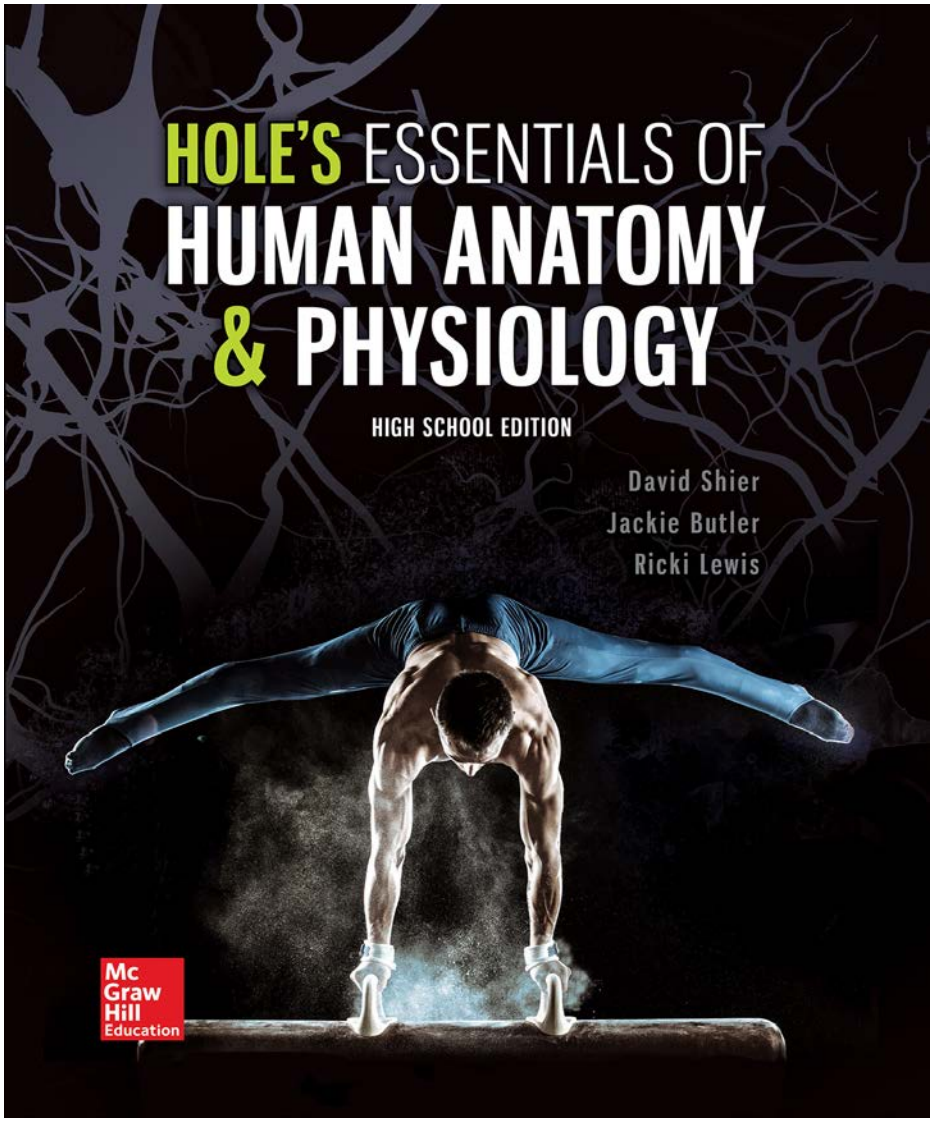
Mississippi

Human Anatomy & Physiology Correlation

Hole's Essentials of Human Anatomy & Physiology
High School Edition



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MISSISSIPPI STANDARDS	
HAP.1 Physiological Functions/Anatomical Structure	
Conceptual Understanding: **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.**	
MISSISSIPPI STANDARDS	**PAGE NUMBERS**
HAP.1 Students will demonstrate an understanding of how anatomical structures and physiological functions are organized and described using anatomical position.	17-21 *Chapter Assessments, Anatomical Terminology* 24 (#1-#4) *Practice* 21 (#1-#3) *Use the Practices* 17 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 2, "Body Organization, Membranes, and Terminology," pages 9-22.
HAP.1.1 ***Apply appropriate anatomical terminology when explaining the orientation of regions, directions, and body planes or sections.***	17-21 *Chapter Assessments, Anatomical Terminology* 24 (#1, #2) *Practice* 21 (#1) *Use the Practices* 17 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 2, "Body Organization, Membranes, and Terminology," pages 9-22.
HAP.1.2 ***Locate organs and their applicable body cavities and systems.***	10-17 *Chapter Assessments, Anatomical Terminology* 24 (#1-#8) *Integrative Assessments* 25 (#7) *Practice* 17 (#1) *Reference Plates* 26-33 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 2, "Body Organization, Membranes, and Terminology," pages 9-22.
HAP.1.3 ***Investigate the interdependence of the various body systems to each other and to the body as a whole.***	9, 11-17, 143-145, 160 *Organization* 148, 193, 236, 292, 355, 422, 449, 497
HAP.2 Cells and Tissues	
Conceptual Understanding: **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.**	

