

Medical Anatomy Final Review

Body Plan and Organization Review

01.03

- Anatomy: structure
- Physiology: function

01.04 Levels of Body Organization

- Chemical: Calcium
- Cellular: Muscle Fiber
- Tissue: Muscle
- Organ: Heart
- Organ System: Cardiovascular
- Organism: Human Body

01.05 Metabolism

- All chemical processes in body
 - a. anabolism: create
 - b. catabolism: break down

01.06 Directional Terms with relation to the midline

- Anterior/Posterior
- Medial/Lateral
- Proximal/Distal
- Superficial/Deep
- Superior/Inferior
- Ventral/Dorsal
- Adduction/Abduction

01.07 Planes

- Sagittal: cut into right and left sections
- Midsagittal: cut into equal right and left sides
- Transverse/horizontal: cut into top and bottom
- Frontal/coronal: cut into front and back half

01.08 Cavities

- Dorsal:
 - a. vertebral
 - b. cranial
- Ventral:
 - a. thoracic: heart and lungs
 1. mediastinum: midline
 2. pericardial: heart
 3. pleural: lungs
 - b. Abdominal: quadrants of internal organs
 - c. Pelvic: reproductive and urinary

01.09 Quadrants

- Left Upper Quadrant: spleen, stomach, left kidney
- Right Upper Quadrant: liver, right kidney
- Left Lower Quadrant: left ovary (small intestine, large intestine)
- Right Lower Quadrant: cecum, appendix, right ovary

01.10 Homeostasis vs. Stress

- Homeostasis: balance, equilibrium
- Stress: anything that disrupts homeostasis

01.11 Feedback Mechanisms

- Stimulus: stress that changes situation
- Receptor: sends info to control center
- Control center: integration and processing
- Effector: receives information and responds
- Types:
 - a. Negative: counteracts the stimulus
example: glucose/insulin levels
 - b. Positive: enhances the stimulus
example: breast feeding

Chemistry Review

02.01 Matter

- Anything that occupies space and has mass
- Solid, liquid, gas
- Atoms: smallest unit of matter
 - a. nucleus: positive overall charge
 1. protons: positive
 2. neutrons: neutral
 - b. electron shells: negative charge
 1. electrons: negative
- Ion: charged particle
- Element: matter made up of same type of atoms

02.02 Most Abundant Elements

- Carbon, hydrogen, oxygen, nitrogen
- Less abundant but essential: sulfur, phosphorus

02.03

- Compound: break down into two or more substances
- Molecule: combination of two or more atoms in a chemical reaction

02.04 Ions

- Cation: positively charged ion
- Anion: negatively charged ion

02.05 Bonds

- Ionic: one atom loses an electron to another atom; held together by opposite attractions
- Covalent: sharing of electrons
 - a. single, double, triple
- Hydrogen: weak bonds that form a bridge between molecules

02.06 pH

- Degree of acidity or alkalinity (base) of a solution

02.07 0-14 Range

- Less than seven: acid
- Seven/neutral: distilled water
- Greater than seven: base

02.08 pH of blood

- 7.35-7.45

02.09 Properties of Water

- Universal solvent
- Transport mechanism
- Lubricant
- Chemical reactions
- Heat capacity

02.10

- Inorganic: no carbon atoms (ionic bonds)
- Organic: carbon atoms (covalent bonds)

02.11 Life Molecules

- Carbohydrates: CHO
 - a. energy source
 - b. sugars
- Lipids: fats
 - a. higher source of energy; harder to break
- Proteins: made of amino acids
 - a. body tissues
 - b. enzymes/hormones
 - c. held together by peptide bonds
- Nucleic Acids: DNA/RNA
 - a. adenine/thymine
 - b. cytosine/guanine

02.12 ATP and Energy Conversion

- Adenosine Triphosphate (ATP)
 - a. Found in all living systems.
 - b. High energy compound that drives most chemical reactions.
 - c. ATP is produced by body cells in a process known as cellular respiration which involves the breaking down of glucose in a series of chemical reactions.
- $ADP + P + \text{energy} = ATP$

Cell Biology Review

03.01 Parts of an Animal Cell & Functions

- Nucleus: control center, directs cell activities, contains chromosomes (DNA)
- Cytosol: intracellular fluid, container for organelles
- Organelles: small structures within the cell, each have specific functions
- Plasma Membrane: see below

