesson 18- 1 Homeostasis is maintained through intercellular communication by the nervous and endocrine systems, pp. 611-613
(HS-LS1-4) Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	**Chapter 3 The Cellular Level of Organization** Lesson 3- 8 Stages of the cell life cycle include interphase, mitosis, and cytokinesis, pp. 102-103 Lesson 3- 9 Several factors regulate the cell life cycle, pp. 103-107 Lesson 3- 11 Cellular differentiation is cellular specialization as a result of gene activation or repression, pp. 109-110
(HS-LS1-5) Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	For supporting content, please see: **Chapter 2 The Chemical Level of Organization** Lesson 2-10 Carbohydrates contain carbon, hydrogen, and oxygen in a 1:2:1 ratio, pp. 45-47

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(HS-LS1-6) Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	**Chapter 2 The Chemical Level of Organization** Lesson 2- 2 Chemical bonds are forces formed by interactions between atoms, pp. 32-37 Lesson 2- 3 Decomposition, synthesis, and exchange reactions are important types of chemical reactions in physiology, pp. 37-39 Lesson 2- 4 Enzymes speed up reactions by lowering the energy needed to start them, pp. 39-40 Lesson 2- 9 Living things contain organic compounds made up of monomers, polymers, and functional groups, p. 45 Lesson 2- 10 Carbohydrates contain carbon, hydrogen, and oxygen in a 1:2:1 ratio, pp. 45-47 Lesson 2- 11 Lipids often contain a carbon-to-hydrogen ratio of 1:2, pp. 47-51 Lesson 2- 12 Proteins contain carbon, hydrogen, oxygen, and nitrogen and are formed from amino acids, pp. 51-57 Lesson 2- 13 DNA and RNA are nucleic acids, pp. 57-59 **Chapter 3 The Cellular Level of Organization** Lesson 3- 2 Organelles within the cytoplasm perform particular Functions, pp. 71-83 Lesson 3- 4 DNA controls protein synthesis, cell structure, and cell function, pp. 85-90
(HS-LS1-7) Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.	**Chapter 2 The Chemical Level of Organization** Lesson 2-3 Decomposition, synthesis, and exchange reactions are important types of chemical reactions in physiology, pp. 37-39 Lesson 2-4 Enzymes speed up reactions by lowering the energy needed to start them, pp. 39-40 Lesson 2-10 Carbohydrates contain carbon, hydrogen, and oxygen in a 1:2:1 ratio, pp. 45-47 Lesson 2- 11 Lipids often contain a carbon-to-hydrogen ratio of 1:2, pp. 47-51 Lesson 2-14 ATP is a high-energy compound used by cells, pp. 59-61 **Chapter 24 The Digestive System** Lesson 24- 8 Chemical digestion is the enzyme-mediated hydrolysis of food into nutrients that can be absorbed and used by the body, pp. 926-931 **Chapter 25 Metabolism, Nutrition, and Energetics** Lesson 25- 1 Metabolism is the sum of all the catabolic and anabolic reactions in the body, and energetics is the flow and transformation of energy, pp. 940-943 Lesson 25- 2 Carbohydrate metabolism generates ATP by glucose catabolism and forms glucose by gluconeogenesis, pp. 943-951 Lesson Spotlights: The Electron Transport Chain and ATP Formation, p. 947

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(HS-LS2) Ecosystems: Interactions, Energy, and Dynamics	
(HS-LS2-1) Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	For supporting content, please see: **Chapter 25 Metabolism, Nutrition, and Energetics** Lesson 25- 1 Metabolism is the sum of all the catabolic and anabolic reactions in the body, and energetics is the flow and transformation of energy, pp. 943-951 Lesson 25- 7 Metabolic rate is the average caloric expenditure, and thermoregulation involves balancing heat-producing and heat-losing mechanisms, pp. 966-972
(HS-LS2-3) Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.	For supporting content, please see: **Chapter 2 The Chemical Level of Organization** Lesson 2-3 Decomposition, synthesis, and exchange reactions are important types of chemical reactions in physiology, pp. 37-39 Lesson 2-14 ATP is a high-energy compound used by cells, pp. 59-61 **Chapter 10 Muscle Tissue** 10- 7 To maintain regular muscle fiber activity, energy and recovery are required, pp. 319-323 **Chapter 23 The Respiratory System** Lesson 23- 6 External respiration and internal respiration allow gas exchange within the body, pp. 851-852 Lesson 23- 7 Pulmonary ventilation—air exchange between the atmosphere and the lungs—involves muscle actions and volume changes that cause pressure changes, pp. 852-860 **Chapter 24 The Digestive System** Lesson 24- 8 Chemical digestion is the enzyme-mediated hydrolysis of food into nutrients that can be absorbed and used by the body, pp. 926-931 **Chapter 25 Metabolism, Nutrition, and Energetics** Lesson 25- 1 Metabolism is the sum of all the catabolic and anabolic reactions in the body, and energetics is the flow and transformation of energy, pp. 940-943 Lesson 25- 2 Carbohydrate metabolism generates ATP by glucose catabolism and forms glucose by gluconeogenesis, pp. 943-951