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HAP.2 Students will demonstrate an understanding of the relationship of cells and tissues that form complex structures of the body.	5-6, 59-69, 109-129 *Chapter Assessments, Introduction* 132 *Chapter Assessments, Epithelial Tissues* 132 *Chapter Assessments, Connective Tissues* 132 *Chapter Assessments, Muscle Tissues* 132 *Chapter Assessments, Nervous Tissues* 132 *Practice* 109, 111, 117, 121, 128, 129 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58.
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***	109-125, 127-129 *Chapter Assessments, Epithelial Tissues* 132 *Chapter Assessments, Connective Tissues* 132 *Chapter Assessments, Muscle Tissues* 132 *Chapter Assessments, Nervous Tissues* 132 *Practice* 111 (#1), 117 (#4-#6), 121 (#1-#4), 125 (#5-#7), 128 (#1, #2) *Use the Practices* 109, 111, 127 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58.
HAP.2.2 ***Construct a model to demonstrate how the structural organization of cells in a tissue relates to the specialized function of that tissue.***	Can be incorporated into the following: 111-125, 127-129, 244 *Chapter Assessments, Epithelial Tissues* 132 (#3) *Chapter Assessments, Connective Tissues* 132 (#8) *Practice* 111 (#2), 128 (#2) *Use the Practices* 129 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58.
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.****	Can be incorporated into the following activities that address cancer and/or engineering: *Diseases, Diagnosis, and Treatment* 373 *Engineer a Healthier World* 1 *Genetic Engineering* 78 *Lab Data Analysis* 57
HAP.3 Integumentary System	
Conceptual Understanding: **The integumentary system is composed of epithelial membranes (i.e., skin epidermis, mucosae, and serosae). The connective-tissue synovial membranes 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.**	

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HAP.3 Students will investigate the structures and functions of the integumentary system, including the cause and effect of diseases and disorders.	11, 135, 136-145 *Chapter Assessments* 150 *Diseases, Diagnosis, & Treatment* 140 *Practice* 137, 140, 143, 145 *Use the Practices* 136, 141 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 7, "Integumentary System," pages 59-68.
HAP.3.1 ***Identify structures and explain the functions of the integumentary system, including layers of skin, accessory structures, and types of membranes.***	11, 135, 136-145 *Chapter Assessments* 150 *Practice* 137, 140, 143, 145 *Use the Practices* 136, 141 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 7, "Integumentary System," pages 59-68.
HAP.3.2 ***Investigate specific mechanisms (e.g., feedback and temperature regulation) through which the skin maintains homeostasis.***	8-9, 144-145 *Chapter Assessments, Skin Functions* (#14-#16) *Integrative Assessments* 150 (#1) *Practice* 10 (#3), 145 (#2, #3)
HAP.3.3 ***Research and analyze the causes and effects of various pathological conditions (e.g., burns, skin cancer, bacterial/viral infections, and chemical dermatitis).***	135 *Appendix G* 645 *Integrative Assessments 151* (#6) *Diseases, Diagnosis, & Treatment* 140, 146-147
HAP3.4 ***Enrichment: Use an engineering design process to design and model/simulate effective treatments for skin disorders (e.g., tissue grafts).****	Can be incorporated into the following activities that address skin disorders and/or engineering: 108 *Engineer a Healthier World* 134 *Integrative Assessments* 132 (#1)
HAP.4 Skeletal System	
Conceptual Understanding: **The skeletal system is composed of cartilage and bone. Together these supportive tissues form the framework for the body. The skeletal system encloses organs, attaches skeletal muscles, and connects bone, forming joints to aid in movement.**	

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HAP.4 Students will investigate the structures and functions of the skeletal system including the cause and effect of diseases and disorders.	11, 152-192 *Chapter Assessments* 196-197 *Diseases, Diagnosis, & Treatment* 158-159 *Practice* 153, 154, 159, 162, 163 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 8, "Organization of the Skeleton," pages 69-78; Exercise 9, "Vertebral Column and Thoracic Cage," pages 79-88; Exercise 10, "Pectoral Girdle and Upper Limb," pages 89-98; Exercise 11, "Pelvic Girdle and Lower Limb," pages 99-108
HAP.4.1 ***Use models to compare the structure and function of the skeletal system.***	Can be incorporated into the following: 11, 152-192 *Use the Practices* 175, 177, 178, 180 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 8, "Organization of the Skeleton," pages 69-78; Exercise 9, "Vertebral Column and Thoracic Cage," pages 79-88; Exercise 10, "Pectoral Girdle and Upper Limb," pages 89-98; Exercise 11, "Pelvic Girdle and Lower Limb," pages 99-108
HAP.4.2 ***Develop and use models to identify and classify major bones as part of the appendicular or axial skeleton.***	162-185 *Chapter Assessments, Skeletal Organization* 197 *Practice* 163 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 8, "Organization of the Skeleton," pages 69-78
HAP.4.3 ***Identify and classify types of joints and their movement.***	185-192 *Chapter Assessments, Joints* 197 *Practice* 192 *Use the Practices* 185
HAP.4.4 ***Demonstrate an understanding of the growth and development of the skeletal system, differentiating between endochondral and intramembranous ossification.***	155-157 *Chapter Assessments, Bone Development and Growth* 196-197 *Practice* 159 *Use the Practices* 155 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 8, "Organization of the Skeleton," page 70

