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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
HAP.1 Physiological Functions/Anatomical Structure	Anatomists have developed a universal set of reference terms that aid in the identification of body structures with a high degree of specificity. Body organization from simple to complex levels and an introduction to the organ systems forming the body lead to a higher understanding of anatomical structures in the human body.	HAP.1 Students will demonstrate an understanding of how anatomical structures and physiological functions are organized and described using anatomical position.	HAP.1.1 Apply appropriate anatomical terminology when explaining the orientation of regions, directions, and body planes or sections.	1: The Human Body: An Orientation 1.5 Anatomical terms describe body directions, regions, and planes Page no. 12 Anatomical Position and Directional Terms Page no. 12 Figure 1.8 Regional terms used to designate specific body areas. Page no. 13 6: Bones and Skeletal Tissues 6.1 Hyaline, elastic, and fibrocartilage help form the skeleton Page no. 174 9: Muscles and Muscle Tissue 9.2 A skeletal muscle is made up of muscle fibers, nerves, blood vessels, and connective tissues Page no. 281 Self-Check: Section 9.2 Q. 2, 3 Page no. 284 20: The Lymphatic System and Lymphoid Organs and Tissues 20.1 The lymphatic system includes lymphatic vessels, lymph, and lymph nodes Page no. 768

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.1.2 Locate organs and their applicable body cavities and systems.	12: The Central Nervous System 12.1 Folding during development determines the complex structure of the adult brain Page no. 433 18: The Cardiovascular System: The Heart 18.1 The heart has four chambers and pumps blood through the pulmonary and systemic circuits Page no. 671 22: The Respiratory System Part 1 Functional Anatomy Figure 22.2 **The major respiratory organs in relation to surrounding structures.** Page no. 824
			HAP.1.3 Investigate the interdependence of the various body systems to each other and to the body as a whole.	1: The Human Body: An Orientation 1.1 Form (anatomy) determines function (physiology) Page no. 2 1.2 The body's organization ranges from atoms to the entire organism Page no. 4 1.3 What are the requirements for life? Figure 1.3 Examples of interrelationships among body organ systems. Page no. 5 Figure 1.4 The body's organ systems and their major functions Page no. 6

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HAP.2 Cells and Tissues	The smallest structural and functional unit of the human body is the cell. The cell is composed of organelles that perform varied but specific functions. Cells within the human body can metabolize, digest foods, dispose of waste, reproduce, grow, move, and respond to stimuli. Groups of cells that are similar in structure and function form the four types of tissues (epithelial, connective, nervous, and muscle) found in the human body.	HAP.2 Students will demonstrate an understanding of the relationship of cells and tissues that form complex structures of the body.	HAP.2.1 Analyze the characteristics of the four main tissue types: epithelial, connective, muscle, and nervous. Examine tissues using microscopes and other various technologies.	4: Tissue: The Living Fabric 4.1 Tissue samples are fixed, sliced, and stained for microscopy Page no. 117 4.2 Epithelial tissue covers body surfaces, lines cavities, and forms glands Page no. 117 4.3 Connective tissue is the most abundant and widely distributed tissue in the body Page no. 126 4.4 Muscle tissue is responsible for body movement Page no. 138 4.5 Nervous tissue is a specialized tissue of the nervous system Page no. 140
			HAP.2.2 Construct a model to demonstrate how the structural organization of cells in a tissue relates to the	4: Tissue: The Living Fabric Figure 4.4 Epithelial tissues. Page no. 119-120 Table 4.1

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			specialized function of that tissue.	**Comparison of Classes of Connective Tissues** Page no. 126 Figure 4.12 Muscle tissues. Page no. 138 Figure 4.13 Nervous tissue. Page no. 140
			HAP.2.3 Enrichment: Use an engineering design process to research and develop medications (i.e., targeted cancer therapy drugs) that target uncontrolled cancer cell reproduction.*	3: Cells: The Living Units 3.11 The cell cycle consists of interphase and a mitotic phase Control of Cell Division Page no. 98 3.13 Autophagy and proteasomes dispose of unneeded organelles and proteins; apoptosis disposes of unneeded cells Page no. 109 Check Your Understanding: Section 3.13 Q. 34 Page no. 109 Chapter 3: Review Questions Q. 19 Page no. 113
HAP.3 Integumentary System	The integumentary system is composed of epithelial membranes (i.e., skin epidermis, mucosae, and serosae). The connective-tissue synovial membranes	HAP.3 Students will investigate the structures and functions of the integumentary system,	HAP.3.1 Identify structures and explain the functions of the integumentary system, including layers of skin, accessory structures, and types of membranes.	5: The Integumentary System Introduction Page no. 150 5.1 The skin consists of two layers: the epidermis and dermis Figure 5.1 **Skin structure.** Page no. 151

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	cover, insulate, protect, and cushion body organs as well as the entire body. The integumentary system is critical to maintaining homeostasis using internal and external regulators.	including the cause and effect of diseases and disorders.		5.2 The epidermis is a keratinized stratified squamous epithelium Page no. 152 Layers of the Epidermis Page no. 153 Self-Check: Section 5.2 Page no. 154 5.3 The dermis consists of papillary dermis and reticular dermis Page no. 154 5.4 Melanin, carotene, and hemoglobin determine skin color Page no. 156 5.5 to 5.7 Page no. 157 to 163 (Hair, Nail, sweat glands) 5.8 First and foremost, the skin is a barrier Page no. 163
			HAP.3.2 Investigate specific mechanisms (e.g., feedback and temperature regulation) through which the skin maintains homeostasis.	5: The Integumentary System System Connections Homeostatic Interrelationships between the Integumentary System and Other Body Systems Page no. 169 Q. 19 Page no. 172
			HAP.3.3 Research and analyze the causes and effects of	5: The Integumentary System

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			various pathological conditions (e.g., burns, skin cancer, bacterial/viral infections, and chemical dermatitis).	5.9 Skin cancer and burns are major challenges to the body (Clinical) Page no. 165 Chapter 5: Related Clinical Terms Page no. 169 (includes infections and other skin conditions)
			HAP.3.4 Enrichment: Use an engineering design process to design and model/simulate effective treatments for skin disorders (e.g., tissue grafts).*	5: The Integumentary System 5.9 Skin cancer and burns are major challenges to the body (Clinical) Page no. 165 Treating Burns Page no. 167 Q. 25 Page no. 172 Clinical Case Study 21-Year-Old Female with Deep Lacerations Page no. 172
HAP.4 Skeletal System	The skeletal system is composed of cartilage and bone. Together these supportive tissues form the framework for the	HAP.4 Students will investigate the structures and functions of the skeletal system including	HAP.4.1 Use models to compare the structure and function of the skeletal system.	6: Bones and Skeletal Tissues 6.1 Hyaline, elastic, and fibrocartilage help form the skeleton Page no. 174 Figure 6.1 The bones and cartilages of the human skeleton. Page no. 174

