



Indiana Academic Standards for Science: Anatomy & Physiology

Correlation Guide

This document illustrates the correlation between the Indiana Academic Standards for Science and the Indiana Academic Standards for Science: Anatomy & Physiology. Teachers are encouraged to use this document as an instructional support tool.

Indiana's Academic Standards for Science - 2010	Indiana's Academic Standards for Science: Anatomy & Physiology
Standard 1: Levels of Organization in the Human Body: Cellular	Standard 1: Levels of Organization in the Human Body: Cellular
Core Standard Describe the different forms of cellular transport within the cell and across the plasma membrane. (AP.1.1, AP.1.2, AP.1.3)	AP.1.1 Investigate the forms of cellular transport within and across cell membranes. Explain how passive and active transport move materials through the body and into/out of cells. Describe the how simple diffusion differs from facilitated diffusion. Describe how vesicular transport moves materials within a cell.
Core Standard Discuss the stages and processes of somatic cell division and investigate cellular differentiation in the course of development and in the adult body. (AP.1.4)	AP.1.2 Develop a model which describes the stages of somatic cell division (mitosis), how it contributes to maintaining homeostasis, and why cellular differentiation is vital to development.
AP.1.1 Compare and contrast diffusion and osmosis, facilitated diffusion, active transport, endocytosis, and exocytosis.	
AP.1.2 Define homeostasis, its principal mechanisms at the cellular level and the consequences of failure to maintain homeostasis.	AP.1.3 Explore the homeostatic range to sustaining human life, the principal mechanism involved, and predict the consequences of what happens when homeostasis is not maintained.
AP.1.3 Describe the importance of proteins in cell function and structure. Give specific examples of proteins and their functions and describe how proteins are synthesized.	AP.1.4 Introduce the basic step and control mechanisms of protein synthesis.
	AP.1.5 Explore the vital ways that proteins contribute to the structure, metabolism, and defense of the body, as well as, the importance of shape to their function.

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<p>AP.1.4 Review the stages of mitosis and discuss differences in lifespan among various types of terminally differentiated cells.</p>	
<p>Standard 2: Levels of Organization in the Human Body: Tissue and Organs</p>	<p>Standard 2: Levels of Organization in the Human Body: Tissue and Organs</p>
<p>Core Standard Examine the role of adhesion molecules and how these contribute to tissue formation. (AP.2.1)</p>	
<p>Core Standard Analyze the relationships among and the histology and physiological functions of tissues and their cellular and biochemical composition. (AP.2.2, AP.2.3, AP.2.4, AP.2.5)</p>	<p>AP.2.1 Analyze how each hierarchical level of life contributes to complexity of anatomy and physiological functions (e.g. cells, tissues, etc.). Investigate the relationships among various tissue types as well as the molecular and cellular composition of these tissues.</p>
<p>AP.2.1 Explain the interactions that exist among cells within multicellular organisms to produce tissues and organs with distinct functions.</p>	
<p>AP.2.2 Compare and contrast the structure, function and location of cells that make up the various types of muscle tissue, nerve tissue and connective tissue.</p>	
<p>AP.2.3 Describe the general cellular structure of an epithelium, including the basement membrane. Describe the different types and locations of epithelia.</p>	<p>AP.2.2 Investigate and be able to describe the histological structural and functional characteristics of the four basic tissue types.</p>
<p>AP 2.4 Describe endocrine and exocrine glands and their development from glandular epithelium.</p>	
<p>AP 2.5 Describe the body cavities, their membranes, and the organs within each cavity and their role in the functioning of the body. Describe the major organ systems and their role in the functioning of the body.</p>	<p>AP.2.3 Identify the body cavities, their membranes, and the organs within each cavity. Investigate the major organ systems and describe their basic functional importance.</p>
	<p>AP.2.4 Identify anatomical terms (including body direction, regions, planes) on a diagram, model, or through dissection.</p>

