

# Anatomy and Physiology: Grades 9-12

## Organization of the Body I

- A** Define and explain how anatomy and physiology are related. I.A

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- B** Identify levels of structural organization that make up the human body and explain the relationship. I.B

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- C** State the human body organ systems and list their functions. I.C

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- D** Identify, locate, and label anatomical position, regional terms, directional terms, body cavities, planes of the body, abdominopelvic quadrants, and abdominopelvic regions. I.D

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- E** Describe the functions of the human body and explain how these functions aid in the maintenance of life. I.E

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- F** Explain homeostasis and its role in normal body function. I.F

## Chemical Basis for Life II

- A** Review how the study of living materials requires understanding of chemistry. II.A

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- B** Explain the concept of pH, and its effect on body functions II.B

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- C** Describe how and where enzymes work in the body II.C

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- D** Explain the importance of water and salts to body homeostasis II.D

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- E** Compare the structures and functions of carbohydrates, lipids, proteins, and nucleic acids II.E

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- F** Compare and contrast the structure and functions of DNA and RNA II.F

## Cells and Tissues III

- A** Identify or diagram the cell organelles and be able to explain their function III.A

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- B** Compare osmosis, diffusion, filtration and give examples III.B

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- C** Describe different cell types and explain the functionality of the differences III.C

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- D** Describe the cell cycle, including the phases of mitosis and explain how the timing of cell division is regulated. III.D

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**E Identify the use of stem cells in modern medical procedures and research** III.E

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**F Name classes of human tissues and explain their structure, function, and location** III.F

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**G Describe ways the body repairs damaged tissue** III.G

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**H Identify the various forms of cancer and describe how it affects the body** III.H

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## **Integumentary System** IV

**A Identify structure and function of the skin and accessory structures** IV.A

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**B Describe the normal and pathological colors and conditions of the skin** IV.B

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**C Identify and differentiate between the different types of skin cancer** IV.C

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**D Describe the three classes of burns, the rule of 9s and treatment of each class** IV.D

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**E Understand the role of the integumentary system in maintaining homeostasis** IV.E

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## **Skeletal System** V

**A Differentiate between axial and appendicular skeleton** V.A

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**B Identify functions of the skeletal system** V.B

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**C Identify, locate, and label bones and bone markings of the body.** V.C

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**D Describe bone development through the lifespan** V.D

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**E Identify, locate, and label the joints of the body** V.E

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**F Identify location and function of tendons and ligaments** V.F

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**G Name different types of fractures** V.G

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**H Identify causes and current medical treatments of skeletal disorders** V.H

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## **Muscular System** VI

**A Distinguish between the three types of muscle tissue and tell where they are in the body** VI.A

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**B Identify major muscle groups of face, neck, shoulder, chest, abdomen, back, arms, and legs.** VI.B

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**C Describe the function of the muscular system** VI.C

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**D Compare the structure of the whole muscle and the structure of a single muscle fiber.** VI.D

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**E Explain how skeletal muscle meets its energy demands during rest and exercise** VI.E

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**F** State the criteria for naming muscles **VII.F**

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**G** Describe action of each muscle group related to origin and insertion. **VII.G**

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**Nervous System VII**

**A** List the general functions of the nervous system **VII.A**

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**B** Explain the structural and functional divisions of the nervous system **VII.B**

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**C** List the types of supporting cells and cite their functions **VII.C**

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**D** Identify and label parts of neurons and relate each to a physiological role **VII.D**

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**E** Classify sensory receptors according to body location, structure, and stimulus detected **VII.E**

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**F** Describe the events that led up to, happen during, and result after a nerve impulse and its conduction from one neuron to another **VII.F**

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**G** Identify and indicate the functions of the major regions of the cerebral hemispheres, diencephalons, brain stem, and cerebellum on a human brain model or diagram **VII.G**

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**H** Identify the three meningeal layers, and state their functions **VII.H**

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**I** Understand the formation and function of cerebrospinal fluid and the blood-brain barrier **VII.I**

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**J** Describe spinal cord structure and list its functions **VII.J**

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**K** List the components of the peripheral nervous system **VII.K**

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**L** Distinguish between sensory, motor, and mixed nerves **VII.L**

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**M** Name and locate the cranial nerves and describe their function **VII.M**

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**N** Identify the major nerve plexuses, give the major nerves of each, and describe their distribution **VII.N**

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**O** Distinguish between autonomic and somatic reflexes **VII.O**

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**P** Compare and contrast the general functions of the parasympathetic and sympathetic nervous systems **VII.P**

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**Q** Understand from an anatomical and physiological perspective, the functions of sight, hearing & balance, taste, and smell **VII.Q**

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**R** Identify diseases and disorders of the special sense systems **VII.R**

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**Endocrine System VIII**

**A** Compare between hormonal and neural controls of body functioning **VIII.A**

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**B** List the major endocrine organs, and describe their locations in the body and the hormones they secrete VIII.B

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**C** Describe what a hormone is and how it functions VIII.C

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**D** Understand the negative feedback mechanism VIII.D