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
	body. The skeletal system encloses organs, attaches skeletal muscles, and connects bone, forming joints to aid in movement.	the cause and effect of diseases and disorders.		6.2 Bones perform several important functions Page no. 175 Self-Check: Section 6.2 3. Which of the following is a function of red bone marrow? Page no. 176
			HAP.4.2 Develop and use models to identify and classify major bones as part of the appendicular or axial skeleton.	6: Bones and Skeletal Tissues 6.3 Bones are classified by their location and shape Figure 6.2 Classification of bones on the basis of shape. Page no. 176 Check Your Understanding: Section 6.1 6. What are the components of the axial skeleton? 7. Contrast the general function of the axial skeleton to that of the appendicular skeleton. 8. What bone class do the ribs and skull bones fall into? Page no. 176
			HAP.4.3 Identify and classify types of joints and their movement.	8: Joints 8.1 Joints are classified into three structural and three functional categories Page no. 251

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Table 8.1 Summary of Joint Classes Page no. 252 Check Your Understanding: Section 8.1 1. What functional joint class contains the least-mobile joints? 2. How are joint mobility and stability related? Page no. 252 Self-Check: Section 8.1 1. Which of the following is a functional classification of joints that have the least mobility? Page no. 252
			HAP.4.4 Demonstrate an understanding of the growth and development of the skeletal system, differentiating between endochondral and intramembranous ossification.	6: Bones and Skeletal Tissues 6.5 Bones develop either by intramembranous or endochondral ossification Page no. 184 Figure 6.9 Endochondral ossification in a long bone. Page no. 185 Figure 6.10 Intramembranous ossification. Page no. 186 Figure 6.11 Growth in length of a long bone occurs at the epiphyseal plate. Page no. 186

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Figure 6.12 Long bone growth and remodeling during youth. Page no. 187 Check Your Understanding: Section 6.5 Page no. 188 Self-Check: Section 6.5 Page no. 188
			HAP.4.5 Construct explanations detailing how mechanisms (e.g., Ca2+ regulation) are used by the skeletal system to maintain homeostasis.	6: Bones and Skeletal Tissues 6.6 Bone remodeling involves bone deposition and removal Page no. 188 Control of Remodeling Page no. 189 Figure 6.13 Parathyroid hormone (PTH) control of blood calcium levels. Page no. 189 Level 1 Remember/Understand Q. 6 Page no. 197 Q. 19 Page no. 198
			HAP.4.6 Research and analyze various pathological conditions (e.g., bone fractures, osteoporosis, bone cancers, various types of arthritis, and carpal tunnel syndrome).	6: Bones and Skeletal Tissues 6.8 Bone disorders result from abnormal bone deposition and resorption (Clinical) Page no. 193 Chapter 6: Related Clinical Terms Page no. 196 8: Joints

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				8.6 Joints are easily damaged by injury, inflammation, and degeneration (Clinical) Check Your Understanding: Section 8.6 Page no. 275 Self-Check: Section 8.6 Page no. 275
			HAP.4.7 Enrichment: Use an engineering design process to develop, model, and test effective treatments for bone disorders (i.e., prosthetics).*	8: Joints A Closer Look (Clinical) Joints: From Knights in Shining Armor to Bionic Humans Page no. 274 A hip prosthesis. Page no. 274
HAP.5 Muscular System	The muscular system, with the aid of three types of muscle tissue (skeletal, cardiac, and smooth), provides movement, contour and shape, joint stability, heat generation, and the transportation of materials throughout the body.	HAP.5 Students will investigate the structures and functions of the muscular system, including the cause and effect of diseases and disorders.	HAP.5.1 Develop and use models to illustrate muscle structure, muscle locations and groups, actions, origins, and insertions.	9: Muscles and Muscle Tissue 9.1 There are three types of muscle tissue Page no. 280 Check Your Understanding: Section 9.1 Page no. 281 9.2 A skeletal muscle is made up of muscle fibers, nerves, blood vessels, and connective tissues Page no. 281 Figure 9.1 Connective tissue sheaths of skeletal muscle: epimysium, perimysium, and endomysium. (b) Photomicrograph of a cross section of part of a skeletal muscle (30×). Page no. 282

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Table 9.1 Structure and Organizational Levels of Skeletal Muscle Page no. 283 Attachments Page no. 283 Check Your Understanding: Section 9.2 Page no. 284 Self-Check: Section 9.2 Page no. 284 10: The Muscular System 10.5 A muscle's attachments determine its action Page no. 332
			HAP.5.2 Describe the structure and function of the skeletal muscle fiber and the motor unit.	9: Muscles and Muscle Tissue 9.3 Skeletal muscle fibers contain calcium-regulated molecular motors Page no. 285 Figure 9.2 Microscopic anatomy of a skeletal muscle fiber. Page no. 285 Figure 9.3 Composition of thick and thin filaments. Page no. 286 Figure 9.5 **Relationship of the sarcoplasmic reticulum and T tubules to myofibrils of skeletal muscle.** Page no. 288 Figure 9.6

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Sliding filament model of contraction Page no. 289 9.4 Motor neurons stimulate skeletal muscle fibers to contract Page no. 290 Anatomy of Motor Neurons and the Neuromuscular Junction Page no. 290 Figure 9.7 Overview of skeletal muscle contraction. Page no. 291 9.5 Temporal summation and motor unit recruitment allow smooth, graded skeletal muscle contractions Page no. 299 The Motor Unit Page no. 299 Figure 9.11 A motor unit consists of one motor neuron and all the muscle fibers it innervates. Page no. 299
			HAP.5.3 Explain the molecular mechanism of muscle contraction and relaxation.	9: Muscles and Muscle Tissue 9.4 Motor neurons stimulate skeletal muscle fibers to contract Page no. 290 Anatomy of Motor Neurons and the Neuromuscular Junction Page no. 290 Figure 9.7 Overview of skeletal muscle contraction. Page no. 291

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Events at the Neuromuscular Junction Page no. 293 Events at the Neuromuscular Junction A&P Flix Video Page no. 293 The Neuromuscular Junction IP2 Video Page no. 293 Figure 9.8 **Summary of events in the generation and propagation of an action potential in a skeletal muscle fiber.** Page no. 293 Focus Figure 9.2 Excitation-Contraction Coupling Page no. 296
			HAP.5.4 Use models to locate the major muscles and investigate the movements controlled by each muscle.	9: Muscles and Muscle Tissue 9.1 There are three types of muscle tissue Page no. 280 9.9 Smooth muscle is nonstriated involuntary muscle Page no. 310 Figure 9.23 Arrangement of smooth muscle in the walls of hollow organs. Page no. 310 Table 9.3 Comparison of Skeletal, Cardiac, and Smooth Muscle Page no. 311 10: The Muscular System