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Standard 3: Movement and Support in the Human Body: The Integumentary System	Standard 3: Movement and Support in the Human Body: The Integumentary System
Core Standard Analyze the structures of the skin, including skin layers as well as accessory structures (e.g, hair follicles, glands and nails). (AP.3.1, AP.3.2)	
Core Standard Describe the function of the integumentary system and the cause and effect of diseases associated with the integumentary system. (AP.3.3, AP.3.4)	AP.3.1 Analyze the structural characteristics and functional importance of the integumentary system to maintaining homeostasis of the body.
AP.3.1 Describe the structure of the skin, including the hypodermis, dermis and the layers of the epidermis.	
AP.3.2 Describe the accessory structures of the skin (i.e., hairs, nails and glands).	
AP.3.3 Describe the important physiological functions of the skin.	
AP.3.4 Evaluate the cause and effect of diseases associated with the integumentary system.	AP.3.2 Investigate the injuries, diseases, and causes associated with the integumentary system and evaluate the consequences.
Standard 4: Movement and Support in the Human Body: The Skeletal System	Standard 4: Movement and Support in the Human Body: The Skeletal System
Core Standard Describe the structure, development, growth and functions of bones.	AP.4.1 Develop a model to illustrate the structure, development, growth, and function of compact and spongy bone.
AP 4.1 Describe the structure of a typical long bone and indicate how each part functions in the physiology and growth of the bone.	
AP 4.2 Distinguish the axial from the appendicular skeleton and name the major bones of each. Locate and identify the bones and the major features of the bones that make up the skull, vertebral column, thoracic cage, pectoral girdle, upper limb, pelvic girdle and lower limb.	AP.4.2 Evaluate the general macroscopic characteristics of a typical long bone, then locate and identify individual bones and bone features.
AP 4.3 Compare and contrast the microscopic organization of compact (i.e., cortical) bone and spongy (i.e., trabecular) bone.	

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<p>AP 4.4 Describe the major types of joints in terms of their mobility and the tissues that hold them together.</p>	<p>AP.4.3 Identify and describe the structure of the major types of joints and how these structural components influence functional mobility and stability.</p>
<p>AP 4.5 Analyze and describe the effects of pressure, movement, torque, tension and elasticity on the human body.</p>	
<p>Standard 5: Movement and Support in the Human Body: The Muscular System</p>	<p>Standard 5: Movement and Support in the Human Body: The Muscular System</p>
<p>Core Standard Describe the physiology and structure of skeletal, smooth and cardiac muscle as they interact to provide movement and support of the human body.</p>	<p>AP.5.1 Compare and contrast the structural and functional similarities and differences between skeletal, cardiac, and smooth muscle.</p>
<p>Core Standard Compare and contrast the microscopic structure, organization, functions and molecular basis of contraction in skeletal, smooth and cardiac muscle.</p>	
<p>AP 5.1 Name the components of a skeletal muscle fiber and describe their functions.</p> <p>Describe how the thin and thick filaments are organized in the sarcomere.</p>	<p>AP.5.2 Investigate the molecular components of skeletal muscle fiber and how they function to bring about contraction and relaxation.</p>
<p>AP 5.2 Explain the molecular processes and biochemical mechanisms that provide energy for muscle contraction and relaxation.</p>	<p>AP.5.3 Explain the molecular processes involved in the sliding filament model and biochemical mechanisms that provide energy for muscle contraction and relaxation.</p>
<p>AP 5.3 Describe a motor unit and its importance in controlling the force and velocity of muscle contraction. Describe the neuromuscular junction and the neurotransmitter released at the neuromuscular junction.</p>	<p>AP.5.4 Describe how a neuromuscular junction functions and investigate how motor units influence the force and velocity of muscle contraction.</p>
<p>AP 5.4 Distinguish between isotonic and isometric contractions of skeletal muscle; cite examples of each and discuss how the forces generated in muscle contraction are amplified by the use of levers.</p>	