03.02 Structure and Function of Cell Membrane

- Phospholipid bilayer, lipid heads, phosphate heads, integral proteins

03.03 Selective Permeability of Membrane

- Electrochemical gradient (outside positive, inside negative)
- Size, lipid solubility, charge, carrier proteins

03.04 Fluids

- Extracellular: outside of the cell
- Intracellular: inside of the cell

03.05 Transport Processes

- Passive: No energy requirement
 - a. Diffusion: higher to lower concent.
 - b. Osmosis: water from high to low
 - c. Facilitated diffusion: use integral proteins to move from high to low
- Active: requires ATP
 - a. Active Transport: move against the gradient
 - b. Phagocytosis and Exocytosis: cell eating and exiting

03.06 Cell placed in solution

- Isotonic: same conc. Fluid will move in and out equally
- Hypotonic: lower conc. of dissolved substances outside the cell (more water out) water will move in (Burst cell).
- Hypertonic: higher conc. of dissolved substances outside cell (less water out) water will move out (Dehydrate cell).

03.07 Functions of cell structures

- Nucleolus: surrounds the DNA
- Gene: master copy of genetic info
- Chromatin: coils of chromosomes
- Chromosome: contain genes
- DNA: (Deoxyribonucleic Acid)
 - a. DNA is a double helix composed of nucleotides.
 - b. DNA contains genetic code or the information needed for

Organelles

- Ribosomes: protein synthesis
- Endoplasmic Reticulum: chemical reactions and intracellular transport
- Golgi Complex: process proteins
- Mitochondria: creates energy for cell
- Lysosomes: digestion
- Peroxisomes: detox
- Microfilaments: cell movement
- Microtubules: cytoskeleton
- Centrioles: move chromosomes for cell division
- Centrosomes: hold centrioles
- Flagella and cilia: movement/transport
- Vacuole: store water or food

03.08 Cell Division

- Mitosis: replication
- Meiosis: sexual repro/crossing over
- Cytokinesis: cell splitting

Tissues and Integumentary System Review

03.09 Tissues

- Epithelial: covers body surfaces, lines cavities, and forms glands

Layer Arrangement:

- a. Simple: single layer
- b. Stratified: stacked in several layers
- c. Pseudostratified: one weird layer

Shape:

- a. Squamous: flattened sac shape
 - b. Cuboidal: cube
 - c. Columnar: tall and cylindrical
 - d. Transitional: change shape
- Connective: binding and supportive tissue
 - a. dense fibrous
 - b. adipose
 - c. cartilage: structural support
 1. hyaline
 2. fibro
 3. elastic
 - d. osseous (bone)
 1. Bone:
 - a. compact
 - b. spongy
 - e. vascular (blood)
 1. Plasma: liquid aspect
 2. Erythrocytes: RBC transport O₂ and CO₂
 3. Leukocytes: WBC immunity
 4. Thrombocytes: platelets (clot)
 - f. Muscle:
 1. skeletal
 2. cardiac
 3. smooth
 - g. Nervous:
 1. Neuron
 - a) cell body
 - b) dendrite
 - c) axon

03.10 Endocrine vs. Exocrine

- Endocrine: secrete into bloodstream
- Exocrine: secrete into ducts that dump outside the body

03.11 Membranes

- Mucous: lines body cavities that open to the exterior
- Serous: lines cavities that do not open to the exterior
- Synovial: lines the cavities of freely moveable joints
- Cutaneous: skin

03.12 Integumentary System

- Skin Function
 - a. regulation of body temp
 - b. protection
 - c. receives stimuli
 - d. excretion
 - e. immunity
- Glands of the Skin:
 - a. sebaceous glands: oil (03.16)
 1. protection, lubrication, hydration
 - b. sudoriferous: sweat glands (03.16)
 1. regulate body temp
 2. eliminate wastes
- Hair:
 - a. protection
 - b. touch receptors
- Nails:
 - a. grasp and manipulate small objects
 - b. protection

03.13 Skin Layers

- Epidermis: outer layer
 - a. Keratinocyte
 - b. Melanocyte
- Dermis: true skin
 - a. vascular layer
 - b. nervous layer
- Subcutaneous layer (hypodermis)
 - a. attaches to underlying surfaces