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				10.1 For any movement, muscles can act in one of three ways Page no. 324 10.4 Muscles acting with bones form lever systems Page no. 327 10.5 A muscle's attachments determine its action Page no. 332 Figure 10.4 Superficial muscles of the body: Anterior view. Page no. 332
			HAP.5.5 Compare and contrast the anatomy and physiology of the three types of muscle tissue.	9: Muscles and Muscle Tissue 9.9 Smooth muscle is nonstriated involuntary muscle Page no. 310 Table 9.3 Comparison of Skeletal, Cardiac, and Smooth Muscle Page no. 311 Differences between Smooth and Skeletal Muscle Fibers Page no. 311
			HAP.5.6 Use technology to plan and conduct an investigation that demonstrates the physiology of muscle contraction, muscle fatigue, or muscle tone.	9: Muscles and Muscle Tissue 9.4 Motor neurons stimulate skeletal muscle fibers to contract Figure 9.7 Page no. 290 Overview of skeletal muscle contraction. Page no. 291

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			Collect and analyze data to interpret results, then explain and communicate conclusions.	Events at the Neuromuscular Junction A&P Flix Video Page no. 293 The Neuromuscular Junction IP2 Video Page no. 293 9.5 Temporal summation and motor unit recruitment allow smooth, graded skeletal muscle contractions Graded Muscle Contractions Page no. 300 Figure 9.13 Temporal summation. Page no. 300 Muscle Tone Page no. 303 Isotonic and Isometric Contractions Page no. 303 Check Your Understanding: Section 9.5 Q. 14, 15 Page no. 303 9.9 Smooth muscle is nonstriated involuntary muscle Page no. 310 Contraction of Smooth Muscle Page no. 314 Chapter 9: Review Questions Level 3 Evaluate/Synthesize Q. 26 Page no. 321 10: The Muscular System Chapter 10: Review Questions Q. 25 Page no. 388

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.5.7 Research and analyze the causes and effects of various pathological conditions, (e.g., fibromyalgia, muscular dystrophy, cerebral palsy, muscle cramps/strains, and tendonitis).	9: Muscles and Muscle Tissue Chapter 9: Related Clinical Terms Page no. 319 Clinical Case Study Children with Muscular Disorders Page no. 322 10: The Muscular System Chapter 10: Related Clinical Terms Page no. 386
			HAP.5.8 Enrichment: Use an engineering design process to develop effective ergonomic devices to prevent muscle fatigue and strain (e.g., carpal tunnel, exoskeletons for paralysis, or training plans to prevent strains/sprains/cramps).*	10: The Muscular System Chapter 10: Review Questions Q. 22, 23, 24, 25 Page no. 388
HAP.6 Nervous System	The nervous system is composed of the central nervous system and the peripheral nervous system. These divisions work together to create every thought, action,	HAP. 6 Students will investigate the structures and functions of the nervous system, including the cause and effect of diseases and disorders.	HAP.6.1 Describe and evaluate how the nervous system functions and interconnects with all other body systems.	11: Fundamentals of the Nervous System and Nervous Tissue 11.1 The nervous system receives, integrates, and responds to information Figure 11.1 The nervous system's functions. Page no. 391

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
	and sensation that occurs within the body. The exploration of the special senses will provide an understanding of sight, hearing, smell, and taste.			Figure 11.3 Organization of the nervous system. Page no. 392 14: The Autonomic Nervous System System Connections Homeostatic Interrelationships between the Nervous System and Other Body Systems Page no. 549
			HAP.6.2 Analyze the structure and function of neurons and their supporting neuroglia cells (e.g. astrocytes, oligodendrocytes, Schwann cells, microglial).	11: Fundamentals of the Nervous System and Nervous Tissue 11.2 Neuroglia support and maintain neurons Page no. 393 Figure 11.4 Neuroglia. Page no. 393 Neuroglia in the CNS Page no. 393 Neuroglia in the PNS Page no. 394 11.3 Neurons are the structural units of the nervous system Page no. 394 Table 11.2 Comparison of Structural Classes of Neurons Page no. 398 Check Your Understanding: Section 11.3 Page no. 400

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Self-Check: Section 11.3 Page no. 400
			HAP.6.3 Discuss the structure and function of the brain and spinal cord.	12: The Central Nervous System 12.1 Folding during development determines the complex structure of the adult brain Page no. 433 Brain Regions and Organization Page no. 434 12.2 to 12.4 (Structure of brain and its parts. Page no. 437 to 452 12.5 to 12. 7 (Functions of different parts of the brain) Page no. 453 to 462 12.10 The spinal cord is a reflex center and conduction pathway Page no. 468 Spinal Cord Cross-Sectional Anatomy Page no. 470
			HAP.6.4 Compare and contrast the structures and functions of the central and peripheral nervous systems. Investigate how the systems interact to maintain homeostasis (e.g., reflex responses, sensory responses).	12: The Central Nervous System 12.11 Neuronal pathways carry sensory and motor information to and from the brain Page no. 474 13: The Peripheral Nervous System and Reflex Activity 13.1 Sensory receptors are activated by changes in the internal or external environment Page no. 488

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				3.2 Receptors, ascending pathways, and cerebral cortex process sensory information Page no. 491 13.8 The reflex arc enables rapid and predictable responses Page no. 517 Components of a Reflex Arc Page no. 517
			HAP.6.5 Enrichment: Plan and conduct an experiment to test reflex response rates under varying conditions. Using technology, construct graphs in order to analyze and interpret data to explain and communicate conclusions.	13: The Peripheral Nervous System and Reflex Activity Chapter 13: Review Questions Q. 27, 28 Page no. 528
			HAP.6.6 Describe the major characteristics of the autonomic nervous system. Contrast the roles of the sympathetic and parasympathetic nervous systems in maintaining homeostasis.	14: The Autonomic Nervous System 14.1 The ANS differs from the somatic nervous system in that it can excite or inhibit its effectors Page no. 530 14.2 The ANS consists of the parasympathetic and sympathetic divisions Page no. 534 14.7 The parasympathetic and sympathetic divisions usually produce opposite effects Page no. 544

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			HAP.6.7 Describe the structure and function of the special senses (i.e., vision, hearing, taste, and olfaction).	15: The Special Senses Part 1 The Eye and Vision Page no. 554 to 574 Part 2 The Chemical Senses: Smell and Taste Page no. 575 to 579 Part 3 The Ear: Hearing and Balance Page no. 580 to 595
			HAP.6.8 Research and analyze the causes and effects of various pathological conditions (e.g., addiction, depression, schizophrenia, Alzheimer's, sports-related chronic traumatic encephalopathy [CTE], dementia, chronic migraine, stroke, and epilepsy).	11: Fundamentals of the Nervous System and Nervous Tissue Chapter 11: Related Clinical Terms Page no. 428 Clinical Case Study Nursing Student with Neuropathic Pain Page no. 431 12: The Central Nervous System Chapter 12: Related Clinical Terms Page no. 482 Clinical Case Study 39-Year-Old Female with Traumatic Brain Injury Page no. 486 13: The Peripheral Nervous System and Reflex Activity Chapter 13: Related Clinical Terms Page no. 524