HAP.4.5 ***Construct explanations detailing how mechanisms (e.g., Ca2+ regulation) are used by the skeletal system to maintain homeostasis.***	**157, 343, 344** ***Practice*** **343 (#3), 344 (#2)** ***Use the Practices*** **160, 343**
HAP.4.6 ***Research and analyze various pathological conditions (e.g., bone fractures, osteoporosis, bone cancers, various types of arthritis, and carpal tunnel syndrome).***	152 *Diseases, Diagnosis, & Treatment* 158-159 *Focus* 157, 170 *Lab Data Analysis* 198
HAP.4.7 ***Enrichment: Use an engineering design process to develop, model, and test effective treatments for bone disorders (i.e., prosthetics).****	Can be incorporated into the following: *Focus* 188 *Genetic Engineering* 161
HAP.5 Muscular System	
Conceptual Understanding: **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.**	
MISSISSIPPI STANDARDS	**PAGE NUMBERS**
HAP.5 Students will investigate the structures and functions of the muscular system, including the cause and effect of diseases and disorders.	11-12, 203-235 *Chapter Assessments* 239-240 *Genetic Engineering* 219 *Lab Data Analysis* 241 *Practice* 207, 210, 213, 218, 221, 234 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58; Exercise 12, "Skeletal Muscle Structure and Function," pages 109-116; Exercise 13, "Muscle Fatigue and Force Variance," pages 117-126
HAP.5.1 ***Develop and use models to illustrate muscle structure, muscle locations and groups, actions, origins, and insertions.***	204-207, 218-235 *Practice* 207 (#1), 221 (#1-#3), 235 (#1-#3) *Use the Practices* 204, 218 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58; Exercise 12, "Skeletal Muscle Structure and Function," pages 109-116; Exercise 14, "Muscles of the Head and Neck," 127-136; Exercise 15, "Muscles of the Chest, Shoulder, and Upper Limb," pages 137-150; Exercise 16, "Muscles of the Hip and Lower Limb," pages 151-162

HAP.5.2 ***Describe the structure and function of the skeletal muscle fiber and the motor unit.***	205-207, 215-216 *Chapter Assessments, Structure of Skeletal Muscle* 239 (#3) *Chapter Assessments, Muscular Responses* 239 (#3) *Practice* 207 (#1, #2), 216 (#2) See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58; Exercise 12, "Skeletal Muscle Structure and Function," pages 109-116
HAP.5.3 ***Explain the molecular mechanism of muscle contraction and relaxation.***	208-212 *Chapter Assessments, Skeletal Muscle Contraction* 239 (#1, #2) *Practice* 210 (#1, #2), 213 (#3) *Use the Practices* 208 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 12, "Skeletal Muscle Structure and Function," pages 109-116; Exercise 13, "Muscle Fatigue and Force Variance, pages 117-126
HAP.5.4 ***Use models to locate the major muscles and investigate the movements controlled by each muscle.***	221-235 *Chapter Assessments, Major Skeletal Muscles* 240 *Practice* 234 (#2, #3) See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 14, "Muscles of the Head and Neck," 127-136; Exercise 15, "Muscles of the Chest, Shoulder, and Upper Limb," pages 137-150; Exercise 16, "Muscles of the Hip and Lower Limb," pages 151-162
HAP.5.5 ***Compare and contrast the anatomy and physiology of the three types of muscle tissue.***	203-207, 216-218 *Chapter Assessments, Introduction* 239 *Chapter Assessments, Structure of a Skeletal Muscle* 239 *Chapter Assessments, Smooth Muscle* 239 *Chapter Assessments, Cardiac Muscle* 239 *Practice* 207 (#1), 217 (#3), 218 (#1, #2) *Use the Practices* 216, 217 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58

HAP.5.6 ***Use technology to plan and conduct an investigation that demonstrates the physiology of muscle contraction, muscle fatigue, or muscle tone. Collect and analyze data to interpret results, then explain and communicate conclusions.***	208-216 *Chapter Assessments, Muscular Responses* 239 *Practice* 210, 213, 216 *Use the Practices* 214 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 12, "Skeletal Muscle Structure and Function," pages 109-116; Exercise 13, "Muscle Fatigue and Force Variance, pages 117-126
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).***	203 *Focus* 207, 216, 223 *Genetic Engineering* 219 *Lab Data Analysis* 241 *Use the Practices* 208
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).****	Can be incorporated into discussion of the following: *Healthy Lifestyle Choices* 215 *Integrative Assessments* 240 (#1, #4, #5)
HAP.6 Nervous System	
Conceptual Understanding: **The nervous system is composed of the central nervous system and the peripheral nervous system. These divisions work together to create every thought, action, and sensation that occurs within the body. The exploration of the special senses will provide an understanding of sight, hearing, smell, and taste.**	
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HAP.6 Students will investigate the structures and functions of the nervous system, including the cause and effect of diseases and disorders.	12, 243-291 *Chapter Assessments* 296-298 *Focus* 247 *Healthy Lifestyle Choices* 280 *Practice* 244, 245, 247, 251, 258, 262, 264, 266 *Use the Practices* 244, 248 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58; Exercise 17, "Nervous Tissue and Nerves," pages 163-172; Exercise 19, "Reflex Arc and Reflexes," pages 181-188; Exercise 20, "Reaction Times and Practice," 189-196
HAP.6.1 ***Describe and evaluate how the nervous system functions and interconnects with all other body systems.***	144, 207, 209-210, 265-266, 281-291, 409-410, 517-518 *Integrative Assessments* 298 (#2) *Lab Data Analysis* 298 *Organization* 292 *Practice* 207 (#4), 210 (#1)