Skeletal System Review

04.01 General Function of the Skeletal System

- Support
 - a. framework
 - b. supports soft tissue
 - c. point of attachment
- Protection
- Movement
- Mineral Storage
- Energy Storage
- Red Blood Cell Production (hematopoiesis)

04.02 Bone Cells

- Osteoblasts: bone formation
- Osteoclasts: break down bone
- Osteocytes: mature bone cells

04.03 Features of a Long Bone

- Diaphysis: shaft
- Epiphysis: ends of bone
- Metaphysis: growth region (where meet)
- Articular Cartilage: Hyaline Cartilage covering epiphysis
- Periosteum: covering of rest of bone
- Marrow Cavity: Fatty marrow
- Endosteum: layer of bone cells in cavity
- Compact Bone: dense – no intracellular space
- Spongy Bone: Irregular spaces and structure

04.04 Shapes of Bones

- Long: greater length than width
- Short: equal length and width (carpals/tarsals)
- Flat: Thin and Flat (cranial bones/sternum)
- Irregular: complex (vertebrae/facial bones)

04.05 Bone Markings

- Process: any projection from bone
- Foramen: opening or hole
- Meatus: tube-like passageway
- Sinus: space lined with mucus membrane
- Condyle: knuckle
- Tuberosity: elevated rough area
- Trochanter: process on femur
- Tubercle: small rounded process

04.06 Sutures and Fontanels

- Suture: seam or stitch
- Fontanel: soft spot

04.07 Skeletons

- Axial Skeleton: bones that lie along the midline
- Appendicular Skeleton: bones of free appendages

04.08 Skull Bones: look in packet and book for review

04.09 Vertebrae: 33 Total

- Cervical: 7 (neck)
- Thoracic: 12 (rib attachments)
- Lumbar: 5 (lower back)
- Sacral: 5 (fused, articulate with pelvic bones)
- Coccygeal: 4 (coccyx/ tailbone)

04.10 Structural Articulations

- Fibrous: little or no movement, no spaces, held by dense fibrous connective tissue
- Synovial: synovial space
- Cartilagenous: little or no movement, no space, held by cartilage

04.11 Ligaments and Tendons

- Ligament: provides joint with structural stability
- Tendon: a band or cord of dense fibrous connective tissue extending from one bone to a muscle for attachment

Muscular System Review

05.01 Functions

- Motion
- Posture
- Heat Production
- Regulation of organ volume
- Protect internal organs

05.02 Characteristics of Muscle Tissue

- Elasticity: return to normal length
- Excitability: respond to stimuli
- Extensibility: lengthening
- Contractility: shortening

05.03 Different Muscle Types

- Skeletal
 - a. attached to bones
 - b. striated
 - c. voluntary
 - d. myofilaments
- Cardiac
 - a. wall of the heart
 - b. striated
 - c. involuntary
- Smooth
 - a. blood vessel walls, stomach, intestines, urinary bladder
 - b. involuntary
 - c. non-striated

05.04 Myofilaments

- Contractile Elements
 - a. Actin (thin)
 - b. myosin (thick)

05.05 Sliding Filament Theory of Muscle Contraction

- Myosin heads attach to the active site of the actin and ratchet or swivel pulling the actin myofilament.
- Causes shortening of the tissue fiber.

05.06 Neuromuscular Junction

- Motor Neuron: stimulates muscle cell to contract
- Motor Unit: motor neuron and all its fibers
- Neuromuscular Junction: end of the axon terminal where it meets the muscle fiber
- Ach (acetylcholine): neurotransmitter released to cause an action potential (AP)
- Receptors: receive Ach and cause AP

05.07 Origin and Insertion

- Origin: the body segment that remains stable or stationary (proximal attachment)
- Insertion: the body segment that moves (distal attachment)

05.08 Prime Movers, etc...

- Agonist: prime mover
- Antagonist: performs opposite movement of agonist
- Synergist: assists agonist
- Fixator: stabilizer

05.09 Locations of Skeletal Muscles

- Biceps Brachii: anterior humerus
- Triceps Brachii: posterior humerus
- Trapezius: Superior and posterior back
- Deltoid: shoulder
- Sternocleidomastoid: anterior neck/chest
- Pectoralis Major: Superior Chest
- Latissimus Dorsi: Inferior and posterior back
- Diaphragm: inferior to thoracic cavity
- Quadriceps: anterior thigh
- Hamstrings: posterior thigh
- Gastrocnemius: posterior calf