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				Clinical Case Study 44-Year-Old Male with Skull Fracture Page no. 528 14: The Autonomic Nervous System Chapter 14: Related Clinical Terms Page no. 549 Clinical Case Study 10-Year-Old Boy with Spinal Injury Page no. 552 15: The Special Senses Chapter 15: Related Clinical Terms Page no. 596 Clinical Case Study 32-Year-Old Male with Recurring Vertigo Page no. 600
			HAP.6.9 Enrichment: Use an engineering design process to develop, model, and test preventative devices for neurological injuries and/or disorders (e.g., concussion-proof helmets or possible medications for addiction and depression).*	13: The Peripheral Nervous System and Reflex Activity Chapter 13: Review Questions Q. 30, 31 Page no. 528 Clinical Case Study 44-Year-Old Male with Skull Fracture Page no. 528 14: The Autonomic Nervous System Chapter 14: Review Questions

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Q. 15, 16 Page no. 551 Clinical Case Study 10-Year-Old Boy with Spinal Injury Page no. 552
HAP.7 Endocrine System	The endocrine system, using hormones, gives instructions that control growth and development, reproductive capabilities, and the physiological homeostasis of the body systems.	HAP.7 Students will demonstrate an understanding of the major organs of the endocrine system and the associated hormonal production and regulation.	HAP.7.1 Obtain, evaluate, and communicate information to illustrate that the endocrine glands secrete hormones that help the body maintain homeostasis through feedback mechanisms.	16: The Endocrine System Figure 16.7 Regulation of thyroid hormone secretion. Page no. 616 16.7 The thyroid gland controls metabolism Transport and Regulation Page no. 620 System Connections Homeostatic Interrelationships between the Endocrine System and Other Body Systems Page no. 637
			HAP.7.2 Discuss the function of each endocrine gland and the various hormones secreted.	16: The Endocrine System 16.6 The hypothalamus controls release of hormones from the pituitary gland in two different ways

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				to 16.11 The pancreas, gonads, and most other organs secrete hormones Page no. 609 -636
			HAP.7.3 Model specific mechanisms through which the endocrine system maintains homeostasis (e.g., insulin/glucagon and glucose regulation; T3 / T4 and metabolic rates; calcitonin/parathyroid and calcium regulation; antidiuretic hormone and water balance; growth hormone; and cortisol and stress).	16: The Endocrine System Focus Figure 16.1 Hypothalamus and Pituitary Interactions Page no. 609 Table 16.3 Pituitary Hormones: Summary of Regulation and Effects Page no. 609 Figure 16.7 Regulation of thyroid hormone secretion. Page no. 616 Table 16.5 Adrenal Gland Hormones: Summary of Regulation and Effects Page no. 622 Figure 16.12 Effects of parathyroid hormone on bone, the kidneys, and the intestine. Page no. 622 Figure 16.14 Major mechanisms controlling aldosterone release. Page no. 624 Figure 16.17

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				Insulin and glucagon from the pancreas regulate blood glucose levels. Page no. 630 Homeostasis: Regulating Blood Sugar BioFlix Video Page no. 630 Figure 16.18
			HAP.7.4 Research and analyze the effects of various pathological conditions (e.g., diabetes mellitus, pituitary dwarfism, Graves' disease, Cushing's syndrome, hypothyroidism, and obesity).	16: The Endocrine System 16.6 The hypothalamus controls release of hormones from the pituitary gland in two different ways Antidiuretic Hormone (ADH) Page no. 613 Homeostatic Imbalance 16.2 (Clinical) Page no. 615 Homeostatic Imbalance 16.4 (Clinical) Page no. 620 Homeostatic Imbalance 16.5 (Clinical) Page no. 622 Homeostatic Imbalance 16.7 (Clinical) Page no. 625 Consequences of insulin deficit (diabetes mellitus). Page no. 631
			HAP.7.5 Enrichment: Use an engineering design process to develop effective treatments for endocrine disorders (e.g.,	16: The Endocrine System Chapter 16: Review Questions Level 3 Evaluate/Synthesize Q. 20 to Q. 26 Page no. 641

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			methods to regulate hormonal imbalance).*	
HAP.8 Male and Female Reproductive Systems	The reproductive system's biological function is to generate offspring for the continuance of our species. Interactions of the egg and sperm, the biological clock, and fertility play critical roles in the production of an offspring. Proper embryonic development directly depends on the health of the reproductive system.	HAP. 8 Students will investigate the structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders.	HAP.8.1 Compare and contrast the structure and function of the male and female reproductive systems.	27: The Reproductive System 27.1 The male and female reproductive systems share common features Page no. 1050 Part 1 Anatomy of the Male Reproductive System Page no. 1056 Part 3 Anatomy of the Female Reproductive System Page no. 1071
			HAP.8.2 Describe the male reproductive anatomy and relate structure to sperm production and release.	27: The Reproductive System Part 1 Anatomy of the Male Reproductive System Page no. 1056 27.2 The testes are enclosed and protected by the scrotum Page no. 1056 27.3 Sperm travel from the testes to the body exterior through a system of ducts Page no. 1058

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Self-Check: Section 27.3 Q. 3 Page no. 1059 27.6 The male sexual response includes erection and ejaculation Page no. 1063 27.7 Spermatogenesis is the sequence of events that leads to formation of sperm Page no. 1063
			HAP.8.3 Describe the female reproductive anatomy and relate structure to egg production and release.	27: The Reproductive System Part 3 Anatomy of the Female Reproductive System Page no. 1071 27.9 Immature eggs develop in follicles in the ovaries Page no. 1071 27.10 The female duct system includes the uterine tubes, uterus, and vagina Page no. 1072 27.13 Oogenesis is the sequence of events that leads to the formation of ova Page no. 1078 27.14 The ovarian cycle consists of the follicular phase and the luteal phase Page no. 1083
			HAP.8.4 Construct explanations detailing the role of hormones in the regulation of sperm and egg	27: The Reproductive System 27.8 Male reproductive function is regulated by hypothalamic, anterior

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			development. Analyze the role of negative feedback in regulation of the female menstrual cycle and pregnancy.	pituitary, and testicular hormones Page no. 1069 27.14 The ovarian cycle consists of the follicular phase and the luteal phase Page no. 1083 27.15 Female reproductive function is regulated by hypothalamic, anterior pituitary, and ovarian hormones Page no. 1083 28: Pregnancy and Human Development 28.2 Embryonic development begins as the zygote undergoes cleavage and forms a blastocyst en route to the uterus Page no. 1107 28.3 Implantation occurs when the embryo burrows into the uterine wall, triggering placenta formation Page no. 1109 Figure 28.6 Hormonal changes during pregnancy. Page no. 1109
			HAP.8.5 Evaluate and communicate information about various contraceptive methods to prevent	Chapter 27: Review Questions Q. 24 Page no. 1100

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			fertilization and/or implantation.	
			HAP.8.6 Describe the changes that occur during embryonic/fetal development, birth, and the growth and development from infancy, childhood, and adolescence to adult.	28: Pregnancy and Human Development 28.2 Embryonic development begins as the zygote undergoes cleavage and forms a blastocyst en route to the uterus Page no. 1107 to 28.7 An infant's extrauterine adjustments include taking the first breath and closure of vascular shunts Page no. 1126 28.8 Lactation is milk secretion by the mammary glands in response to prolactin Page no. 1127
			HAP.8.7 Research and analyze the causes and effects of various pathological conditions (e.g., infertility, ovarian cysts, endometriosis, sexually transmitted diseases, and ectopic pregnancy). Research current treatments for infertility.	27: The Reproductive System 27.17 Sexually transmitted infections cause reproductive and other disorders Page no. 1090 Chapter 27: Related Clinical Terms Page no. 1096