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**E** Describe major pathological consequences of hypersecretion and hypo-secretion of hormones VIII.E

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**F** Identify the endocrine role of the kidneys, the stomach and intestine, the heart, and the placenta VIII.F

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**E** Describe the effect of aging on the endocrine system and homeostasis VIII.E

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## Blood IX

**A** Describe the composition and physical characteristics of whole blood and explain why it is classified as a connective tissue IX.A

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**B** List the functions of blood IX.B

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**C** Discuss the composition and functions of plasma IX.C

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**D** Describe the blood-clotting process IX.D

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**E** Describe the ABO and Rh blood groups and explain the basis of transfusion reactions IX.E

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**F** Explain the importance of blood testing as a diagnostic tool IX.F

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**G** Name some blood disorders that become more common with age IX.G

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## Cardiovascular System X

**A** Describe the location of the heart in the body, and identify its major anatomical structures X.A

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**B** Describe the structure and functions of the heart chambers. Name each chamber and provide the name and general route of blood flow X.B

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**C** Trace the electrical activity of the heart (EKG) X.C

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**D** Compare and contrast the structure and function of arteries, veins, and capillaries X.D

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**E** Define vasoconstriction and vasodilation X.E

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**F** Trace blood flow through the heart. X.F

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**H** Identify the body's major arteries and veins, and name the body region supplied by each X.H

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**I** Discuss the unique features of special circulations of the body: arterial to the brain, hepatic portal, pulmonary, and fetal X.I

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**J** List and explain the factors that influence blood pressure and describe how blood pressure is regulated X.J

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**K** Describe the structure and function of a capillary bed X.K

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**L** Draw a diagram of a normal electrocardiogram tracing: name the individual waves and intervals, and indicate what each represents X.L

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## Lymphatic System and Immune Systems XI

**A** Identify the structures of the lymphatic system and explain how the lymphatic system is functionally related to the cardiovascular and immune systems XI.A

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**B** Describe the composition of lymph and explain its formation and transport XI.B

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**C** Describe the general location, histological structure, and functions of lymph nodes XI.C

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**D** Name and describe the other lymphoid organs of the body. Compare and contrast them with lymph nodes structurally and functionally XI.D

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**E** #VALUE! XI.E

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**F** Explain the difference between an antigen and an antibody. XI.F

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**G** Explain how fever helps protect the body against invading pathogens XI.G

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**H** Describe immune-deficiencies, allergies, and autoimmune diseases XI.H

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## Respiratory System XII

**A** Identify locate and label the structures of the respiratory system. XII.A

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**B** Trace the air from nostrils to alveoli XII.B

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**C** Describe the process of inspiration and expiration XII.C

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**D** Identify lung volumes and capacities XII.D

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**E** Discuss voluntary and involuntary control of breathing XII.E

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**F** Describe common lung diseases and disorders XII.F

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**G** Explain the functional importance of the intra-pleural space XII.G

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**H** Describe how oxygen and carbon dioxide are transported in the blood XII.H

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**I** Name several physical factors that influence respiratory rate XII.I

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## Digestive System and Metabolism XIII

- A Describe the function of the digestive system XIII.A**

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- B List and briefly describe the major processes occurring during digestion XIII.B**

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- C Identify, locate and label the structures of the digestive system XIII.C**

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- D Differentiate between the organs of the alimentary canal and accessory organs XIII.D**

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- E List the major functions of the large intestine XIII.E**

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- F List the major enzymes produced by the digestive system and how they function XIII.F**

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- G List the major nutrient categories their dietary sources and the main cellular uses XIII.G**

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- H Explain metabolism XIII.H**

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- I Analyze and explain the chemical reactions that provide energy for the body XIII.I**

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- J Explain the importance of electrolytes balance and its role in homeostasis XIII.J**

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- K Identify common diseases and disorders of the digestive system. XIII.K**

## Urinary System XIV

- A Describe the general structure and function of the urinary system including kidneys, ureters, bladder, and urethra XIV.A**

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- B Identify the parts of the nephron responsible for filtration, reabsorption, and secretion XIV.B**

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- C Describe the physical and chemical properties of urine XIV.C**

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- D Describe diseases and disorders of the urinary system. XIV.D**

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- E Define micturition XIV.E**

## Reproductive System XV

- A Describe the common structure and function of the male and female reproductive systems XV.A**

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- B Define spermatogenesis and trace the pathway of sperm cells from their site of formation to the body exterior XV.B**

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- C Discuss effects of testosterone on male reproductive system XV.C**

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- D Describe the phases of the ovarian cycle and relate them to events of oogenesis XV.D**

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- E Describe effects of hormones on the female reproductive organs XV.E**

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**F Discuss disorders and diseases of the male and female reproductive systems. XV.F**

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**G Describe the process of fertilization and the changes of the female body during pregnancy XV.G**

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**H Explain how labor is initiated and describe the three stages of labor XV.H**

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**I Discuss risk factors that interfere with normal fetal development XV.I**

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**J Distinguish among the types of inheritance and explain techniques to predict genetic disease XV.J**