Nervous System Review

06.01 Functions

- Sensory: monitors changes inside and outside
- Integration: processes stimuli and decides upon next step
- Motor: response that activates muscles or glands

06.02 General Organization

Structural

- Central Nervous System: brain and spinal cord
- Peripheral Nervous System: contains nerves that extend from the brain and spinal cord
 - a. spinal and cranial nerves

Functional

- Sensory: carry input messages to be integrated (afferent)
- Motor: transmit impulses from CNS (efferent)
 - a. voluntary: somatic
 - b. involuntary: autonomic
 - 1. sympathetic
 - 2. parasympathetic

06.03 Structure and Function

- Neurons
 - a. cell body
 - b. dendrite
 - c. axon
- Neuroglial Cells
 - a. astrocytes: anchors to blood capillaries
 - b. Microglia: dispose of dead cells/bacteria
 - c. Oligodendrocytes: produce myelin on axons in CNS
 - d. Ependymal cells: circulate CSF
 - e. Schwann cells: produce myelin on PNS fibers
 - f. Satellite cells: protect and cushion other neurons

06.04 Sequence of an Action Potential

- Resting: polarized membrane
 - a. High Potassium inside cell (positive)
 - b. High Sodium outside cell (negative)
- Neuron Stimulated:
 - a. sodium channels open
 - b. switch relative charges
- Repolarization:
 - a. sodium gates close
 - b. potassium gates open
 - c. restores original charges
- Restore Chemical Gradient:
 - a. sodium potassium pump reverses the chemicals using ATP

06.05 White and Grey Matter

- White: nerve fibers contain myelin
- Grey: nerve fibers do not contain myelin

06.06 Maintenance and Protection of CNS

- Meninges: outer to inner layer
 - a. dura mater: tough mother
 - b. arachnoid mater: spider mother (subarachnoid space)
 - c. pia mater: soft mother

06.07 Reflex Arc's

- Reflexes are rapid/predictable/involuntary responses to stimuli
 - a. sensory stimuli: detects incoming stimuli
 - b. afferent neuron: takes AP to spinal cord
 - c. interneuron: between spinal cord and brain
 - d. efferent neuron: takes AP from spinal cord
 - e. effector: stimulates muscle or gland response

06.08 Principle parts of brain

- Cerebrum: hemispheres, lobes
 - a. frontal, parietal, temporal, occipital lobes
- Cerebellum: coordination and balance
- Diencephalon: thalamus (relay station) and hypothalamus (regulation of body functions)
- Brainstem: pathway for impulses to and from brain

06.09 CSF: Cerebrospinal Fluid

- Produced by the choroid plexus
- Cushions nervous tissue
- Found in ventricles in brain and in subarachnoid space

06.10 Structures of the brainstem

- Medulla oblongata: regulates heart rate, breathing, bp, swallowing, coughing, sneezing, vomiting
- Pons: regulates rate and depth of breathing
- Midbrain: reflex centers for hearing and vision

06.11 Diencephalon

- Thalamus: relay station for sensory impulses whether it will be pleasant or not
- Hypothalamus: regulates body temperature, water balance, metabolism, thirst, hunger, pleasure, sex drive and emotions

06.12 Lobes of the Cerebrum

- Frontal: skeletal muscle control, concentration, planning, problem solving, writing and speech
- Parietal: sensations of temperature, touch, pressure and pain
- Temporal: hearing and balance
- Occipital: vision

06.13 Cerebellum

- Control and coordination
- Equilibrium and Balance

Special Senses Review

06.15 Structures of the Eye

- Eyelid: protects anterior surface
- Conjunctiva: mucous membrane (moisten)
- Lacrimal Apparatus: secretes tears
- Extrinsic Muscles: move the eyeball
- Fibrous Tunic:
 - a. sclera: white portion
 - b. cornea: anterior clear bulge
- Vascular Tunic:
 - a. iris: colored portion
 - b. lens: focuses light
- Nervous Tunic:
 - a. retina: neurons entering the eye
 - b. rods and cones