HAP.6.2 ***Analyze the structure and function of neurons and their supporting neuroglia cells (e.g. astrocytes, oligodendrocytes, Schwann cells, microglial).***	244, 246-251, 263-264 *Chapter Assessments, Introduction* 296 *Chapter Assessments, Neuroglia* 296 *Chapter Assessments, Neurons* 296 *Practice* 244 (#1), 247, 251 *Use the Practices* 244, 248 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 6, "Muscle and Nervous Tissues," pages 53-58; Exercise 17, "Nervous Tissue and Nerves," pages 163-172
HAP.6.3 ***Discuss the structure and function of the brain and spinal cord.***	267-281 *Chapter Assessments, Spinal Cord* 297 *Chapter Assessments, Brain* 297 *Practice* 269, 274, 277, 281 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 18, "Spinal Cord, Spinal Nerves, and Meninges," pages 173-180; Exercise 21, "Brain and Cranial Nerves," pages 197-208
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).***	244, 251, 260-286 *Chapter Assessments, Peripheral Nervous System* 297 *Practice* 244 (#2), 251 (#4) See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 17, "Nervous Tissue and Nerves," pages 164; Exercise 19, "Reflex Arc and Reflexes," pages 181-188; Exercise 20, "Reaction Times and Practice," pages 189-196; Exercise 22, "General Senses," pages 209-214
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.***	264-266 *Chapter Assessments, Neural Pathways* 297 *Integrative Assessments* 298 (#4) *Practice* 266 *Use the Practices* 264 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 19, "Reflex Arc and Reflexes," pages 181-188; Exercise 20, "Reaction Times and Practice," pages 189-196

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.***	245, 281, 286-291 *Chapter Assessments, Peripheral Nervous System* 297 (#2) *Chapter Assessments, Autonomic Nervous System* 298 *Practice* 288, 291 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 29, "Breathing and Respiratory Volumes," pages 271-280
HAP.6.7 ***Describe the structure and function of the special senses (i.e., vision, hearing, taste, and olfaction).***	305-314, 317-325 *Chapter Assessments, Special Senses* 328 *Chapter Assessments, Sense of Smell* 328 *Chapter Assessments, Sense of Taste* 328 *Chapter Assessments, Sense of Hearing* 328 *Chapter Assessments, Sense of Sight* 328-329 *Practice* 306, 308, 309, 314, 319, 320, 321, 322, 324 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 23, "Smell and Taste," pages 215-224; Exercise 24, "Ear and Equilibrium," pages 225-232
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).***	*Focus* 273, 276, 279 *Healthy Lifestyle Choices* 280 *Integrative Assessments* 298 (#2, #6)
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).****	Can be incorporated into the following: *Genetic Engineering* 255 *Healthy Lifestyle Choices* 280 *Integrative Assessments* 298 (#4)
HAP.7 Endocrine System	
Conceptual Understanding: **The endocrine system, using hormones, gives instructions that control growth and development, reproductive capabilities, and the physiological homeostasis of the body systems.**	

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HAP.7 Students will demonstrate an understanding of the major organs of the endocrine system and the associated hormonal production and regulation.	12, 331-354 *Chapter Assessments* 358-359 *Practice* 332 (#3), 336, 337, 338, 340, 341, 343, 344, 346, 348, 350, 351 *Use the Practices* 333 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 25, "Endocrine Structure and Function," pages 233-244
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.***	9-10, 336-337, 340, 343, 344-345, 347-348, 350 *Chapter Assessments, Control of Hormone Secretions* 358 *Chapter Assessments, Pituitary Gland* 358 (#8) *Chapter Assessments, Parathyroid Gland* 359 (#3) *Chapter Assessments, Adrenal Glands* 359 (#3) *Practice* 10 (#3), 337 (#2), 341 (#9), 343 (#3), 348 (#9), 350 (#4) *Use the Practices* 336, 343, 349 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 25, "Endocrine Structure and Function," pages 233-244
HAP.7.2 ***Discuss the function of each endocrine gland and the various hormones secreted.***	337-351 *Chapter Assessments, Pituitary Gland* 359 *Chapter Assessments, Thyroid Gland* 358 *Chapter Assessments, Parathyroid Glands* 359 *Chapter Assessments, Adrenal Glands* 359 *Chapter Assessments, Pancreas* 359 *Integrative Assessments* 359 (#3, #5, #6) *Practice* 338, 340, 341, 343, 344, 346, 348, 350, 351 *Use the Practices* 337, 342, 349 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 25, "Endocrine Structure and Function," pages 233-244

