

Spanish Fork High School

Target Standards for Medical Anatomy & Physiology

UNIT 1 – BODY PLAN AND ORGANIZATION

STANDARDS AND OBJECTIVES

STANDARD

01 Students will explore careers in health care and describe the body plan and organization and homeostasis.

OBJECTIVES

01.01 I CAN explore careers in health care.

01.02 I CAN provide an oral and/or written report for each career exploration utilizing the report outline located in the MAP curriculum.

01.03 I CAN select a topic and defend their position on a current medical ethical dilemma.

01.04 I CAN contrast the sciences of anatomy and physiology.

01.05 I CAN describe the six levels of structural organization of the human body.

(chemical, cellular, tissue, organ, system, organism)

01.06 I CAN describe metabolism and its anabolic and catabolic processes.

01.07 I CAN apply directional terms used in human anatomy.

(posterior/anterior, medial/lateral, proximal/distal, superficial/deep, superior/inferior)

01.08 I CAN apply commonly used planes to divide the body.

(sagittal, midsagittal, transverse [horizontal], frontal [coronal])

01.09 I CAN identify the body cavities and locate the following organs within each cavity.

Dorsal Cavity, Vertebral - spinal cord, Cranial – brain, Ventral Cavity, Thoracic – heart, lungs, Mediastinum - heart, bronchi, esophagus, thymus, Pericardial – heart, Pleural – lungs, Abdominopelvic Cavity - liver, spleen, intestines, kidneys, stomach, Pelvic - intestines, urinary bladder, sex organs

01.10 I CAN identify the major organ(s) in each abdominal quadrant.

•RUQ - right upper quadrant - liver, gallbladder, right kidney

•RLQ - right lower quadrant – cecum, appendix, right ovary

•LUQ - left upper quadrant - spleen, stomach, left kidney

- LLQ - left lower quadrant - left ovary

01.11 I CAN examine the relationship between homeostasis and stress.

01.12 I CAN differentiate between negative and positive feedback mechanisms.

UNIT 2 - BASIC PRINCIPLES OF BODY CHEMISTRY

STANDARDS AND OBJECTIVES

STANDARD

02 Students will explain basic principles of body chemistry.

OBJECTIVES

02.01 I CAN review the following terms and concepts.

(states of matter, elements, basic components of the atom [nucleus, electrons, protons, and neutrons], ion [electrolyte])

02.02 I CAN identify the four major elements in the body.

(carbon, hydrogen, oxygen, nitrogen)

02.03 I CAN differentiate between a compound and a molecule.

02.04 I CAN differentiate between a cation and an anion.

02.05 I CAN describe the characteristics of ionic, covalent, and hydrogen bonds.

02.06 I CAN define pH.

02.07 I CAN categorize acidic, basic, or neutral solutions based on the pH of a solution.

02.08 I CAN distinguish between “neutral” pH and the “average” pH range of the blood.

(neutral pH = 7.0, average pH of blood = 7.35 to 7.45)

02.09 I CAN describe the properties of water and how it is utilized in the human body.

(universal solvent, transport, lubricant, heat capacity, chemical reactions)

02.10 I CAN distinguish between inorganic and organic compounds.

(Inorganic compounds do not contain carbon, are small molecules, and usually form ionic bonds. Organic compounds usually contain carbon, are large molecules, form covalent bonds, and flammable)

02.11 I CAN describe the structures and functions of carbohydrates, proteins, lipids, and nucleic acids.

02.12 I CAN describe how the body produces energy during cellular respiration.

(ATP ↔ ADP + P + ENERGY)

UNIT 3 - CELLS, HISTOLOGY, INTEGUMENTARY SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

03 Students will describe basic concepts of structures and functions of cells, histology, and the integumentary system.

OBJECTIVES

03.01 I CAN identify the four principle parts of a generalized animal cell and their functions. (nucleus, cytosol, organelles & cell membrane)

03.02 I CAN describe the structure and function of the cell membrane.

03.03 I CAN describe a selectively permeable membrane and factors which influence permeability.

03.04 I CAN contrast intracellular and extracellular fluid in terms of location and composition.

03.05 I CAN describe each of the following cellular transport processes and classify them as active or passive. (Passive processes – diffusion, osmosis, facilitated diffusion, dialysis, and filtration. Active processes -- phagocytosis, exocytosis and active transport)

03.06 I Can review the osmotic effects that occur when a cell is placed in an isotonic, hypotonic, or hypertonic solution.