06.16 Structures of the Ear

- Outer Ear:
 - a. auricle: outer appendage
 - b. auditory canal: opening to ear
- Middle Ear:
 - a. Eustachian tubes: equalizes pressure
 - b. Tympanic membrane: eardrum
 - c. Auditory Ossicles:
 - 1. Malleus: hammer
 - 2. Incus: anvil
 - 3. Stapes: stirrup
- Inner Ear:
 - a. semicircular canals: balance
 - b. vestibule: balance
 - c. cochlea: organs of corti

Endocrine System Review

07.01 General Functions

- Coordinate functions of all body systems
- Resgulate homeostasis through hormone secretion
- Regulate growth, development, and reproduction

07.02 Hormones

- Hormone: secretions of endocrine glands that enter blood and effect a target cell, tissue, or organ

07.03 Glands and major secretions

- Pituitary: in brain
 - a. hGH
 - b. TSH
 - c. ACTH
- Thyroid Gland: throat
 - a. thyroxine
 - b. regulate metabolism
 - c. growth and development
 - d. increase HR, BP, and nervousness
- Adrenal Glands: superior to kidneys
 - a. epinephrine (adrenaline)
 - b. norepinephrine (noradrenaline)
 - c. Fight or flight response
- Pancreas: posterior to stomach
 - a. glucagons
 - b. insulin

Blood Review

08.01 Formed Elements of the blood

- Erythrocytes: Red Blood Cells
- Leukocytes: White Blood Cells
- Thrombocytes: platelets

08.02 Erythrocytes

- Carries O₂ and CO₂
- Bioconcave Disk
- Hemoglobin:
 - a. four globin chains bound to the red pigment called heme
 - b. each heme contains an iron which will bond to O₂

08.03 Leukocytes

- Protects the body from infection
- Granulocytes:
 - a. neutrophils
 - b. eosinophils
 - c. basophils
- Agranulocytes:
 - a. monocytes
 - b. lymphocytes

08.04 Hemostasis

- Stoppage of bleeding
 - a. Vascular Spasm: smooth muscle walls of vessels contract to decrease blood flow to injury
 - b. Platelet Plug Formation: platelets stick to the ends of the injured vessels
 - c. Coagulation: blood clotting (need clotting factors present)

08.05 Types of Clots

- Thrombus: abnormal clot in a blood vessel
 - a. can stop blood supply to a vessel or an organ
- Embolus: dislodged thrombus, traveling clot

08.06 Blood Typing

- Antigens: proteins on the surface of RBC's
- Antibodies: proteins that attach to specific antigens and destroy them
- Type of blood names the antigen and have opposite antibodies
- Ex. Type A blood has A antigens and type B antibodies
- Type O is the universal donor
- Type AB is the universal recipient
- RH Factor
 - a. + is present / - is not present

Lymphatic System Review

08.08 Components

- Lymph nodes: remove foreign particles and clean lymph fluid
- Spleen: filters blood
- Thymus Gland: Site of T cell Maturation
- Peyer's Patches: destroy pathogens in the small intestine
- Bone Marrow: produces white blood cells that mature into lymphocytes

08.09 Movement of Lymph

- Lymphatic capillaries: flow of lymph begins here (small)
- Lymphatic vessels: carry lymph toward the heart with one way valves (larger)
- Lymphatic trunk: larger vessels that dump into collecting ducts
- Blood Stream

08.10

- Antigen: foreign substances that stimulate an immune response
- Antibody: proteins that are produced by cells that react with antigens to destroy them

08.11 Immunity

- T Cells in Cell Mediated Immunity
- Killer t cells: destroy virus infected cells, cancer cells, and foreign cells
- Helper t cells: stimulate other defensive activities of other lymphocytes
- Suppressor t cells: inhibits action of other lymphocytes
- Memory t cells: stores info for the next infection
- Role of B cells in Humoral Immunity
- Humoral immunity: macrophage identifies an antigen and phagocytizes it and processes it.
- Plasma cells: synthesize and release antibodies
- Memory B cells: store information about the specific antigen for the next encounter

08.12 Immunities

- Naturally acquired active immunity: previous exposure to pathogens
- Naturally acquired passive immunity: transfer of antibodies from one person to another
- Artificially acquired active immunity: vaccine
- Artificially acquired passive immunity: antibodies from an animal or another person

Cardiovascular Review

08.14 General Functions

- Transportation of oxygen, carbon dioxide, nutrients, hormones, waste products, enzymes, electrolytes, and other substances