HAP.7.3 ***Model specific mechanisms through which the endocrine system maintains homeostasis (e.g., insulin/glucagon and glucose regulation; T_3/ T_4 and metabolic rates; calcitonin/parathyroid and calcium regulation; antidiuretic hormone and water balance; growth hormone; and cortisol and stress).***	336-337, 340, 343, 344-345, 347-348, 350, 353-354 *Chapter Assessments, Control of Hormone Secretions* 358 *Chapter Assessments, Pituitary Gland* 358 (#8) *Chapter Assessments, Parathyroid Gland* 359 (#3) *Chapter Assessments, Adrenal Glands* 359 (#3) *Practice* 337 (#2), 341 (#9), 343 (#3), 348 (#9), 350 (#4) *Use the Practices* 336, 343, 349 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 25, "Endocrine Structure and Function," pages 233-244
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).***	343 *Diseases, Diagnosis, and Treatment* 352 *Focus* 339, 340, 343, 346 *Integrative Assessments* 359 (#2, #4, #6) *Use the Practices* 342
HAP.7.5 ***Enrichment: Use an engineering design process to develop effective treatments for endocrine disorders (e.g., methods to regulate hormonal imbalance).****	Can be incorporated into the following: *Diseases, Diagnosis, & Treatment* 352 *Engineer a Healthier World* 242 *Healthy Lifestyle Choices* 353 *Integrative Assessments* 359 (#3, #4) *Lab Data Analysis* 360
HAP.8 Male and Female Reproductive Systems	
Conceptual Understanding: **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.**	
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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.	14, 577-599, 603-604 *Chapter Assessments* 609 *Diseases, Diagnosis, and Treatment* 600-601 *Focus* 578, 592 *Practice* 577, 578, 580, 583, 584, 586, 589, 592, 593 *Use the Practices* 577, 603
HAP.8.1 ***Compare and contrast the structure and function of the male and female reproductive systems.***	577-584, 587-593 *Chapter Assessments, Organs of the Male Reproductive System* 609 *Chapter Assessments, Organs of the Female Reproductive System* 609 *Practice* 578, 580, 583, 584, 588, 593, 594 *Use the Practices* 587

HAP.8.2 ***Describe the male reproductive anatomy and relate structure to sperm production and release.***	577-584 *Chapter Assessments, Organs of the Male Reproductive System* 609 *Integrative Assessments* 610 (#2) *Practice* 578, 580, 583, 584 *Use the Practices* 577
HAP.8.3 ***Describe the female reproductive anatomy and relate structure to egg production and release.***	587-593 *Chapter Assessments, Organs of the Female Reproductive System* 609 *Practice* 588, 589, 592, 593
HAP.8.4 ***Construct explanations detailing the role of hormones in the regulation of sperm and egg development. Analyze the role of negative feedback in regulation of the female menstrual cycle and pregnancy.***	584-586, 593-597 *Chapter Assessments, Hormonal Control of Male Reproductive Functions* 609 *Chapter Assessments, Hormonal Control of Female Reproductive Functions* 609 *Lab Data Analysis* 610 *Practice* 586, 594, 597 *Use the Practices* 584
HAP.8.5 ***Evaluate and communicate information about various contraceptive methods to prevent fertilization and/or implantation.***	599-603 *Chapter Assessments, Birth Control* 609 *Integrative Assessments* 610 (#1) *Practice* 603 *Use the Practices* 593, 599
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.***	612-630 *Chapter Assessments, Fertilization* 637 *Chapter Assessments, Pregnancy and the Prenatal Period* 637 *Chapter Assessments, Postnatal Period* 637 *Chapter Assessments, Aging* 637 *Practice* 612, 613, 616, 618, 620, 622, 624, 625, 627 *Study Strategy* 612 *Use the Practices* 629
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.***	603-604, 611 *Chapter Assessments, Sexually Transmitted Diseases* 609 *Diseases, Diagnosis, and Treatment* 600-601 *Focus* 578, 592, 615 *Genetic Engineering* 632 *Integrated Assessments* 610 (#3) *Practice* 604
HAP.9 Blood	
Conceptual Understanding: **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). Blood types are based on the presence or absence of inherited antigens on the surface of the red blood cells.**	

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HAP.9 Students will analyze the structure and functions of blood and its role in maintaining homeostasis.	363-367 *Chapter Assessments* 383-384 *Practice* 364, 365, 368, 371, 375, 377 *Study Strategy* 363 *Use the Practices* 375 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 26, "Blood Cells," pages 245-254
HAP.9.1 ***Describe the structure, function, and origin of the cellular components and plasma components of blood.***	363-377 *Chapter Assessments, Introduction* 383 *Chapter Assessments, Blood Cells* 383-384 *Chapter Assessments, Plasma* 384 *Chapter Assessments, Hemostasis* 384 *Practice* 364, 365, 368, 369, 371, 372, 375, 377 *Use the Practices* 375 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 26, "Blood Cells," pages 245-254
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.***	377-381 *Chapter Assessments, Blood Groups and Transfusions* 384 *Engineer a Healthier World* 361 *Genetic Engineering* 381 *Integrative Assessments* 384 (#4, #6) *Practice* 380 *Use the Practices* 377 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 27, "Blood Typing," pages 255-260
HAP.9.3 ***Research and analyze the causes and effects of various pathological conditions (e.g., anemia, malaria, leukemia, hemophilia, and blood doping).***	367, 370, 380 *Diseases, Diagnosis, and Treatment* 373 *Focus* 367, 368 *Integrative Assessments* 384 (#2, #3, #5) *Lab Data Analysis* 385 *Use the Practices* 364 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Learning Extension Activity, page 249