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Case Study 23-Year-Old Female with Menstrual Irregularity Page no. 1100 28: Pregnancy and Human Development 28.9 Assisted reproductive technology may help an infertile couple have offspring Page no. 1129 Chapter 28: Related Clinical Terms Page no. 1130 Clinical Case Study 38-Year-Old Female with Preeclampsia Page no. 1133
HAP.9 Blood	Blood is the necessary fluid that transports oxygen and other elements throughout the body and removes waste products. Blood's unique composition allows for grouping into four major blood type groups (A, B, AB, and O).	HAP.9 Students will analyze the structure and functions of blood and its role in maintaining homeostasis.	HAP.9.1 Describe the structure, function, and origin of the cellular components and plasma components of blood.	17: Blood 17.2 Blood consists of plasma and formed elements Page no. 643 Blood Plasma Page no. 644 Table 17.1 Composition of Plasma Page no. 644 Formed Elements Page no. 645 17.3 Erythrocytes play a crucial role in oxygen and carbon dioxide transport Page no. 645

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
	Blood types are based on the presence or absence of inherited antigens on the surface of the red blood cells.			Functions of Erythrocytes Page no. 646 Production of Erythrocytes Page no. 647 Figure 17.5 Erythropoiesis: formation of red blood cells. Page no. 648 17.4 Leukocytes defend the body Page no. 651 Figure 17.11 Leukocyte formation. Page no. 655 17.5 Platelets are cell fragments that help stop bleeding Page no. 657
			HAP.9.2 Distinguish the cellular difference between the ABO blood groups and investigate blood type differences utilizing antibodies to determine compatible donors and recipients.	17: Blood 17.7 Transfusion can replace lost blood (Clinical) Page no. 663 Human Blood Groups Page no. 664 ABO Blood Groups Page no. 664 Table 17.4 ABO Blood Groups Page no. 664
			HAP.9.3 Research and analyze the causes and effects of various pathological conditions (e.g., anemia, malaria, leukemia, hemophilia, and blood doping).	17: Blood Clinical: Erythrocyte Disorders Page no. 650 Figure 17.8 Sickle-cell anemia. Page no. 650 Polycythemia Page no. 651

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Homeostatic Imbalance 17.1 (Clinical) Page no. 651 Clinical: Leukocyte Disorders Page no. 655 Chapter 17: Related Clinical Terms
			HAP.9.4 Enrichment: Use an engineering design process to develop effective treatments for blood disorders (e.g., methods to regulate blood cell counts or blood doping tests).*	17: Blood Chapter 17: Review Questions Level 3 Evaluate/Synthesize Q. 22 to Q. 27 Page no. 669
HAP.10 Cardiovascular System	The cardiovascular system is composed of the heart and blood vessels. The heart is the mechanism that cycles the blood throughout the body via the blood vessels. Using blood as a carrier, the system transports nutrients, gases, wastes, antibodies, electrolytes, and many other substances to and from	HAP.10 Students will investigate the structures and functions of the cardiovascular system, including the cause and effect of diseases and disorders.	HAP.10.1 Design and use models to investigate the functions of the organs of the cardiovascular system.	18: The Cardiovascular System: The Heart 18.1 The heart has four chambers and pumps blood through the pulmonary and systemic circuits Page no. 671 Figure 18.3 The layers of the pericardium and of the heart wall. Figure 18.4 **The circular and spiral arrangement of cardiac muscle bundles in the myocardium of the heart.** Page no. 674 Figure 18.5

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	the cells of the body. The location, size, and orientation of the heart, blood vessels, veins, arteries, and capillaries are essential in maintaining cardiovascular health. Maintenance of this system is vital.			**Gross anatomy of the heart.** Page no. 675 18.2 Heart valves make blood flow in one direction Page no. 679 18.3 Blood flows from atrium to ventricle, and then to either the lungs or the rest of the body Page no. 681
			HAP.10.2 Describe the flow of blood through the pulmonary system and systemic circulation.	18: The Cardiovascular System: The Heart The Pulmonary and Systemic Circuits Page no. 671 Figure 18.1 The systemic and pulmonary circuits. Page no. 671
			HAP.10.3 Investigate the structure and function of different types of blood vessels (e.g., arteries, capillaries, veins). Identify the role each plays in the transport and exchange of materials.	19: The Cardiovascular System: Blood Vessels Part 1 Blood Vessel Structure and Function Page no. 707 19.1 Most blood vessel walls have three layers Page no. 709 19.2 Arteries are pressure reservoirs, distributing vessels, or resistance vessels Page no. 710

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				19.3 Capillaries are exchange vessels Page no. 711 19.4 Veins are blood reservoirs that return blood toward the heart Page no. 714 19.5 Anastomoses are special interconnections between blood vessels Page no. 715
			HAP.10.4 Demonstrate the role of valves in regulating blood flow.	18: The Cardiovascular System: The Heart 18.2 Heart valves make blood flow in one direction Page no. 679 18.3 Blood flows from atrium to ventricle, and then to either the lungs or the rest of the body Page no. 681 Focus Figure 18.1 Blood Flow through the Heart
			HAP.10.5 Plan and conduct an investigation to test the effects of various stimuli on heart rate and/or blood pressure. Construct graphs to analyze data and communicate conclusions.	18: The Cardiovascular System: The Heart 18.6 The cardiac cycle describes the mechanical events associated with blood flow through the heart Page no. 693 Focus Figure 18.2 The Cardiac Cycle Page no. 694 Check Your Understanding: Section 18.6 Q. 18 Page no. 696

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				18.7 Stroke volume and heart rate are regulated to alter cardiac output Page no. 696 Afterload: Back Pressure Exerted by Arterial Blood Page no. 698 Regulation of Heart Rate Page no. 698 Autonomic Nervous System Page no. 698 Regulation of Heart Rate Chemical Regulation of Heart Rate Page no. 699 Other Factors That Regulate Heart Rate Page no. 699
			HAP.10.6 Research and analyze the effects of various pathological conditions (e.g., hypertension, myocardial infarction, mitral valve prolapse, varicose veins, and arrhythmia).	18: The Cardiovascular System: The Heart Homeostatic Imbalance 18.1 (Clinical) Page no. 673 Homeostatic Imbalance 18.2 (Clinical) Page no. 680 Homeostatic Imbalance 18.3 (Clinical) Page no. 683 Homeostatic Imbalance 18.4 (Clinical) Page no. 688