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<p>AP 5.5 Identify the major muscles on a diagram of the body's musculature, through dissection or both. Describe the movements associated with each muscle.</p>	<p>AP.5.5 Identify the major muscles on a diagram, model, or through dissection.</p>
<p>AP 5.6 Explain what is meant by muscular hypertrophy and atrophy and discuss causes of these processes.</p>	<p>AP.5.6 Distinguish between isotonic and isometric contractions of skeletal muscle. Examine muscular hypertrophy and atrophy and discuss causes of these processes.</p>
<p>Standard 6: Integration and Coordination in the Human Body: The Nervous System</p>	<p>Standard 6: Integration and Coordination in the Human Body: The Nervous System</p>
<p>Core Standard Recognize that the nervous system consists of two parts: the peripheral nervous system and the central nervous system. Understand the structure and function of each.</p>	<p>AP.6.1 Develop a model that illustrates the structural components and functional subdivisions of the nervous system.</p>
<p>Core Standard Recognize uses of contemporary electrophysiological technologies (e.g. electroencephalogram, electrocardiogram, transcutaneous electrical nerve stimulation and cardioversion).</p>	
<p>AP 6.1 Distinguish the structures of the various types of neurons. Diagram the structure of a motor neuron and explain the function of each of its parts.</p>	<p>AP.6.2 Describe and diagram the structures of the various types of neurons, their supporting neuroglial cells, and investigate their basic functions.</p>
<p>AP 6.2 Describe the different types of neuroglia. Describe the function of oligodendrocytes and Schwann cells. Describe the structure and function of the myelin sheath and the role that Schwann cells play in myelin and in regeneration of a severed axon.</p>	
<p>AP 6.3 Discuss mathematically the origin of the resting potential. Refer to transcellular gradients of sodium and potassium ions, the "permeability" of the plasma membrane to these ions, and the intracellular concentration of negatively-charged proteins.</p>	
<p>AP 6.4 Explain the changes in membrane potential during the action potential and their relationship to the number of open channels for sodium and potassium ions.</p>	<p>AP.6.4 Identify and model how action potentials are generated, the ions and channel protein involved, and the basic structural and functional aspects which allow for synaptic connection.</p>

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<p>AP 6.5 Explain the role of excitatory and inhibitory neurotransmitters. Explain why is it important to remove a neurotransmitter from its site of action and describe two mechanisms for removal.</p>	
<p>AP 6.6 Describe the meninges of brain and spinal cord. Describe the cerebral ventricles and their interconnections. Describe the secretion, flow pathways, absorption, locations and functions of cerebrospinal fluid.</p>	
<p>AP 6.7 Discuss the functions of the spinal cord. Describe the five segments (i.e., regions) of the spinal cord and explain its organization in terms of gray matter; white matter; and dorsal and ventral roots.</p>	
<p>AP 6.8 Discuss the components and broad function of the brain stem and the diencephalon. Describe and give the functions of the various structures that make up the cerebrum including the cerebral cortex and its anatomical divisions, the cerebral components of the basal ganglia, and the corpus callosum.</p>	
<p>AP 6.9 Describe the structure and functions of the cerebellum and its nuclei regarding postural control, smooth coordination of movements and motor learning.</p>	
<p>AP 6.10 Describe the major characteristics of the autonomic nervous system and contrast its efferent pathways with those of somatic nervous system. Compare and contrast the actions, origins and pathways of nerve fibers in the parasympathetic and sympathetic divisions of the autonomic nervous system including their associated ganglia and neurotransmitters.</p>	<p>AP.6.3 Compare and contrast the actions, origins, and pathways of nerve fibers in the parasympathetic and sympathetic divisions of the autonomic nervous system and their associated neurotransmitters.</p>
<p>Standard 7: Integration and Coordination in the Human Body: Somatic and Special Senses</p>	<p>Standard 7: Integration and Coordination in the Human Body: Somatic and Special Senses</p>