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).***	*Genetic Engineering* 381 *Engineering a Healthier World* 361 *Integrative Assessments* 384 (#1)
HAP.10 Cardiovascular System	
Conceptual Understanding: **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 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.**	
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HAP.10 Students will investigate the structures and functions of the cardiovascular system, including the cause and effect of diseases and disorders.	386-421 *Chapter Assessments* 425 *Diseases, Diagnosis, and Treatment* 402 *Practice* 387, 389, 391, 393, 396, 397, 400, 401, 403, 408 *Use the Practices* 387 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 28, "Cardiac Cycle," pages 261-270
HAP.10.1 ***Design and use models to investigate the functions of the organs of the cardiovascular system.***	387-397 *Integrative Assessments* 426 (#1, #2) *Use the Practices* 387 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 28, "Cardiac Cycle," pages 261-270
HAP.10.2 ***Describe the flow of blood through the pulmonary system and systemic circulation.***	387, 411 *Chapter Assessments, Structure of the Heart* 425 (#4) *Chapter Assessments, Paths of Circulation* 425 *Practice* 411 *Study Strategy* 387 *Use the Practices* 387
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.***	400, 403-406 *Chapter Assessments, Blood Vessels* 425 *Integrative Assessments* 426 *Practice* 401, 403, 404, 406
HAP.10.4 ***Demonstrate the role of valves in regulating blood flow.***	390-391, 392, 394, 404-405 *Focus* 391 *Practice* 391 (#5) *Use the Practices* 411

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.***	398-399, 407-410 *Chapter Assessments, Blood Pressure* 425 (#2) *Healthy Lifestyle Choices* 409 *Lab Data Analysis* 426 *Practice* 400 (#10) *Use the Practices* 400 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 28, "Cardiac Cycle," pages 261-270
HAP.10.6 ***Research and analyze the effects of various pathological conditions (e.g., hypertension, myocardial infarction, mitral valve prolapse, varicose veins, and arrhythmia).***	386 *Diseases, Diagnosis, and Treatment* 402 *Focus* 391, 397, 400, 401 *Integrative Assessments* 426 (#4)
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 valves, open blood vessels, or strengthening leaky valves).****	Can be incorporated into the following: *Diseases, Diagnosis, and Treatment* 402 *Focus* 401 *Integrative Assessments* 426 (#1, #2)
HAP.11 Lymphatic System	
Conceptual Understanding: **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.**	
MISSISSIPPI STANDARDS	**PAGE NUMBERS**
HAP.11 Students will investigate the structures and functions of the lymphatic system, including the cause and effect of diseases and disorders.	427-435 *Chapter Assessments, Lymphatic Pathways* 452 *Chapter Assessments, Tissue Fluid and Lymph* 452 *Chapter Assessments, Lymphatic Tissues and Lymphatic Organs* 452 *Focus* 433 *Integrative Assessments* 453 (#2) *Practice* 428, 430, 432, 434, 435 *Use the Practices* 431
HAP.11.1 ***Analyze the functions of leukocytes, lymph, and lymphatic organs in the immune system.***	431, 432, 434-435, 437, 438, 439 *Chapter Assessments, Lymphatic Tissues and Lymphatic Organs* 452 (#1) *Chapter Assessments,* Innate (Nonspecific) Defenses 453 (#7) *Practice* 432 (#3), 434 (#2) See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 26, "Blood Cells," pages 245-254

HAP.11.2 ***Compare the primary functions of the lymphatic system and its relationship to the cardiovascular system.***	428-435 *Chapter Assessments, Lymphatic Pathways* 452 *Practice* 428 *Use the Practices* 428, 431
HAP.11.3 ***Compare and contrast the body's non-specific and specific lines of defense, including an analysis of the roles of various leukocytes: basophils, eosinophils, neutrophils, monocytes, and lymphocytes.***	436-447 *Chapter Assessments, Innate (Nonspecific) Defenses* 453 *Chapter Assessments, Adaptive (Specific) Defenses* 453 *Integrative Assessments* 453 (#3) *Practice* 438 (#2), 440, 442, 445, 446 *Use the Practices* 437 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 26, "Blood Cells," pages 245-254
HAP.11.4 ***Correlate the functions of the spleen, thymus, lymph nodes, and lymphocytes to the development of immunity.***	433-435, 437, 438-440 *Chapter Assessments, Lymphatic Tissues and Lymphatic Organs* 452 *Practice* 434, 435, 440 *Use the Practices* 433
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.***	439, 440-443 *Chapter Assessments, Adaptive (Specific) Defenses* 453 (#1-#4) *Practice* 440 (#3), 442, 445
HAP.11.6 ***Investigate various forms of acquired and passive immunity (e.g., fetal immunity, breastfed babies, vaccinations, and plasma donations).***	446-447 *Chapter Assessments, Adaptive (Specific) Defenses* 453 (#10) *Integrative Assessments* 453 (#4, #5) *Practice* 447 (#15) *Use the Practices* 438
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).***	427, 447-448 *Diseases, Diagnosis, and Treatment* 444 *Focus* 436 *Lab Data Analysis* 454
HAP.12 Respiratory System	
Conceptual Understanding: **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.**	