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(HS-LS2-5) Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	For supporting content, please see: **Chapter 2 The Chemical Level of Organization** Lesson 2-3 Decomposition, synthesis, and exchange reactions are important types of chemical reactions in physiology, pp. 37-39 Lesson 2-14 ATP is a high-energy compound used by cells, pp. 59-61 **Chapter 23 The Respiratory System** Lesson 23- 6 External respiration and internal respiration allow gas exchange within the body, pp. 851-852 Lesson 23- 7 Pulmonary ventilation—air exchange between the atmosphere and the lungs—involves muscle actions and volume changes that cause pressure changes, pp. 852-860 **Chapter 24 The Digestive System** Lesson 24- 8 Chemical digestion is the enzyme-mediated hydrolysis of food into nutrients that can be absorbed and used by the body, pp. 926-931 **Chapter 25 Metabolism, Nutrition, and Energetics** Lesson 25- 1 Metabolism is the sum of all the catabolic and anabolic reactions in the body, and energetics is the flow and transformation of energy, pp. 940-943 Lesson 25- 2 Carbohydrate metabolism generates ATP by glucose catabolism and forms glucose by gluconeogenesis, pp. 943-951
(HS-LS3) Heredity: Inheritance and Variation of Traits	
(HS-LS3-1) Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	**Chapter 3 The Cellular Level of Organization** Lesson 3- 3 The nucleus contains DNA and enzymes essential for controlling cellular activities, pp. 83-85 Lesson 3- 4 DNA controls protein synthesis, cell structure, and cell function, pp. 85-90 Lesson 3- 8 Stages of the cell life cycle include interphase, mitosis, and cytokinesis, pp. 102-103 **Chapter 29 Development and Inheritance** Lesson 29- 1 Directed by inherited genes, a fertilized ovum differentiates during prenatal development to form an individual; postnatal development brings that individual to maturity, pp. 1104-1105 Lesson 29-9 Genes and chromosomes determine patterns of inheritance, pp. 1132-1141

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(HS-LS3-2) Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.	**SE/TE:** **Chapter 3 The Cellular Level of Organization** Lesson 3- 4 DNA controls protein synthesis, cell structure, and cell function, pp. 85-90 **Chapter 28 The Reproductive System** Lesson 28- 1 Male and female reproductive system structures produce gametes that combine to form a new individual, pp. 1056-1057 Lesson 28- 3 Spermatogenesis occurs in the testes, and hormones from the hypothalamus, pituitary gland, and testes control male reproductive functions, pp. 1065-1072 Lesson 28- 5 Oogenesis occurs in the ovaries, and hormones from the hypothalamus, pituitary gland, and ovaries control female reproductive functions, pp. 1082-1091 **Chapter 29 Development and Inheritance** Lesson 29- 1 Directed by inherited genes, a fertilized ovum differentiates during prenatal development to form an individual; postnatal development brings that individual to maturity, pp. 1104-1105 Lesson 29- 2 Fertilization—the fusion of a secondary oocyte and a sperm—forms a zygote, pp. 1105-1107 Lesson 29-9 Genes and chromosomes determine patterns of inheritance, pp. 1132-1141
(HS-LS4) Biological Evolution: Unity and Diversity	
(HS-LS4-2) Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	For supporting content, please see: **Chapter 3 The Cellular Level of Organization** Lesson 3- 4 DNA controls protein synthesis, cell structure, and cell function, pp. 85-90 **Chapter 28 The Reproductive System** Lesson 28- 1 Male and female reproductive system structures produce gametes that combine to form a new individual, pp. 1056-1057 Lesson 28- 3 Spermatogenesis occurs in the testes, and hormones from the hypothalamus, pituitary gland, and testes control male reproductive functions, pp. 1065-1072 Lesson 28- 5 Oogenesis occurs in the ovaries, and hormones from the hypothalamus, pituitary gland, and ovaries control female reproductive functions, pp. 1082-1091 **Chapter 29 Development and Inheritance** Lesson 29-9 Genes and chromosomes determine patterns of inheritance, pp. 1132-1141