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<p>Core Standard Distinguish between somatic senses and special senses and classify sensory receptors according to the types of stimuli that activate them.</p>	<p>AP.7.1 Distinguish between somatic senses and special senses, the prominent sensory receptor types, and their functional operation.</p>
<p>AP 7.1 Explain how information on stimulus intensity and stimulus quality is signaled to the brain.</p>	
<p>AP 7.2 Explain what is meant by sensory receptor adaptation and give examples related to everyday experience.</p>	
<p>AP 7.3 Describe the structure, function and location of olfactory and taste receptor cells.</p>	
<p>AP 7.4 Identify and describe the parts of the eye. Describe the cells found in the neural retina and the functional dependence of the rods and cones on the pigmented epithelium (i.e., the non-neural retina).</p>	
<p>AP 7.5 Compare the structures of rods and cones, describe the fovea and its function, and discuss the relationship of rods and cones to visual acuity, night vision, dark- adaptation, color vision and color blindness.</p>	<p>AP.7.2 Explore the anatomy of the eye, it's functional layers, the fovea and its function. Investigate how the eye accommodates for near and distance vision as well as how the eye adapts to changes in light.</p>
<p>AP 7.6 Describe the three regions of the ear. Distinguish the structure and function of the vestibular apparatus from the auditory apparatus. Describe how sound is transmitted from the external auditory meatus to the cochlea.</p>	<p>AP.7.3 Investigate the structural components and function of the ear, and model how equilibrium and sound are detected through the ear.</p>
<p>AP 7.7 Explain how the hair cells in the vestibular apparatus and cochlea respond to head tilt, linear acceleration, rotation and sound.</p>	
<p>Standard 8: Integration and Coordination in the Human Body: The Endocrine System</p>	<p>Standard 8: Integration and Coordination in the Human Body: The Endocrine System</p>

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<p>Core Standard Understand the structure and function of the endocrine system in relation to homeostasis, Include a discussion of the specific role of hormones and distinguish between the endocrine glands and endocrine secretory cells found in other organs.</p>	<p>AP.8.1 Investigate the structure and function of the endocrine system and develop models showing how changes in prominent hormone levels impact homeostasis throughout the body systems.</p>
<p>AP 8.1 Discuss the difference between an endocrine gland and an exocrine gland.</p>	<p>AP.8.2 Discuss the structural and functional differences between an endocrine gland and an exocrine gland.</p>
<p>AP 8.2 Explain the nature of a hormone and the endocrine system in relation to digestion and metabolism, homeostasis, growth, development, and reproduction.</p>	
<p>AP 8.3 Identify the chemical classes to which important hormones belong and explain that some hormones act via second messengers.</p>	<p>AP.8.3 Distinguish between amino acid, peptide, and lipid based hormones and describe how they differ in bringing about changes in cellular activity.</p>
<p>AP 8.4 Discuss chemical signals that can control hormone secretion.</p>	<p>AP.8.4 Investigate the hormones of the hypothalamus-pituitary complex, the function of these hormones in controlling the thyroid, gonads, and adrenal cortex; and the feedback signals that control them. Evaluate how the HP complex, the sympathetic nervous system, and the adrenal medulla are influenced by stress.</p>
<p>AP 8.5 Describe the structure and hormones of the hypothalamus-pituitary complex and the function of these hormones in controlling the thyroid, gonads and adrenal cortex.</p> <p>Describe the structure of these glands and the functions of the hormones secreted by them.</p>	
<p>AP 8.6 For glands that are not under the control of the hypothalamus-pituitary complex, describe their structure, the hormones they secrete and their function, and the stimuli for secretion.</p>	<p>AP.8.5 Investigate the endocrine and exocrine functions of the pancreas and its involvement in digestion and blood sugar regulation.</p>