MISSISSIPPI STANDARDS	PAGE NUMBERS
HAP.12 Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders.	503-525 *Chapter Assessments* 525 *Diseases, Diagnosis, and Treatment* 515 *Genetic Engineering* 510 *Healthy Lifestyle Choices* 519 *Practice* 505, 510, 511, 517, 518, 522, 525 *Study Strategy* 504 *Use the Practices* 504 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 29, "Breathing and Respiratory Volumes," pages 271-280; Exercise 30, "Control of Breathing," 281-288
HAP.12.1 ***Design and use models to illustrate the functions of the organs of the respiratory system.***	504-511 *Chapter Assessments, Organs and Associated Structures of the Respiratory System* 525 *Practice* 505, 510, 511 *Use the Practices* 504 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 29, "Breathing and Respiratory Volumes," pages 271-280; Exercise 30, "Control of Breathing," 281-288
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.***	504-505, 509 *Chapter Assessments, Organs and Associated Structures of the Respiratory System* 529 (#2) *Practice* 505 (#2)
HAP.12.3 ***Identify the five mechanics of gas exchange: pulmonary ventilation, external respiration, transport gases, internal respiration, and cellular respiration.***	520-525 *Chapter Assessments, Alveolar Gas Exchanges* 529 *Chapter Assessments, Gas Transport* 529 *Practice* 521, 522, 525 *Use the Practices* 521
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.****	Can be incorporated into discussion of the following: 512-514, 516-520 *Chapter Assessments, Control of Breathing* 529 *Focus* 516 *Practice* 516, 517, 518 *Use the Practices* 517 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 29, "Breathing and Respiratory Volumes," pages 271-280; Exercise 30, "Control of Breathing," 281-288

HAP.12.5 ***Research and analyze the causes and effects of various pathological conditions (e.g., asthma, bronchitis, pneumonia, and COPD).***	503 *Diseases, Diagnosis, and Treatment* 515 *Focus* 508, 512, 514 *Genetic Engineering* 510 *Lab Data Analysis* 530
HAP.12.6 ***Research and discuss new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition).***	503
HAP.13 Digestive System	
Conceptual Understanding: **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.**	
MISSISSIPPI STANDARDS	**PAGE NUMBERS**
HAP.13 Students will investigate the structures and functions of the digestive system, including the cause and effect of diseases and disorders.	456-485 *Chapter Assessments* 501 *Practice* 457, 459, 462, 465, 466, 467, 469, 470, 472 *Study Strategy* 457 *Use the Practices* 460, 465, 466, 467 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 31, "Digestive Organs," 289-302; Exercise 32, "Action of a Digestive Enzyme," pages 303-308
HAP.13.1 ***Analyze the structure-function relationship in organs of the digestive system.***	457-459, 464, 466, 477-481, 483-485 *Practice* 459, 477, 479 (#2) *Use the Practices* 460, 466 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 31, "Digestive Organs," 289-302
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).***	463-464, 467-468, 477-483 *Use the Practices* 460, 467, 477 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 31, "Digestive Organs," 289-302

HAP.13.3 ***Identify the accessory organs (i.e., salivary glands, liver, gallbladder, and pancreas) for digestion and describe their function.***	349-350, 465-466, 471-477 *Chapter Assessments, Salivary Glands* 501 *Chapter Assessments, Pancreas* 501 *Chapter Assessments, Liver* 501 *Integrative Assessments* 502 (#3) *Practice* 350, 466, 472, 474, 477 *Use the Practices* 465, 470 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 31, "Digestive Organs," 289-302
HAP.13.4 ***Plan and conduct an experiment to illustrate the necessity of mechanical digestion for efficient chemical digestion.***	460, 465, 467-470 *Use the Practices* 460, 465, 467
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.***	91-92, 349-350, 465, 468, 469, 470-471, 479, 480 *Chapter Assessments, Salivary Glands* 501 *Practice* 92 (#3), 350 (#3), 466 (#1), 469 (#2), 470 (#5), 472 (#1, #2) *Use the Practices* 91, 465 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 32, "Action of a Digestive Enzyme," pages 303-308
HAP.13.6 ***Evaluate the role of hormones (i.e., gastrin, leptin, and insulin) in the regulation of hunger and satiety/fullness.***	349-350, 469, 471 *Chapter Assessments, Pancreas* 359 (#2, #3) *Chapter Assessments, Stomach* 501 *Practice* 350 (#3), 470 (#4)
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).***	456 *Diseases, Diagnosis, and Treatment* 476 *Focus* 461, 467, 468, 471, 473, 480, 482 *Healthy Lifestyle Choices* 464, 496 *Integrative Assessments* 502 (#2, #3) *Lab Data Analysis* 502 *Use the Practices* 472
HAP.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).****	456 *Career Corner* 457 *Diseases, Diagnosis, and Treatment* 476 *Engineer a Healthier World* 455 *Integrative Assessments* 502 (#2)
HAP.14 Urinary System	
Conceptual Understanding: **The urinary system regulates the body's homeostasis by removing nitrogenous wastes while 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.**	