08.15 Layers of the heart

- Epicardium: outer layer of the heart, visceral pericardium
- Myocardium: middle layer of the heart, heart muscle
- Endocardium: inner layer of the heart

08.16 Chambers

- Atria: superior chambers, called the receiving chambers (from veins)
- Ventricles: inferior chambers, called the pumping chambers (to arteries)

08.17 Great Vessels

- Superior and Inferior vena cava: drainage into right atrium: deoxygenated blood
- Pulmonary Trunk: branches into left and right pulmonary arteries which go to lungs
- Pulmonary arteries: take deoxygenated blood to the lungs
- Pulmonary veins: take oxygenated blood from lungs to left atrium
- Aorta: oxygenated blood from the left ventricle to the body
- Branches of the aorta: brachiocephalic, left subclavian, left common carotid

08.18 Valves

- Tricuspid: between right atria and ventricle
- Bicuspid: between left atria and ventricle
- Pulmonary Semi-lunar valve: between right ventricle and pulmonary trunk
- Aortic Semi-lunar valve: between left ventricle and aorta

08.19 Blood Flow through the heart

- SVC/IVC, right atrium, tricuspid valve, right ventricle, pulmonary semi lunar valve, pulmonary trunk, pulmonary arteries, lungs, pulmonary veins, left atrium, bicuspid valve, left ventricle, aortic semilunar valve, aorta, branches

08.20 Conduction System Pathway

- SA node (pacemaker)
- AV node (backup pacemaker)
- AV bundle (bundle of his)
- Bundle branches
- Purkinje Fibers

08.21 Cardiac Cycle

- Systole: contraction
- Diastole: relaxation
- Lub: blood hits against closed AV valves
- Dub: blood hits against closed semilunar valves

08.22 Cardiac Output

- Stroke volume: volume of blood pumped out with each heartbeat
- Heart rate: number of heart beats in one minute
- Cardiac output: $SV * HR = CO$
- Factors that affect cardiac output
- Anything that makes the heart beat faster or that makes it stronger
- Anything that tends to cause the heart to beat more slowly or more weakly

08.23 Arteries, capillaries, and veins

- Arteries: carries blood away from the heart
 - a. all except pulmonary artery carry oxygenated blood
 - b. small arteries are called arterioles
 - c. Layers: tunica externa, tunica media, tunica intima

- Veins: carry blood to the heart
 - a. all except pulmonary veins carry deoxygenated blood
 - b. small veins are called venules
 - c. same layers but have one way valves
- Capillaries: small vessels that exchange nutrients and wastes between arterioles and venules

08.24 Pulse Points

- Radial: wrist
- Temporal: temples/ side of face
- Common carotid: sides of trachea in neck
- Facial: lower jawbone
- Brachial: biceps brachii
- Popliteal: behind knee
- Posterior tibial: inner ankle
- Dorsalis pedis: upper foot

08.25 Blood Pressure:

- a. Systolic: force of blood pushing against the artery walls when ventricles contract
- b. Diastolic: force of blood pushing against the artery walls when the ventricles relax

08.29 Pulmonary and Systemic Circulation

- Pulmonary Circuit: blood flow from heart to lungs and back
- Systemic Circuit: blood flow from heart to the rest of the body and back

08.30 Risk factors for Cardiovascular Disease

- Non controllable: genetics, gender, age
- Controllable: smoking, high fat/cholesterol diet, blood pressure, inactivity, stress, weight

Respiratory System Review

09.01 Functions

- Deliver oxygenated air to alveoli
- Remove CO₂
- Filters, warms, humidifies air
- Produces sound
- Sense of smell
- Regulates pH

09.02 Passage of Air

- Nose/mouth
- Pharynx
- Larynx
- Trachea
- Bronchi
- Bronchioles
- Alveoli
- Alveolar sacs

09.03 Pharynx

- Nasopharynx
- Oropharynx
- Laryngopharynx

09.04 Larynx

- Epiglottis: flap over trachea
- Glottis: opening for air between vocal cords
- Hyoid Bone: attachment for tongue/help swallow
- Thyroid Cartilage: adam's apple
- Vocal Cords: true (produce sound)
- False: close larynx during swallowing