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<p>AP 8.7 Discuss how the hypothalamus-pituitary complex, the sympathetic nervous system, the adrenal medulla and the adrenal cortex are all involved in the body's response to stress.</p>	
<p>AP 8.8 Explain how the cells of the adrenal medulla supplement the actions of the autonomic nervous system.</p>	
<p>Standard 9: Transport in the Human Body: The Blood</p>	<p>Standard 9: Transport in the Human Body: The Blood</p>
<p>Core Standard Define hemostasis and how it is achieved.</p>	
<p>Core Standard Analyze the functions of blood including its role in responding to invading microorganisms, its defense mechanisms (e.g., acute inflammation) and the immune response.</p>	<p>AP.9.1 Analyze and model the functions of blood which are fundamental to maintaining homeostasis; including hemostasis; nutrient, gas, and waste exchange; and inflammatory response.</p>
<p>AP 9.1 Distinguish whole blood from plasma and serum. Classify and explain the functions of the formed elements found in blood and describe where they are produced.</p>	<p>AP.9.2 Evaluate the composition and functions of whole blood, plasma, and the regulation and production of blood cells.</p>
<p>AP 9.2 Describe how erythropoietin regulates red blood cell production.</p>	
<p>AP 9.3 Explain the ABO blood types and their significance in blood transfusion.</p>	<p>AP.9.3 Investigate the ABO blood types, antigens and antibodies, and their significance in blood transfusion.</p>
<p>AP 9.4 Describe the basic processes in blood clotting.</p>	
<p>Standard 10: Transport in the Human Body: The Cardiovascular System</p>	<p>Standard 10: Transport in the Human Body: The Cardiovascular System</p>
<p>Core Standard Identify and locate the organs of the cardiovascular system and discuss their functions.</p>	<p>AP.10.1 Investigate the primary structures of the cardiovascular system and explore their functional importance to maintaining homeostasis.</p>

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<p>Core Standard Analyze the cardiac cycle and explain how it is controlled.</p>	<p>AP.10.2 Investigate the stages, control, and regulation of the cardiac cycle.</p>
<p>AP 10.1 Describe the layers found in the walls of blood vessels and discuss the relative prominence of these layers in the different types of blood vessels. Include an analysis of vasoconstriction and vasodilation and their importance in controlling blood flow through tissues. Describe both the venous pump and varicose veins.</p>	<p>AP.10.3 Compare and contrast the structural and functional difference between the different blood vessel types. Model what vasoconstriction and vasodilation are and how they impact homeostasis.</p>
<p>AP 10.2 Diagram the structure of a capillary bed and explain how materials move in and out of capillaries.</p>	
<p>AP 10.3 Describe the heart and include the pericardium, the layers in its wall, the four chambers, the valves, and the great vessels entering and leaving the heart. Describe the major arteries branching off from the aorta and the regions they supply. Describe the major veins entering the superior and inferior venae cavae. Explain with diagrams how the heart valves ensure one-way blood flow during systole and diastole. Discuss the heart sounds and the points in the cardiac cycle when they are heard.</p>	<p>AP.10.4 Use a diagram and/or a model to illustrate the external and internal structures and layers of the heart, the vessels entering and leaving the heart, and the one-way blood flow through the heart.</p>
<p>AP 10.4 Discuss the importance of the baroreceptor reflex in the regulation of blood pressure. Explain what is meant by hypertension and mention some of the dangers associated with it.</p>	<p>AP.10.5 Discuss the regulation of blood pressure. Analyze the effect of abnormal blood pressure on long term health.</p>
<p>AP 10.5 Describe how the action potential of a cardiac muscle cell differs from that of a neuron. Describe the importance of calcium ion influx during the plateau phase of the action potential. Discuss the functioning of pacemaker cells and the how the wave of depolarization is transmitted to the ventricles.</p>	
<p>AP 10.6 Explain the adjustment of the cardiovascular system to exercise and how it relates to hemorrhage. Contrast changes in the distribution of blood flow and cardiac output and explain the importance of the sympathetic branch of the autonomic nervous system in these responses.</p>	<p>AP.10.6 Investigate how the cardiovascular system and other body systems respond to changes in blood volume as well as changes in physical activity which allow the body to maintain homeostasis.</p>