MISSISSIPPI STANDARDS	PAGE NUMBERS
HAP.14 Students will investigate the structures and functions of the urinary system, including the cause and effect of diseases and disorders.	14, 531-552, 558, 562, 570 *Diseases, Diagnosis, and Treatment* 551, 565-566 *Focus* 542, 551 *Integrative Assessments* 557 (#4-#6) *Lab Data Analysis* 557 *Practice* 532, 534, 536, 538, 542, 545, 547, 549, 551, 552 *Use the Practices* 532, 548
HAP.14.1 ***Understand the structure and function of the urinary system in relation to maintenance of homeostasis.***	344, 347, 538-547, 562, 563-566 *Chapter Assessments, Urine Formation* 556 *Chapter Assessments, Water Balance* 573 (#4) *Chapter Assessments, Electrolyte Balance* 573 (#4) *Practice* 348 (#7), 562 (#5), 563 (#3), 566 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 33, "Urinary Organs," pages 309-320; Exercise 34, "Urinalysis," pages 321-326
HAP.14.2 ***Describe the processes of filtration and selective reabsorption within the nephrons as it relates to the formation of urine and excretion of excess materials in the blood.***	534, 538-547 *Chapter Assessments, 17.3 Urine Formation* 556 *Practice* 542, 545, 547 *Use the Practices* 538 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 33, "Urinary Organs," pages 309-320
HAP.14.3 ***Investigate relationship between urine composition and the maintenance of blood sugar, blood pressure, and blood volume.***	408, 542 *Organization* 422
HAP.14.4 ***Enrichment: Conduct a urinalysis to compare the composition of urine from various "patients."***	See *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 34, "Urinalysis," pages 321-326
HAP.14.5 ***Develop and use models to illustrate the path of urine through the urinary tract.***	Can be incorporated into the following: 538, 548-552 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 33, "Urinary Organs," pages 309-320
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).***	*Focus* 541, 542 *Integrative Assessments* 557 (#3, #6) *Lab Data Analysis* 557 *Use the Practices* 532 See also *High School Laboratory Manual for Human Anatomy & Physiology*, Exercise 34, "Urinalysis," pages 321-326

Overarching SEPs for Inquiry Extension of Labs	
Ask questions to generate hypotheses for scientific investigations based on empirical evidence and observations and/or ask questions to clarify or refine models, explanations, or designs.	See *High School Laboratory Manual for Human Anatomy & Physiology* xiv-xvii; Exercise 1, "Scientific Method and Measurements," pages 1-8; Exercise 13, Muscle Fatigue and Force Variance," pages 117-126; Exercise 20, "Reaction Times and Practice, pages 189-196; Critical Thinking Activity, page 4; Learning Extension Activity, page 285, 306
Plan and conduct controlled scientific investigations to produce data to answer questions, test hypotheses and predictions, and develop explanations or evaluate design solutions, which require the following:	
Identify dependent and independent variables and appropriate controls.	See *High School Laboratory Manual for Human Anatomy & Physiology* xvi; Learning Extension Activity, page 285, 306
Select and use appropriate tools or instruments to collect data, and represent data in an appropriate form.	See *High School Laboratory Manual for Human Anatomy & Physiology* xvi; Exercise 1, "Scientific Method and Measurements," pages 1-8; Exercise 5, "Movements Through Membranes," pages 41-52; Exercise 32, "Action of a Digestive Enzyme," pages 303-308; Exercise 20; "Reaction Times and Practice," pages 189-196; Alternate Activity, page 43; Critical Thinking Activity, page 4; Learning Extension Activity, page 285, 306
Analyze and interpret various types of data sets, using appropriate mathematics, in order to verify or refute the hypothesis or determine an optimal design solution.	See *High School Laboratory Manual for Human Anatomy & Physiology* xvi; Exercise 1, "Scientific Method and Measurements," pages 1-8; Exercise 5, "Movements Through Membranes," pages 41-52; Exercise 32, "Action of a Digestive Enzyme," pages 303-308; Exercise 20; "Reaction Times and Practice," pages 189-196; Alternate Activity, page 43; Critical Thinking Activity, page 4; Learning Extension Activity, page 285, 306
Construct an explanation of observed relationships between variables.	See *High School Laboratory Manual for Human Anatomy & Physiology* xvi; Exercise 1, "Scientific Method and Measurements," pages 1-8; Exercise 5, "Movements Through Membranes," pages 41-52; Exercise 32, "Action of a Digestive Enzyme," pages 303-308; Exercise 20; "Reaction Times and Practice," pages 189-196; Alternate Activity, page 43; Critical Thinking Activity, page 4; Learning Extension Activity, page 285, 306

Communicate scientific and/or technical information in various formats.	Can be incorporated into the following: *Career Corner* 60, 111, 332, 533, 559, 612 See also *High School Laboratory Manual for Human Anatomy & Physiology***: s**tudents will meet objective through creation of reports of their experiments and completion of Laboratory Assessments: **Exercise 1, "Scientific Method and Measurements," pages 1-8; Exercise 5, "Movements Through Membranes," pages 41-52;** Exercise 32, "Action of a Digestive Enzyme," pages 303-308; Exercise 20; "Reaction Times and Practice," pages 189-196; **Alternate Activity, page 43; Critical Thinking Activity, page 4; Learning Extension Activity, page 285, 306** 303-308, 321-326