03.07 I CAN describe the function of the following structures within the cell. (nucleolus, gene, chromatin, chromosome, DNA, ribosomes, endoplasmic reticulum, Golgi complex, mitochondria, lysosomes, vacuole, peroxisomes, microfilaments, microtubules, centrioles, centrosomes, flagella, cilia, microvilli)

03.08 I CAN compare and contrast mitosis and meiosis.

03.09 I CAN identify the general characteristics and functions of each of the four principle types of tissues. (Epithelial - strategies for tissue identification [arrangement & cell shape]; Connective - adipose, cartilage, dense fibrous, blood, bone; Muscular - skeletal, smooth, cardiac; and Nervous)

03.10 I CAN contrast exocrine and endocrine glands.

03.11 I CAN differentiate between the four basic types of membranes.

(mucous, serous, synovial, cutaneous) 03.12 Describe the structures and functions of the integumentary system components (skin, glands, hair, nails).

03.13 I CAN describe the major layers of skin (epidermis, dermis, subcutaneous [hypodermis]).

03.14 I CAN describe the functions of sudoriferous (sweat) and sebaceous (oil) glands.

03.15 I CAN identify the following diseases or disorders of the integumentary system.

(acne, skin cancers [basal cell carcinoma, squamous cell carcinoma, malignant melanoma], decubitus ulcers)

UNIT 4 - SKELETAL SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

04 Students will describe the structures and functions of the skeletal system and its components.

OBJECTIVES

04.01 I CAN identify the general functions of the skeletal system.

04.02 I CAN identify the roles of the osteoblasts, osteocytes, and osteoclasts in bone growth and ossification.

04.03 I CAN describe the features of a long bone.(periosteum, diaphysis, epiphysis, medullary cavity, red marrow, yellow marrow, articular cartilage, endosteum, compact bone, spongy bone).

04.04 I CAN identify the four shapes of bones with characteristics and examples of each (long, short, flat, irregular).

04.05 I CAN describe and locate the following bone markings (foramen, meatus, sinus, fossa, condyle, tuberosity, trochanter, tubercle, process).

04.06 I CAN describe the terms “suture” and “fontanel”.

04.07 I CAN contrast the axial and appendicular skeletons.

04.08 I CAN locate the following skull bones(mandible, maxilla, zygomatic, frontal, parietal, occipital, sphenoid, ethmoid, hyoid, temporal, mastoid process).

04.09 I CAN contrast the average number, location and function of each of the five groups of vertebrae.

04.10 I CAN explain the structural classifications of articulations(fibrous, synovial & cartilaginous).

04.11 I CAN differentiate between ligaments and tendons.

04.12 I CAN identify the following diseases or disorders of the skeletal system (herniated disk, osteoarthritis, osteoporosis, scoliosis, spina bifida).

UNIT 5 - MUSCULAR SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

05 Students will describe the structures and functions of the muscular system and its components.

OBJECTIVES

05.01 I CAN identify the general functions of the muscular system.

05.02 I CAN describe the four characteristics of muscle tissue (elasticity, excitability [irritability], extensibility, flexibility).

05.03 I CAN contrast the general location, microscopic appearance, control, and functions of the three specific types of muscle tissue (skeletal, smooth, cardiac).

05.04 I CAN contrast thick and thin myofilaments.

05.05 I CAN describe the sliding-filament theory of muscle contraction.

05.06 I CAN describe what occurs at the neuromuscular junction.

05.07 I CAN define the terms “origin” and “insertion.”

05.08 I CAN explain the role of prime movers (agonists), antagonists, synergists, and fixators.

05.09 I CAN describe the locations and functions of the following skeletal muscles: (biceps brachii, triceps brachii, sternocleidomastoid, trapezius, deltoid, diaphragm, pectoralis major, latissimus dorsi, gastrocnemius, hamstrings, quadriceps, gluteus maximus).