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Standard 11: Transport in the Human Body: The Lymphatic System and Immune Mechanisms	Standard 11: Transport in the Human Body: The Lymphatic System and Immune Mechanisms
Core Standard Identify and locate major organs of the lymphatic system and discuss their functions.	AP.11.1 Identify the primary structural components of the lymphatic system and their functions. Analyze the relationship with activities of bone marrow, thymus gland, and overall importance in maintaining homeostasis.
Core Standard Illustrate lines of defense including the cellular and non-cellular components of the immune system.	AP.11.2 Investigate the difference between innate and acquired immunity. Examine how cellular and non-cellular components work collectively to defend the body against foreign pathogens and how they contribute to maintaining homeostasis.
AP 11.1 Discuss the major anatomical structures and functions of the lymphatic system including the lymphatic vessels, the structure and major groupings of lymph nodes, and the structures and functions of the spleen, thymus and bone marrow.	
AP 11.2 Discuss the different types of pathogens and outline the strategies the body uses to protect itself from them. Compare and contrast non-specific, innate or natural immunity from specific or acquired immunity.	
AP 11.3 Describe the mechanisms of the acute inflammatory response, its causes and the role of chemical signaling molecules.	AP.11.2 Investigate the difference between innate and acquired immunity. Examine how cellular and non-cellular components work collectively to defend the body against foreign pathogens and how they contribute to maintaining homeostasis.
AP 11.4 Describe the development and maturation of B- and T-lymphocytes. Discuss why the development of self-tolerance is important.	
AP 11.5 Define and discuss antigens, antibodies and complement.	
Standard 12: Absorption and Excretion in the Human Body: The Digestive System	Standard 12: Absorption and Excretion in the Human Body: The Digestive System
Core Standard Identify and locate major and accessory organs of the digestive system and discuss their functions.	AP.12.1 Identify and locate major and accessory organs of the digestive system and investigate their physiological functions.

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Core Standard Analyze the digestive processes from ingestion to defecation.	
AP 12.1 Describe the functions of all the structural components and enzymes of the gastrointestinal tract and accessory organs in relation to the processing, digesting, and absorbing of the three major food classes.	AP.12.2 Investigate the enzymes of the gastrointestinal tract and accessory organs in relation to the processing, digesting, and absorbing of the three major biomolecules.
AP 12.2 Explain the roles of the lacteals and the hepatic portal vein in transporting the products of digestion.	
AP 12.3 Describe the regulation of the enzyme and bicarbonate content of the pancreatic juice.	
AP 12.4 Explain the difference between metabolic and respiratory acidosis and alkalosis.	AP.12.3 Explain the difference between metabolic and respiratory acidosis and alkalosis.
AP 12.5 Describe the microscopic anatomy of the liver and its relationship to the functions of the liver.	
Standard 13: Absorption and Excretion in the Human Body: The Respiratory System	Standard 13: Absorption and Excretion in the Human Body: The Respiratory System
Core Standard Identify and locate major organs of the respiratory system and discuss their functions.	AP.13.1 Identify and locate major organs of the respiratory system and discuss their functions.
Core Standard Analyze the breathing processes (i.e., inspiration, expiration, respiratory volumes and capacities).	AP.13.2 Investigate the anatomical structures and physiological processes involved in inspiration & expiration.
AP 13.1 Contrast inspiration and expiration (i.e., quiet and forced) and explain the role of various muscles and of lung elasticity in this process.	

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<p>AP 13.2 Compare the percentages of the oxygen and carbon dioxide in the external air to the percentages in the alveolar and the pulmonary capillaries. Explain the meaning of partial pressure.</p>	<p>AP.13.3 Investigate how percentages and partial pressure gradients of oxygen and carbon dioxide impact net gas exchange.</p>
<p>AP 13.3 Explain the use of the spirometer and describe the data it generates in a spirogram.</p>	
<p>AP 13.4 Describe the neuronal networks controlling respiration. Contrast and compare the chemoreceptors involved in control of respiration and the stimuli to which they respond. Explain how these receptors affect ventilation under conditions of low arterial oxygen partial pressure, high arterial carbon dioxide and low arterial pH.</p>	<p>AP.13.4 Describe how the body monitors changes in blood pH and carbon dioxide using specialized receptors and how the respiratory system adjusts in order to maintain homeostasis.</p>
<p>Standard 14: Absorption and Excretion in the Human Body: The Urinary System</p>	<p>Standard 14: Absorption and Excretion in the Human Body: The Urinary System</p>
<p>Core Standard Identify and locate major organs of the urinary system and discuss their functions.</p>	<p>AP.14.1 Identify and locate major organs of the urinary system and discuss their functions.</p>
<p>Core Standard Understand the function of the kidneys in relation to homeostatic control of bodily fluids, blood pressure and erythrocyte production.</p>	<p>AP.14.2 Understand the function of the kidneys in relation to homeostatic control of bodily fluids, blood pressure, and erythrocyte production.</p>
<p>AP 14.1 Describe the external and internal structure of the kidney. Describe the parts of a nephron and how it is involved in the three steps in the production of urine. Compare the composition of plasma and ultrafiltrate and discuss the percentages of filtered water, sodium and glucose normally reabsorbed by the kidney tubules.</p>	<p>AP.14.3 Develop a model of the nephron which explores its structural components and the functional processes of filtration, secretion, and reabsorption, which are essential to maintaining homeostasis.</p>
<p>AP 14.2 Explain the importance of the juxtaglomerular cells in the secretion of renin and how it plays a central role in controlling blood pressure by controlling blood levels of angiotensin and aldosterone.</p>	