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Homeostatic Imbalance 18.5 (Clinical) Page no. 692 Homeostatic Imbalance 18.6 (Clinical) Page no. 696 Homeostatic Imbalance 18.7 (Clinical) Page no. 699 Homeostatic Imbalance 18.8 (Clinical) Page no. 699 Homeostatic Imbalance 18.9 (Clinical) Page no. 701 Figure 18.23 Three examples of congenital heart defects. Page no. 701 Heart Function throughout Life Page no. 702 Chapter 18: Related Clinical Terms Page no. 702
			HAP.10.7 Enrichment: Use an engineering design process to develop, model, and test effective treatments for cardiovascular diseases (e.g., methods to regulate heart rate, artificial replacement	18: The Cardiovascular System: The Heart Clinical Case Study 54-Year-Old Female with a Defective Heart Valve Page no. 705

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			valves, open blood vessels, or strengthening leaky valves).*	
HAP.11 Lymphatic System	The lymphatic system is composed of lymphoid vessels and organs. These vessels assist the cardiovascular system by maintaining blood volume. The lymphoid organs defend the body from pathogens by providing sites for development and maturation of immune system cells. There are multiple disorders of the immune system affecting the human population.	HAP. 11 Students will investigate the structures and functions of the lymphatic system, including the cause and effect of diseases and disorders.	HAP.11.1 Analyze the functions of leukocytes, lymph, and lymphatic organs in the immune system.	17: Blood 17.4 Leukocytes defend the body Page no. 651 General Structural and Functional Characteristics Page no. 651 Lymphocytes Page no. 653 20: The Lymphatic System and Lymphoid Organs and Tissues 20.1 The lymphatic system includes lymphatic vessels, lymph, and lymph nodes Page no. 768 Distribution and Structure of Lymphatic Vessels Page no. 768 Figure 20.2 Major lymphatic trunks and ducts. Page no. 770 Figure 20.3 The lymphatic system Page no. 770 Lymphoid Cells Page no. 771 Lymphoid Tissue Page no. 772 Lymphoid Organs Page no. 772

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				20.6 T lymphocytes mature in the thymus Page no. 777 Table 20.1 Summary of Lymphoid Organs and Tissues Page no. 778
			HAP.11.2 Compare the primary functions of the lymphatic system and its relationship to the cardiovascular system.	20: The Lymphatic System and Lymphoid Organs and Tissues Figure 20.1 20.1 The lymphatic system includes lymphatic vessels, lymph, and lymph nodes Page no. 768 Distribution and Structure of Lymphatic Vessels Page no. 768 Distribution and special features of lymphatic capillaries. Page no. 768 Lymph Transport Page no. 770 System Connections Homeostatic Interrelationships between the Lymphatic System/Immunity and Other Body Systems Page no. 779
			HAP.11.3 Compare and contrast the body's non-specific and specific lines of defense, including an analysis of the roles of various	17: Blood 17.4 Leukocytes defend the body Page no. 651 General Structural and Functional Characteristics Page no. 651

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			leukocytes: basophils, eosinophils, neutrophils, monocytes, and lymphocytes.	Neutrophils Page no. 652 Eosinophils Page no. 652 Basophils Page no. 653 Lymphocytes Page no. 653 Monocytes Page no. 653 20: The Lymphatic System and Lymphoid Organs and Tissues 20.5 Malt guards the body's entryways against pathogens Page no. 776 21: The Immune System: Innate and Adaptive Body Defenses 21.1 Surface barriers act as the first line of defense to keep invaders out of the body Page no. 785 21.2 Innate internal defenses are cells and chemicals that act as the second line of defense Page no. 786 Part 2 Adaptive Defenses Page no. 793 21.3 Antigens are substances that trigger the body's adaptive defenses Page no. 794 21.4 B and T lymphocytes and antigen-presenting cells are cells of the adaptive immune response Page no. 795

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.11.4 Correlate the functions of the spleen, thymus, lymph nodes, and lymphocytes to the development of immunity.	17: Blood 17.4 Leukocytes defend the body: Lymphocytes Page no. 653 20: The Lymphatic System and Lymphoid Organs and Tissues 20.1 The lymphatic system includes lymphatic vessels, lymph, and lymph nodes Page no. 768 20.4 The spleen removes bloodborne pathogens and aged red blood cells Page no. 775 20.6 T lymphocytes mature in the thymus Page no. 776
			HAP.11.5 Differentiate the role of B-lymphocytes and T-lymphocytes in the development of humoral and cell-mediated immunity and primary and secondary immune responses.	17: Blood 17.4 Leukocytes defend the body: Lymphocytes Page no. 653 Figure 17.11 Leukocyte formation. Page no. 655 20: The Lymphatic System and Lymphoid Organs and Tissues 20.6 T lymphocytes mature in the thymus Page no. 776

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				21: The Immune System: Innate and Adaptive Body Defenses 21.4 B and T lymphocytes and antigen-presenting cells are cells of the adaptive immune response Page no. 795 21.5 In humoral immunity, antibodies are produced that target extracellular antigens Page no. 799 21.6 Cellular immunity consists of T lymphocytes that direct adaptive immunity or attack cellular targets Page no. 805 Table 21.9 Cells and Molecules of the Adaptive Immune Response Page no. 814
			HAP.11.6 Investigate various forms of acquired and passive immunity (e.g., fetal immunity, breastfed babies, vaccinations, and plasma donations).	21: The Immune System: Innate and Adaptive Body Defenses 21.5 In humoral immunity, antibodies are produced that target extracellular antigens Page no. 799 Active and Passive Humoral Immunity Page no. 801 Chapter 21: Related Clinical Terms Page no. 818

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.11.7 Research and analyze the causes and effects of various pathological conditions (e.g., viral infections, auto-immune disorders, immunodeficiency disorders, and lymphomas).	17: Blood Clinical: Leukocyte Disorders Leukemias Page no. 655 Infectious Mononucleosis Page no. 656 Chapter 17: Related Clinical Terms Page no. 666 20: The Lymphatic System and Lymphoid Organs and Tissues Homeostatic Imbalance 20.1 (Clinical) Page no. 770 Chapter 20: Related Clinical Terms Page no. 780 21: The Immune System: Innate and Adaptive Body Defenses Antimicrobial Proteins Page no. 791 Interferons Page no. 791 Figure 21.4 The interferon mechanism against viruses. Page no. 791 21.7 Insufficient or overactive immune responses create problems (Clinical) Page no. 815 Immunodeficiencies Page no. 815 Autoimmune Diseases Page no. 816

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Chapter 21: Related Clinical Terms Page no. 818
HAP.12 Respiratory System	The respiratory system provides the body with an abundant and continuous supply of oxygen and removes carbon dioxide from the body. The organs of this system include the nose, pharynx, larynx, trachea, bronchi and their smaller branches, and the lungs. The interaction of these organs with the cardiovascular system transports respiratory gases to the tissue cells throughout the body. Interruptions in the mechanics of this system will lead to respiratory distress.	HAP. 12 Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders.	HAP.12.1 Design and use models to illustrate the functions of the organs of the respiratory system.	22: The Respiratory System Part 1 Functional Anatomy Page no. 824 Figure 22.2 The major respiratory organs in relation to surrounding structures. Page no. 824 Table 22.1 The Upper Respiratory System Page no. 824 Table 22. 2 The Lower Respiratory System Page no. 824 22.1 The upper respiratory system warms, humidifies, and filters air Page no. 824 22.2 The lower respiratory system consists of conducting and respiratory zone structures Page no. 828

