Medical Anatomy & Physiology Strands and Burt's Basics

Box Elder High School

STRAND 1: BODY PLAN AND ORGANIZATION-Students will explore and describe the body plan, organization, and homeostasis

- Standard 1 Contrast the sciences of anatomy and physiology

- Standard 2 Describe the six levels of structural organization of the human body and give an example of each level.
    - Chemical Cellular Tissue Organ System Organism

- Standard 3 Describe the following: Metabolism, Anabolic process, Catabolic process

- Standard 4 Apply directional terms used in human anatomy.
    - Posterior/Anterior Medial/Lateral Proximal/Distal Superficial/Deep Superior/Inferior

- Standard 5 Apply commonly used planes to divide the body. Sagittal Midsagittal Transverse (horizontal) Frontal (coronal)

- Standard 6 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
            - Abdominal-liver, spleen, intestines, kidneys, stomach
            - Pelvic-intestines, urinary bladder, sex organs

- Standard 7 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-lower left quadrant-left ovary

- Standard 8 Examine the relationship between homeostasis and stress.

- Standard 9 Differentiate between negative and positive feedback mechanisms. Give examples of each.
    - Be able to describe the following:
        - Childbirth, Breast feeding, Blood clotting

STRAND 2: BASIC PRINCIPLES OF BODY CHEMISTRY-Students will explain basic principles of body chemistry.

- Standard 1 Review the following terms and concepts.
    - States of Matter, Elements, Basic components of the atom
        - Nucleus
        - Electrons
        - Protons
        - Neutrons
        - Ion, Electrolyte

- Standard 2 Identify the four major elements in the body.
    - Carbon Hydrogen Oxygen Nitrogen

- Standard 3 Differentiate between: Compound and Molecule

- Standard 4 Differentiate between: Cation and Anion

- Standard 5 Describe the characteristics of bonds.
    - Ionic, Covalent, and Hydrogen

- Standard 6 Define pH

- Standard 7 Categorize the following based on the pH of a solution:
    - Acidic, Basic, and Neutral

- Standard 8 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

- Standard 9 Describe the properties of water and how it is utilized in the human body. Universal solvent Transport Lubricant Heat capacity Chemical reactions

- Standard 10 Distinguish between: Inorganic compounds-do not contain carbon, small molecules, usually form ionic bonds Organic compounds-usually contain carbon, large molecules, form covalent bonds, flammable

- Standard 11 Describe the structures and functions of the following and give an example of each:
    - Carbohydrates, Proteins (Amino Acids), Lipids,
    - Nucleic acids: RNA, DNA

- Standard 12 Describe how the body produces energy during cellular respiration. ATP ↔ ADP + P + ENERGY

STRAND 3:CELLS-Students will describe basic concepts of structures and functions of cells.

- Standard 1 Identify the four principle parts of a generalized animal cell and their functions.
    - Nucleus, Cytosol, Organelles, Cell membrane

- Standard 2 Describe the structure and function of the cell membrane.

- Standard 3 Describe a selectively permeable membrane and factors which influence permeability.

- Standard 4 Contrast intracellular and extracellular fluid in terms of location and composition.

- Standard 5 Describe each of the following cellular transport processes and classify them as active or passive.
    - Passive processes
        - Diffusion, Osmosis, Facilitated diffusion, Dialysis, Filtration
    - Active processes
        - Phagocytosis, Exocytosis, Active transport

- Standard 6 Review the osmotic effects that occur when a cell is placed in the following: Isotonic solution, Hypotonic solution, Hypertonic solution

- Standard 7 Describe the function of the following structures within the cell.
    - Nucleolus, DNA, RNA, Gene, Chromatin, Chromosome, Ribosomes, Rough endoplasmic reticulum, Smooth endoplasmic reticulum, Golgi, complex, Vesicle (vacuole), Lysosomes, Peroxisomes, Mitochondria, Cytoskeleton (Microfilaments, Intermediate filaments, Microtubules) Centrosomes, Centrioles, Cellular surface variants, Microvilli (absorption), Cilia (transports products along the surface of the cell, “crowd surfers”), Flagella (transports the cell)

- Standard 8 Compare and contrast: Mitosis Meiosis

STRAND 4: HISTOLOGY & INTEGUMENTARY SYSTEM-Students will describe basic concepts of structures and functions of histology, and the integumentary system.

- Standard 1 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
    - Nervous

- Standard 2 Contrast the following: Exocrine glands and Endocrine glands

- Standard 3 Differentiate between the four basic types of membranes.
    - Mucous, Serous, Synovial, and Cutaneous

- Standard 4 Describe the structures and functions of the integumentary system components. Skin, Glands, Hair, and Nails

- Standard 5 Describe the major layers of skin.
    - Epidermis, Dermis, Subcutaneous (hypodermis)

- Standard 6 Describe the functions of the following:
    - Sudoriferous (sweat) glands and Sebaceous (oil) glands

- Standard 7 Identify the following diseases and disorders of the integumentary system.
    - Skin cancers: Basal cell carcinoma, Squamous cell carcinoma, Malignant melanoma
    - Decubitus ulcers, Eczema, Lesion
    - Burns: 1st degree, 2nd degree, and 3rd degree

STRAND 5: SKELETAL SYSTEM-Students will describe the structures and functions of the skeletal system and its components.

- Standard 1 Identify the general functions of the skeletal system.

- Standard 2 Identify the roles of the following in bone growth and ossification:
    - Osteoblasts, Osteocytes, and Osteoclasts

- Standard 3 Describe the features of a long bone.
    - Periosteum, Diaphysis, Epiphysis, Medullary cavity, Red marrow, Yellow marrow, Articular cartilage, Endosteum, Compact bone, Spongy bone

- Standard 4 Identify the four shapes of bones with characteristics and examples of each.
    - Long, Short, Flat, and Irregular

- Standard 5 Describe and locate the following bone markings:
    - Foramen, Meatus, Sinus, Fossa, Condyle, Tuberosity, Trochanter, Tubercle, and Process

- Standard 6 Describe and differentiate between the following terms:
    - Suture and Fontanel

- Standard 7 Contrast the axial and appendicular skeletons.

- Standard 8 Locate the following bones:
    - Mandible, Maxilla, Zygomatic, Frontal, Parietal, Occipital, Sphenoid, Ethmoid, Hyoid, Temporal,
    - Clavicle, Scapula, Sternum, Ribs
    - Pelvic bone: (Ilium, Ischium, Pubis) Femur, Patella, Tibia, Fibula, Tarsals, Metatarsals, Phalanges
    - Humerus, Ulna, Radius, Carpals, Metacarpals, Phalanges
    - Vertebrae

- Standard 9 Contrast the average number, location, and function of each of the five groups of vertebrae.
    - Cervical, Thoracic, Lumbar, Sacral, and Coccygeal (Coccyx)

- Standard 10 Explain the structural and functional classifications of articulations:
    - Fibrous, Synovial, and Cartilaginous
    - Amphiarthrotic, Diarthrotic, and Synarthrotic

- Standard 11 Differentiate between ligaments and tendons.
- Standard 12 Identify the following diseases and disorders of the skeletal system:
    - Herniated disk, Osteoarthritis, Osteoporosis, Scoliosis, Kyphosis, Lordosis, Spina bifida, and RA (Rheumatoid arthritis)