

# Anatomy Introduction

Science Olympiad Anatomy and Physiology

Name \_\_\_\_\_

Science Olympiad Anatomy and Physiology consists of three body systems this year as follows:

- Nervous System
- Sensory System
- Endocrine System

However, before delving into these systems, a foundational level of knowledge is required about basic human anatomy and physiology that is applied often. This introduction unit is outlined below.

## INTRODUCTION UNIT

Fundamentals of biology, anatomy/physiology, cytology, and histology will all be implemented into this introduction unit.

### Biology

- Organic molecules - carbohydrates, proteins, lipids, and nucleic acids
- General cellular information - organelles/structures, specialization, transport, and homeostasis
- Cellular respiration - anaerobic and aerobic respiration, lactic acid fermentation
- Enzymes - general functions, enzyme-substrate complex, inhibition, and factors that affect them
- Cell division - cell cycle, mitosis, and meiosis
- DNA vs. RNA - similarities and differences, types of each, general biological importance
- Genetics - terms, Mendel's Laws of Heredity, patterns of inheritance, and Punnett squares
- Disease - microbes/pathogens, natural lines of defense

### Anatomy/Physiology

- Body systems - general information regarding each of the thirteen main human organ systems
- Locational terms - terms used in human anatomy, anatomical planes (sagittal, coronal, transverse)
- Regional terms - terms used in human anatomy to refer to regions of the body
- Body cavities - ventral and dorsal cavities, what they divide into, visceral vs. parietal membranes
- Body quadrants - four body quadrants (RUQ, RLQ, LUQ, LLQ) and contents, nine abdominal regions
- Levels of organization - chemical, cell, tissue, organ, organ system, organism and what each entail
- Homeostasis - definition, hypothalamus, negative and positive feedback mechanisms, efferent vs. afferent pathways, components (receptor, integrator, effector), examples

### Cytology

- Cell structures and functions - components of the cell and what each does (eukaryotic)
- Cell membrane - fluid mosaic model, lipid rafts, proteins, types of movement, and diagrams
- Cell junctions - types (adherens, desmosomes, hemidesmosomes, tight, gap) and functions of each, molecules associated with them, examples in the human body
- Cell division - cell cycle ( $G_1$ , S,  $G_2$ , M) with regulation and major checkpoints, mitosis, meiosis, central dogma (DNA replication, transcription, translation)

### Histology

- Epithelial tissue - covering/lining vs. glandular epithelium, classifications (cell shape and number of cell layers), types of glands, functions, location examples
- Connective tissue - loose, dense, osseous, fluid, and cartilage CT, components (cells, fibers, matrix), functions, location examples
- Nervous tissue - neurons vs. neuroglia, neuronal anatomy, CNS vs. PNS, and myelination
- Muscle tissue - three types (skeletal, cardiac, smooth) and characteristics of each, type I and II muscle fibers

Upon completion of this introduction unit, the three body systems will be explored thoroughly.