09.05 Lungs

- Apex: superior aspect
- Base: inferior aspect/rests on diaphragm
- Lobes: 3 on right, 2 on left
- Fissures: divides lungs into lobes
- Pleura: visceral (sac encloses lungs), parietal (lines thoracic cavity)
- Pleural cavity: space filled with fluid

09.06 Gas Exchange

- Alveoli to capillary network
- Swap CO₂ from blood with O₂ from outside body

09.07 Ventilation

- Tidal Volume: air moved in and out during quiet breathing
- Inspiratory Reserve Volume: air during forced inhalation + TV
- Expiratory Reserve Volume: air during forced exhalation + TV
- Residual Volume: air remains in the lungs at all times
- Vital Capacity: Maximum air exhaled after deepest breath. $VC=TV+IRV+ERV$

09.08

- Ventilation: breathing air in and out
- External Respiration: exchange gas between air and blood
- Internal Respiration: exchange gas between blood and body cells

09.09 Effects of CO₂ on Respiration

- Medulla Oblongata: sensitive to changes
- Respiratory Center: is stimulated if breathing rate increases; & if increased CO₂ levels
- CO₂ is a respiratory stimulus

Unit 14 Digestive Review

10.01 Functions

- Break down large food molecules into small molecules to be used by body.

10.02 Digestion

- Chemical: break down CHO, lipids, and proteins into their building blocks using chemical reactions
- Mechanical: break from large to small physically

10.03 Alimentary vs. Accessory

- Alimentary: tube from mouth to anus
- Accessory Organs: enzymes break down food

10.04 Saliva

- 99.5% H₂O, .5% Chemicals to break down food
- Salivary amylase; breaks down starch into maltose

10.05 Teeth

- Crown: exposed above gums
- Neck: Line between crown and root
- Root: Embedded in jaw
- Gingivae: gums
- Dentin: basic shape of tooth
- Pulp Cavity: nerves and blood vessels inside tooth
- Enamel: hard protective cover

10.06 Digestive Processes

- Deglutition: swallowing
- Mastication: chewing
- Maceration: mix food with gastric juice = chyme
- Segmentation: bring chyme into contact with mucous membrane: absorption
- Haustral Churning: in large intestine, food fill haustra and is pushed to next haustra

10.07 Stomach

- Stomach: gastric secretion takes place to break down food
 - a. fundus: storage
 - b. body: gastric pits
 - c. pylorus: link to SI, sphincter

10.08 Gastric Juice Components

- Pepsin: active digestive enzyme
- Hydrochloric Acid: activates pepsinogen to pepsin
- Mucous: protects lining of stomach

10.09 Pancreas

- Located posterior to stomach
- Secretes insulin and glucagon and pancreatic digestive juices (flow into SI)

10.10 Bile

- Gallbladder: holds bile that is produced in liver
- Secretes into SI via common bile duct
- Bile emulsifies fat
- Bile pigment is bilirubin

10.11 Small Intestine

- Duodenum: chemical digestion
- Jejunum: absorb nutrients
- Ileum: absorb nutrients

10.12 Large Intestine

- Absorbs water, vitamins, and electrolytes
- Produce vitamin K
- Form feces
- Removal of feces

- Anatomy:
 - a. cecum
 - b. ascending colon
 - c. transverse colon
 - d. descending colon
 - e. sigmoid colon
 - f. rectum
 - g. anus

Urinary System Review

11.01 General Functions

- Maintain homeostasis by regulating the composition and volume of blood
- Excretes H₂O and nitrogenous wastes
- Eliminate heat
- Maintain blood pressure
- Help in metabolic processes

11.02 Four organs of Urinary

- Kidneys: filter blood and uring
- Ureters: tube from kidney to bladder
- Bladder: stores urine for secretion
- Urethra: tube leading from bladder to exterior

11.03 Anatomy of Kidney

- Renal capsule: tissue surrounding kidney/barrier
- Adipose Capsule: fat surrounding kidney/protect
- Renal Fascia: anchors kidney to surrounding structures
- Renal Pelvis: collects urine from renal pyramids

11.04 Nephron

- Renal Corpuscle
 - a. Glomerulus: capillary network
 - b. bowmans capsule: surrounds glomerulus
 - c. Afferent arteriole: approaching glomerulus
 - d. Efferent arteriole: leaving glomerulus
- Renal Tubule
 - a. proximal convoluted tubule
 - b. loop of henle
 - c. distal convoluted tubule
 - d. Peritubular capillaries
- Collecting Duct