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<p>AP 14.3 Explain the neural basis of micturition including the function of the sphincters associated with the male and female urethra.</p>	<p>AP.14.4 Explain the neural basis of micturition including the function of the sphincters associated with the male and female urethra.</p>
<p>AP 14.4 Discuss how the volume of body fluid is determined by the balance between ingested and metabolic water on the one hand and water lost in the urine, respiration, feces and sweating on the other hand.</p>	
<p>AP 14.5 Describe how the kidneys respond to excess water intake and to dehydration.</p> <p>Explain the role of antidiuretic hormone and of other hormones that control sodium and water absorption in the kidney.</p>	<p>AP.14.5 Investigate how the kidneys respond to excess water intake and to dehydration, as well as the role of antidiuretic hormone (ADH) and sodium in the regulation of water absorption and excretion.</p>
<p>AP 14.6 Describe how food and metabolic processes add acid to the body fluids. Recognize how chemical buffers, the lungs and the kidneys interact in protecting the body against lethal changes of pH.</p>	
<p>Standard 15: Life Cycle in the Human Body: The Reproductive System</p>	<p>Standard 15: Life Cycle in the Human Body: The Reproductive System</p>
<p>Core Standard Identify and locate major and accessory organs of the female and male reproductive systems and discuss their functions (e.g., oogenesis and spermatogenesis).</p>	<p>AP.15.1 Identify and locate major and accessory organs of the female and male reproductive systems and discuss their functions.</p>
<p>Core Standard Discuss the role of hormones in the reproductive system.</p>	<p>AP.15.2 Discuss the role of hormones in the reproductive system.</p>
<p>AP 15.1 Discuss the anatomy and physiology of the male and female reproductive systems.</p>	
<p>AP 15.2 Compare and contrast oogenesis and spermatogenesis. Distinguish between diploid germcells and haploid or monoploid sex cells.</p>	<p>AP.15.3 Create a model showing how fluctuating hormonal changes associated with the reproductive system impact both the uterine and ovarian cycles.</p>

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<p>AP 15.3 Describe the hormones of the gonads, their cellular origins and their functions. Explain the functions of the gonadotropins FSH and LH in males and females.</p>	
<p>AP 15.4 Explain what is happening during the follicular, ovulatory and luteal phases of the menstrual cycle. Describe how estradiol and progesterone released by the ovaries are responsible for the phases that the uterus goes through during the menstrual cycle.</p>	<p>AP.15.4 Describe how spermatozoa move through the female reproductive tract and describe the process of fertilization.</p>
<p>AP 15.5 Describe how spermatozoa move through the female reproductive tract and describe the process of fertilization.</p>	
<p>AP 15.6 Explain the differences among a dikaryon zygote, a zygote, a morula and a blastocyst. Recognize that the implanted blastocyst secretes human onadotropin, which prolongs the life of the corpus luteum and therefore maintains progesterone secretion. Describe the process of implantation and development of the placenta, the substances that move across it and the role of the placenta in maintaining the fetus.</p>	<p>AP.15.5 Investigate and develop a model of early development which traces the changes of a fertilized cell (zygote) through the blastocyst level of development and the then gastrulation process resulting in the rise of the three primary germ layers.</p>
<p>AP 15.7 Describe the changes in the breast leading to lactation, the hormonal events that initiate milk secretion, the maintenance of milk secretion by the breasts and the milk ejection reflex.</p>	