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.12.2 Describe structural adaptations of the respiratory tract and relate these structural features to the function of preparing incoming air for gas exchange at the alveolus.	22: The Respiratory System Part 1 Functional Anatomy Page no. 824 22.1 The upper respiratory system warms, humidifies, and filters air Page no. 824 The Nose and Paranasal Sinuses Page no. 824 Nasal Cavity Page no. 825 Figure 22.4 The nasal cavity. Page no. 825 Nasal Conchae Page no. 826 Paranasal Sinuses Page no. 826 The Pharynx Page no. 826 Figure 22.5 The pharynx, larynx, and upper trachea. Page no. 826 The Nasopharynx Page no. 827 22.2 The lower respiratory system consists of conducting and respiratory zone structures The Larynx Page no. 828 The Trachea Page no. 831 The Bronchi and Subdivisions Page no. 832 Figure 22.9 Conducting zone passages

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				Conducting Zone Structures Page no. 832
			HAP.12.3 Identify the five mechanics of gas exchange: pulmonary ventilation, external respiration, transport gases, internal respiration, and cellular respiration.	22: The Respiratory System 22.4 Volume changes cause pressure changes, which cause air to move Page no. 839 Pulmonary Ventilation Page no. 840 Focus Figure 22.1 The Mechanics of Breathing at Rest Page no. 840 Breathing Cycles and Muscles IP2 Video Page no. 840 22.6 Gases exchange by diffusion between the blood, lungs, and tissues Page no. 848 22.7 Oxygen is transported by hemoglobin, and carbon dioxide is transported in three different ways Page no. 852 Oxygen Transport Page no. 852 Focus Figure 22.2 The Oxygen-Hemoglobin Dissociation Curve Page no. 852 Tissue Oxygen Exchange IP2 Video Page no. 852 Oxygen Transport and Exchange: Summary

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				IP2 Video Page no. 853 Figure 22.24 Transport and exchange of CO2 and O2. Page no. 856
			HAP.12.4 Enrichment: Use an engineering design process to develop a model of the mechanisms that support breathing, and illustrate the inverse relationship between volume and pressure in the thoracic cavity.*	22: The Respiratory System 22.4 Volume changes cause pressure changes, which cause air to move Pulmonary Ventilation Page no. 839 Figure 22.14 **Intrapulmonary and intrapleural pressure relationships.** Page no. 839 Focus Figure 22.1 The Mechanics of Breathing at Rest Page no. 840 Transpulmonary Pressure Page no. 840 Boyle's Law and Respiratory Pressures IP2 Video Page no. 840
			HAP.12.5 Research and analyze the causes and effects of various pathological conditions (e.g., asthma, bronchitis, pneumonia, and COPD).	22: The Respiratory System 22.10 Respiratory diseases are major causes of disability and death (Clinical) Page no. 864 Chronic Obstructive Pulmonary Disease (COPD) Page no. 864 Chronic Bronchitis Page no. 865 Asthma Page no. 865

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				Tuberculosis (TB) Page no. 865 Lung Cancer Page no. 865
			HAP.12.6 Research and discuss new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition).	22: The Respiratory System Chapter 22: Review Questions Level 3 Evaluate/Synthesize Q. 25 Page no. 872
HAP.13 Digestive System	The digestive system processes food so that it can be absorbed and used by the body's cells. The organs of the system are responsible for food ingestion, digestion, absorption, and elimination of the undigested remains from the body.	HAP.13 Students will investigate the structures and functions of the digestive system, including the cause and effect of diseases and disorders.	HAP.13.1 Analyze the structure-function relationship in organs of the digestive system.	23: The Digestive System Part 2 Functional Anatomy of the Digestive System Page no. 881 Digestive IP Anatomy Review Animation Page no. 881 23.4 Ingestion occurs only at the mouth Page no. 883 23.5 The pharynx and esophagus move food from the mouth to the stomach Page no. 888 23.6 The stomach temporarily stores food and begins protein digestion Page no. 891 23.7 The liver secretes bile; the pancreas secretes digestive enzymes Page no. 901

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				23.8 The small intestine is the major site for digestion and absorption Page no. 907 Figure 23.31 Structural modifications of the small intestine that increase its surface area for digestion and absorption. Page no. 908 Motility of the Small Intestine Page no. 911 23.9 The large intestine absorbs water and eliminates feces Page no. 912
			HAP.13.2 Use models to describe structural adaptations present in each organ of the tract and correlate the structures to specific processing of food at each stage (e.g., types of teeth; muscular, elastic wall and mucous lining of the stomach; villi and microvilli of the small intestine; and sphincters along the digestive tract).	23: The Digestive System 23.4 Ingestion occurs only at the mouth Page no. 882 Figure 23.8 **Anatomy of the oral cavity (mouth).** Page no. 882 Figure 23.9 Dorsal surface of the tongue, and the tonsils. Page no. 883 Figure 23.10 The salivary glands. Page no. 884 Figure 23.11 Human dentition. Page no. 885 Figure 23.15

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				Gross Anatomy of the Stomach Page no. 891 Anatomy of the stomach Page no. 891 Figure 23.16 Microscopic anatomy of the stomach. Page no. 892 Figure 23.31 Structural modifications of the small intestine that increase its surface area for digestion and absorption. Page no. 908 Figure 23.32 Microvilli of the small intestine. Page no. 909 Chapter 23: Review Questions Level 1 Remember/Understand Q. 2, 3, 10 Page no. 930
			HAP.13.3 Identify the accessory organs (i.e., salivary glands, liver, gallbladder, and pancreas) for digestion and describe their function.	23: The Digestive System 23.4 Ingestion occurs only at the mouth Page no. 882 The salivary glands. Page no. 884 Figure 23.11 23.7 The liver secretes bile; the pancreas secretes digestive enzymes Page no. 900 The Gallbladder Page no. 904

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.13.4 Plan and conduct an experiment to illustrate the necessity of mechanical digestion for efficient chemical digestion.	23: The Digestive System 23.4 Ingestion occurs only at the mouth Page no. 882 Digestive Processes of the Mouth Page no. 887 Mastication (Chewing) Page no. 887
			HAP.13.5 Research and analyze the activity of digestive enzymes within different organs of the digestive tract, connecting enzyme function to environmental factors such as pH.	23: The Digestive System 23.6 The stomach temporarily stores food and begins protein digestion Page no. 891 Types of Gland Cells: Parietal Cells, Chief Cells Page no. 893 23.7 The liver secretes bile; the pancreas secretes digestive enzymes Page no. 900 Bile: Composition and Enterohepatic Circulation Page no. 903 The Pancreas Page no. 904 23.8 The small intestine is the major site for digestion and absorption Page no. 907 Intestinal Juice Page no. 910 Digestive Processes in the Small Intestine Page no. 911 Sources of Enzymes for Digestion Page no. 911