11.05 Urine Formation

- Glomerular Filtration: force fluid through membrane to filter
- Tubular Absorption: filter from tubules to blood
- Tubular Secretion: addition of materials to filtrate from blood

11.06 Urine

- Color: yellow or amber
- Turbidity: clear

- Odor: shouldn't have unless old due to ammonia
- pH: 4.6-8.0
- Specific gravity
- Chemical Composition:
 - a. urea
 - b. uric acid
 - c. creatine
 - d. ketones
 - e. hypuric acid
 - f. indican
 - g. organic and inorganic materials

11.07 Fluids

- Micturition: urination
- Voiding: elimination of urine
- Sweat: evaporation of fluids to regular temp.
- Feces: water eliminated through defecation
- Exhaled vapor: fluid lost through ventilation of exhaled vapor

Unit 16 Reproductive Review

12.01 Function

- Produce offspring
- Pass on genetic information
- Produce and secrete hormones

12.02 Male Genitalia

- Testes: male sex organs
- Epididymus: site of sperm maturation
- Ductus Deferens: passage for sperm from epididymus to urethra
- Ejaculatory Ducts: ducts under the bladder to eject sperm into prostate
- Urethra: eject sperm and urine
- Accessories
 - a. seminal vesicles: secretes fluid to add to semen (nutrients)
 - b. Prostate gland: secretes fluid to add to semen
 - c. Cowpers glands: lubrication for intercourse, add fluid to semen
- Scrotum: encloses and protects testes
- Penis: introduce sperm to female genitalia

12.03 Function of Testes

- Production of sperm
- Production of testosterone

12.04 Functions of Testosterone

- Growth and development
- Maintain sex organs
- Stimulate bone growth
- Close epiphyseal plate
- Influence sexual behavior
- Sperm maturation
- Stimulates secondary sex characteristics

12.05 Female Reproductive Structures

- Ovaries: develop egg cells
- Vagina: passageway for sperm and menstrual flow, receptacle for penis
- Vulva: external genitalia
 - a. Labia Majora: outer lip, covered with pubic hair
 - b. Labia Minora: inner lip, no pubic hair
 - c. Clitoris: nervous and erectile tissue
 - d. Vestibular glands: produce lubrication for intercourse
- Mammary Glands: milk producing glands
 - a. areola: dark area surrounding nipple
 - b. nipple: raised area for infant suckling

12.06 Functions of the Ovaries

- Produce mature ovum
- Ovulation
- Secretion of female hormones

12.07 Fallopian/Uterine Tubes

- Transport ova from site of ovulation to uterus
- Infundibulum: funnel opening next to ovaries
- Fimbriae: finger-like projections that draw egg into tube

12.08 Uterus

- Cervix: opening to the vaginal canal
- Perimetrium: outermost layer
- Myometrium: smooth muscle tissue for expansion and contraction
- Endometrium: layer shed during menstruation; layer used for implantation of blastocyst

12.09 Cycles

- Menstrual cycle: series of changes in endometrium
- Ovarian cycle: series of changes associated with the maturation of an ovum

12.10 Hormones

- Estrogen
 - a. devt. and maintenance of the female repro system
 - b. fluid and electrolyte balance
 - c. blood calcium and bone density levels
 - d. protein anabolism
- Progesterone
 - a. maturation
 - b. prepare and maintain uterine lining

- Relaxin
 - a. relaxes pubic symphysis
 - b. dilate cervix for delivery
- 12.11 Gamete Production
 - Spermatogenesis: production of sperm
 - Oogenesis: production of eggs
- 12.12 Human Development
 - Fertilization: union of sperm with egg
 - Zygote: fertilized egg
 - 16 cells in mass: morula
 - Blastocyst: attaches to endometrium
 - Implantation: blastocyst inserts itself into lining
 - Embryo: first eight weeks
 - Fetus: eight weeks to birth
- 12.13 Labor
 - Stage 1: dilation and effacement of cervix
 - a. amniotic sac ruptures
 - b. dilate cervix to 10 cm
 - Stage 2: birth and delivery through vaginal canal or cesarean section
 - Stage 3: placental expulsion