05.10 I CAN identify the following diseases and disorders of the muscular system. (fibromyalgia, muscular dystrophy, shin splints)

UNIT 6 - NERVOUS SYSTEM / SPECIAL SENSES

STANDARDS AND OBJECTIVES

STANDARD

05 Students will describe the structures and functions of the nervous system and special senses.

OBJECTIVES

- 06.01 I CAN restate the three broad functions of the nervous system:(sensory, integration, motor).
- 06.02 I CAN describe the general organization of the nervous system.
- 06.03 I CAN list the functions and structures of neurons and neuroglial cells: (astrocytes, microglia, oligodendrocytes, ependymal cells, Schwann cells).
- 06.04 I CAN sequence the major events when the nerve impulse (action potential) is initiated and transmitted through a neuron.
- 06.05 I CAN contrast white and gray matter of nervous tissue.
- 06.06 I CAN identify the structures responsible for the maintenance and protection of the central nervous system (meninges [dura mater, arachnoid mater and pia mater]).
- 06.07 I CAN explain the role of each of the components of a reflex arc (reflex, reflex arc, receptor, sensory neuron, association [interneuron] neuron, motor neuron, effector).
- 06.08 I CAN identify the four principle parts of the brain (cerebrum, cerebellum, brain stem, diencephalon).
- 06.09 I CAN describe the location, and function of CSF (ventricles, subarachnoid space).
- 06.10 I CAN describe the functions of the three structures of the brain stem. (medulla oblongata, pons, midbrain)
- 06.11 I CAN describe the structures and functions of the diencephalon. (thalamus, hypothalamus)
- 06.12 I CAN describe the locations and functions of the four lobes of the cerebrum (frontal, parietal, temporal, occipital).
- 06.13 I CAN explain the major functions of the cerebellum.
- 06.14 I CAN identify the following diseases or disorders of the nervous system

(ALS, Alzheimer's, bacterial meningitis, cerebral palsy, epilepsy, multiple sclerosis, Parkinson's).

06.15 I CAN describe the principle anatomical structures of the eye.

(accessory structures [eyelid, conjunctiva, lacrimal apparatus, extrinsic muscles]
layers of the eyeball (fibrous tunic [sclera, cornea], vascular tunic [choroid, ciliary body, iris, lens, pupil], nervous tunic [retina])

06.16 I CAN describe the principle anatomical structures of the ear.

(outer ear [auricle, auditory canal], middle ear [tympanic cavity, tympanic membrane, auditory (Eustachian) tube, auditory ossicles (malleus, incus, stapes)], inner ear [bony labyrinth, membranous labyrinth, semicircular canals, vestibule, cochlea, Organ of Corti])

06.17 I CAN identify the following diseases or disorders associated with special senses.

(presbyopia, myopia, hyperopia, cataracts, conjunctivitis, deafness [conductive, sensorineural], glaucoma, macular degeneration, middle ear infection, strabismus, tinnitus, vertigo).

UNIT 7 - ENDOCRINE SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

06 Students will describe the structures and functions associated with the endocrine system.

OBJECTIVES

07.01 I CAN identify the general functions of the endocrine system.

07.02 I CAN describe a “hormone” and how it functions in the body.

07.03 I CAN describe the locations, secretions, and functions of the major endocrine glands (pituitary gland [GH, TSH, ACTH], thyroid gland [thyroxine], adrenals [epinephrine, norepinephrine, cortisol, pancreas [glucagon, insulin]).

07.04 I CAN identify the following diseases or disorders of the endocrine system (acromegaly, cretinism, diabetes mellitus, dwarfism, gigantism, hyperthyroidism, hypothyroidism, myxedema).

UNIT 8 - BLOOD / LYMPHATIC / CARDIOVASCULAR SYSTEMS

STANDARDS AND OBJECTIVES

STANDARD

08 Students will describe the components and functions associated with blood, and the structures and functions of the lymphatic and cardiovascular systems.

OBJECTIVES

08.01 I CAN identify the components of blood and their functions.

(erythrocytes, leukocytes, thrombocytes, plasma)

08.02 I CAN describe erythrocytes, including the structure of hemoglobin.

08.03 I CAN define “leukocyte” and list the two major groups with their cell types.

(granulocytes – neutrophils, basophils, eosinophils, and agranulocytes – monocytes, lymphocytes).