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			HAP.13.6 Evaluate the role of hormones (i.e., gastrin, leptin, and insulin) in the regulation of hunger and satiety/fullness.	23: The Digestive System 23.6 The stomach temporarily stores food and begins protein digestion Page no. 891 Enteroendocrine Cells Page no. 894 Table 23.1 Hormones and Paracrines That Act in Digestion Page no. 894 23.7 The liver secretes bile; the pancreas secretes digestive enzymes Page no. 900 The Pancreas Page no. 904 Figure 23.26 Structure of the enzyme-producing tissue of the pancreas. Page no. 904
			HAP.13.7 Research and analyze the causes and effects of various pathological conditions (e.g., GERD/acid reflux, stomach ulcers, lactose intolerance, irritable bowel syndrome, gallstones, appendicitis, and hormonal imbalances and obesity).	23: The Digestive System Homeostatic Imbalance 23.6 (Clinical) Page no. 889 Homeostatic Imbalance 23.7 (Clinical) Page no. 894 Figure 23.17 A gastric ulcer. Page no. 894 Homeostatic Imbalances of the Liver (Clinical) Page no. 904 Homeostatic Imbalance 23.9 (Clinical) Page no. 904

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				Homeostatic Imbalance 23.10 (Clinical) Page no. 909 Homeostatic Imbalance 23.11 (Clinical) Page no. 912 Homeostatic Imbalance 23.14 (Clinical) Page no. 916 Homeostatic Imbalance 23.15 (Clinical) Page no. 917 Chapter 23: Related Clinical Terms Page no. 926
			AP.13.8 Enrichment: Use an engineering design process to develop effective treatments for gastrointestinal diseases (e.g., methods to regulate stomach acids or soothe ulcers, treat food intolerance, and dietary requirements/modifications).*	23: The Digestive System Chapter 23: Related Clinical Terms Page no. 926 Chapter 23: Review Questions Page no. 929 Level 3 Evaluate/Synthesize Q. 28 to 32 Page no. 930 Clinical Case Study 48-Year-Old Female with Gallstones Page no. 931
HAP.14 Urinary System	The urinary system regulates the body's homeostasis by removing nitrogenous wastes while	HAP.14 Students will investigate the structures and functions of the urinary system, including the cause and	HAP.14.1 Understand the structure and function of the urinary system in relation to maintenance of homeostasis.	25: The Urinary System 25.1 The kidneys have three distinct regions and a rich blood supply Page no. 981

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
	maintaining water balance, electrolytes, and the blood's acid/base balance within the body. The kidney is the primary filtration and reabsorption organ of the urinary system, controlling the composition of urine and, in turn, regulating blood composition. Improper function of the kidneys could lead to death if not corrected.	effect of diseases and disorders.		25.2 Nephrons are the functional units of the kidney Page no. 984 Figure 25.6 Location and structure of nephrons. Page no. 984 25.3 Overview: Filtration, reabsorption, and secretion are the key processes of urine formation Page no. 990 Focus Figure 25.1 Three Major Renal Processes Page no. 990 26: Fluid, Electrolyte, and Acid-Base Balance 26.3 Sodium, potassium, calcium, and phosphate levels are tightly regulated Page no. 1027 26.5 Renal regulation is a long-term mechanism for controlling acid-base balance Page no. 1037 System Connections Homeostatic Interrelationships between the Urinary System and Other Body Systems Page no. 1044
			HAP.14.2 Describe the processes of filtration and	25: The Urinary System

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
			selective reabsorption within the nephrons as it relates to the formation of urine and excretion of excess materials in the blood.	25.3 Overview: Filtration, reabsorption, and secretion are the key processes of urine formation Page no. 990 Focus Figure 25.1 Three Major Renal Processes Page no. 990 25.4 Urine formation, step 1: The glomeruli make filtrate Page no. 993 25.5 Urine formation, step 2: Most of the filtrate is reabsorbed into the blood Page no. 998 25.6 Urine formation, step 3: Certain substances are secreted into the filtrate Page no. 1002 Self-Check: Section 25.6 Page no. 1002
			HAP.14.3 Investigate relationship between urine composition and the maintenance of blood sugar, blood pressure, and blood volume.	25: The Urinary System 25.4 to 25.6 25.8 Page no. 993 to 1002 Renal function is evaluated by analyzing blood and urine Page no. 1008 Urine Chemical Composition Page no. 1009 Table 25.3 Abnormal Urinary Constituents Page no. 1009 Physical Characteristics Page no. 1009

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Disciplinary Core Idea	**Conceptual Understanding**	**Content Standard**	**Breakout**	**Citations**
				Check Your Understanding: Section 25.8 Page no. 1010 Self-Check: Section 25.8 Page no. 1010
			HAP.14.4 Enrichment: Conduct a urinalysis to compare the composition of urine from various “patients.”	25: The Urinary System 25.8 Renal function is evaluated by analyzing blood and urine Page no. 1008 Clinical Case Study 32-Year-Old Male with Diabetes on a Diuretic Page no. 1019 26: Fluid, Electrolyte, and Acid-Base Balance Level 3 Evaluate/Synthesize Q. 20 to 24 Page no. 1047
			HAP.14.5 Develop and use models to illustrate the path of urine through the urinary tract.	25: The Urinary System 25.3 Overview: Filtration, reabsorption, and secretion are the key processes of urine formation Page no. 990 Focus Figure 25.1 Three Major Renal Processes Page no. 990 How the Kidneys Make Urine IP2 Video Page no. 990 25.4 Urine formation, step 1: The glomeruli make filtrate Page no. 993 Glomerular Filtration: Summary

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				IP2 Video Page no. 997 25.6 Urine formation, step 3: Certain substances are secreted into the filtrate Page no. 1002 Tubular Reabsorption & Secretion: Summary IP2 Video Page no. 1002 25.7 The kidneys create and use an osmotic gradient to regulate urine concentration and volume Page no. 1003 Focus Figure 25.2 **Medullary Osmotic Gradient** Page no. 1004-1005
			HAP.14.6 Research and analyze the causes and effects of various pathological conditions and other kidney abnormalities (e.g., kidney stones, urinary tract infections, gout, dialysis, and incontinence).	**25: The Urinary System** Homeostatic Imbalance 25.1 (Clinical) Page no. 982 Homeostatic Imbalance 25.2 (Clinical) Page no. 982 Homeostatic Imbalance 25.3 (Clinical) Page no. 993 Homeostatic Imbalance 25.4 (Clinical) Page no. 997 Homeostatic Imbalance 25.5 (Clinical) Page no. 1009

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				Homeostatic Imbalance 25.6 (Clinical) Page no. 1010 Homeostatic Imbalance 25.7 (Clinical) Page no. 1012 Homeostatic Imbalance 25.8 (Clinical) Page no. 1013 Homeostatic Imbalance 25.9 (Clinical) Page no. 1015 Chapter 25: Related Clinical Terms Page no. 1015