08.04 I CAN describe the process of hemostasis (vascular spasm, platelet plug formation, coagulation).

08.05 I CAN contrast a thrombus and an embolus.

08.06 I CAN identify the antigens found on the erythrocytes and the antibodies that determine the ABO blood types and the Rh factor.

08.07 I CAN identify the following diseases or disorders associated with the blood.

(anemias, hemolytic disease of the newborn, hemophilia, leukemia, mononucleosis, polycythemia)

08.08 I CAN identify the components of the lymphatic system.

(tonsils, spleen, thymus, lymph nodes, bone marrow, lymph vessels)

08.09 I CAN describe how lymph is moved through the body.

08.10 I CAN contrast antigens and antibodies.

08.11 I CAN describe the general roles of T-cells and B-cells in the immune response.

08.12 I CAN distinguish between active and passive immunity, and natural vs. artificial acquisition of immunity.

08.13 I CAN identify the following diseases or disorders associated with the lymphatic system (AIDS, measles, mumps, rubella, tetanus).

08.14 I CAN list the general functions of the cardiovascular system.

08.15 I CAN describe the layers of the heart (epicardium, myocardium, endocardium).

08.16 I CAN identify the chambers of the heart.

08.17 I CAN locate the great blood vessels of the heart (superior vena cava, inferior vena cava, pulmonary trunk, pulmonary arteries, pulmonary veins, aorta, branches of the aorta.)

08.18 I CAN identify the valves of the heart (tricuspid, pulmonary semilunar, bicuspid (mitral), aortic semilunar).

08.19 I CAN trace blood flow through the heart.

08.20 I CAN identify the components of the conduction system of the heart and trace the pathway (SA node, AV node, AV bundle, bundle branches, Purkinje fibers [conduction], fibers).

08.21 I CAN sequence the principle events of the cardiac cycle in terms of systole and diastole.

08.22 I CAN define cardiac output and identify factors that influence it (heart rate and stroke volume).

08.23 I CAN contrast the structures and functions of arteries, capillaries, and veins.

08.24 I CAN define pulse and identify the general location of arteries where pulse may be felt.

08.25 I CAN describe blood pressure and how to measure it.

08.26 I CAN contrast pulmonary and systemic circulation.

08.27 I CAN identify the following diseases or disorders of the cardiovascular system. (aneurysm, arteriosclerosis, atherosclerosis, cerebrovascular accident/stroke, coronary artery disease, hypertension, murmur, myocardial infarction)

UNIT 9 - Respiratory System

STANDARDS AND OBJECTIVES

STANDARD

09 Students will describe the structures and functions associated with the respiratory system.

OBJECTIVES

09.01 I CAN identify the general functions of the respiratory system.

09.02 I CAN sequence the organs of the respiratory system in the order which air will pass through them from the exterior. (nose or mouth, pharynx, larynx, trachea, bronchi, bronchioles, alveolar duct, alveoli).

09.03 I CAN identify the three regions of the pharynx (nasopharynx, oropharynx and laryngopharynx).

09.04 I CAN identify the following anatomical features of the larynx (epiglottis, glottis, hyoid bone, thyroid cartilage, cricoid cartilage, true and false vocal cords).

09.05 I CAN identify the coverings of the lungs and the gross anatomical features of the lungs. (apex, base, lobes, visceral pleura, parietal pleura, pleural cavity)

09.06 I CAN identify the site at which gas exchange occurs in the lungs (alveoli).

09.07 I CAN identify the volumes and capacities of air exchanged during ventilation (tidal volume, vital capacity).

09.08 I CAN differentiate between ventilation, external respiration, and internal respiration.

09.09 I CAN describe the effects of carbon dioxide on ventilation.

09.10 I CAN identify the following diseases or disorders of the respiratory system. (emphysema, influenza, lung cancer, pneumonia, SIDS, tuberculosis)

UNIT 10 - DIGESTIVE SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

10 Students will describe the structures and functions associated with the digestive system.

OBJECTIVES

- 10.01 I CAN identify the general functions of the digestive system.
- 10.02 I CAN contrast chemical and mechanical digestion.
- 10.03 I CAN differentiate between the alimentary canal structures (mouth, pharynx, esophagus, stomach, small intestines, large intestines, rectum, anus) and the accessory structures (salivary glands [parotid], pancreas, gallbladder, liver).
- 10.04 I CAN describe the functions of saliva and salivary amylase in digestion.
- 10.05 I CAN identify the following parts of a typical tooth (crown, neck, root, gingiva, periodontal ligament, enamel, dentin, pulp, root canal).
- 10.06 I CAN define deglutition, mastication, maceration, segmentation, peristalsis and haustral churning.
- 10.07 I CAN identify the anatomical features of the stomach.
(fundus, body, pylorus, rugae, cardiac sphincter, pyloric sphincter).
- 10.08 I CAN identify the basic components of gastric juice.
(pepsin, hydrochloric acid, and mucus)
- 10.09 I CAN identify the location and digestive functions of the pancreas.
- 10.10 I CAN describe the function of bile (emulsification).
- 10.11 I CAN identify the three sections of the small intestine.
(duodenum, jejunum, ileum)
- 10.12 I CAN identify the structures and sections of the large intestine.
(cecum, colon [ascending, transverse, descending, sigmoid], rectum, anal canal)
- 10.13 I CAN identify the following diseases or disorders of the digestive system.
(appendicitis, cirrhosis, colorectal cancer, gallstones, hepatitis, obesity, ulcers)

UNIT 11 - URINARY SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

11 Students will describe the structures and functions associated with the urinary system.

OBJECTIVES

11.01 I CAN identify the general functions of the urinary system.

11.02 I CAN identify the four major organs of the urinary system.

(kidneys, ureters, bladder, urethra)

11.03 I CAN identify the gross anatomy of the kidney.

(renal cortex, renal medulla, renal pyramids, renal pelvis)

11.04 I CAN identify the microscopic structures of the nephron:

(renal corpuscle, glomerulus, glomerular [Bowman's] capsule, afferent arteriole, efferent arteriole), renal tubule (proximal convoluted tubule, descending limb, nephron loop, ascending limb, distal convoluted tubule and collecting duct) and peritubular capillaries.

11.05 I CAN describe the three basic physiological processes and the structures involved in urine formation. (filtration, reabsorption, secretion)

11.06 I CAN identify abnormal constituents of urine.

(glucose, ketones, erythrocytes, leukocytes, bilirubin, microbes)

11.07 I CAN describe the methods of fluid intake (oral [liquid and solid], intravenous, metabolic) and output (micturition, voiding, sweat, feces, exhaled vapor).

11.08 I CAN identify the following diseases or disorders associated with the urinary system (cystitis, diabetes insipidus, glomerulonephritis, incontinence, kidney stones, renal failure, urinary tract infections).

UNIT 12 - REPRODUCTIVE SYSTEM

STANDARDS AND OBJECTIVES

STANDARD

12 Students will describe the structures and functions associated with the reproductive system.

OBJECTIVES

- 12.01 I CAN identify the general functions of the reproductive system.
- 12.02 I CAN describe the anatomy of the male genitalia.
- 12.03 I CAN identify the function of the testes.
- 12.04 I CAN identify the functions of testosterone in the male.
- 12.05 I CAN describe the anatomy of the female reproductive structures.
- 12.06 I CAN identify the functions of the ovaries.
- 12.07 I CAN identify the structures and functions of the uterine (Fallopian) tubes, including fimbriae and infundibulum.
- 12.08 I CAN describe the structures and function of the uterus.
(perimetrium, myometrium, endometrium, fundus, cervix)
- 12.09 I CAN define the menstrual cycle including the ovarian and uterine cycles and changes that occur during menopause.
- 12.10 I CAN describe the physiological effects of estrogens, progesterone and relaxin.
- 12.11 I CAN contrast the general outcomes of spermatogenesis vs. oogenesis.
- 12.12 I CAN define the following sequence of events that occur during human development (fertilization, zygote, implantation, embryo, fetus).
- 12.13 I CAN identify the principle events associated with the three stages of labor.
(Stage 1 - dilation and effacement, Stage 2 - delivery and birth, Stage 3 -placental expulsion).
- 12.14 I CAN identify the following diseases or disorders of the reproductive system.
(reproductive cancers [breast, testicular, cervical, ovarian, prostate], endometriosis, impotence, Sexually Transmitted Infections – STI's [gonorrhea, syphilis, genital herpes, chlamydia, trichomoniasis, genital warts, HPV [HumanPapilloma Virus]).