Systems

- Systems
  - Like cells form tissues
  - Like tissues form organs
  - Organs with similar functions form systems

- Ten (10) bodily systems
  - Skeletal
  - Muscular
  - Integumentary
  - Urinary
  - Endocrine
  - Digestive
  - Circulatory
  - Respiratory
  - Nervous
    - Includes special organs of sense
    - Reproductive

Skeletal System

- Physiology
  - Support
  - Protection
  - Framework for movement
  - Hemopoeisis
  - Calcium storage

- Two major sections
  - Axial skeleton
    - Skull
    - Spinal column
    - Chest wall
  - Appendicular skeleton
    - Shoulders
    - Arms
    - Forearms
    - Wrists, hands & fingers
- Pelvis
- Thighs
- Legs
- Ankles, feet & toes

Axial Skeleton

- Skull
  - Formed by individual plates “sutured” together
    - Frontal (one)
    - Parietal (two)
    - Sphenoid (two)
    - Temporal (two)
    - Occipital (one)
- Face
  - Supraorbital arches
  - Zygomatic arches
  - Nasal bone
  - Maxilla
  - Mandible
    - Temperomandibular joint (TMJ)
- Spinal Column
  - Individual anatomy
    - Body
    - Transverse processes (two)
    - Spinous process (one)
    - Vertebral discs
  - Collective anatomy
    - 33 total bones stacked in a column
    - 5 regions
      - Cervical spine (most superior)
      - Thoracic spine (chest wall)
      - Lumbar spine (small of the back)
      - Sacral spine (back of pelvis)
      - Coccyx (“tailbone”)
- Cervical spine
- Forms the neck
- 7 bones
  - C1 through C7
    - C1 aka “Atlas”
    - C2 aka “Axis”
- Curves anteriorly
- Devastating injury if cord involved

- Thoracic spine
  - Forms the chest
  - 12 bones
    - T1 through T12
      - Each vertebrae has one pair of attached ribs
  - Curves posteriorly

- Lumbar spine
  - Forms the “small” of the back
  - 5 bones
    - L1 through L5
  - Curves anteriorly
  - Spinal cord ends in lumbar spine
  - Frequently injured

- Sacral spine (Sacrum)
  - Forms the back wall of the pelvis
  - 5 fused bones
  - Curves posteriorly

- Coccyx
  - Forms the back wall of the pelvis
  - 4 fused bones
  - Curves posteriorly

- Chest wall
  - Ribs
    - 12 pairs
    - First seven are “True” ribs
- Attach directly to sternum
  • Last 5 are “false” ribs
    - Do not attach to sternum
  • Last 2 are also “floating” ribs
    - Attach to nothing
- Breastbone (usually collectively referred to as the Sternum)
  • Manubrium
  • Sternum
  • Xyphoid process

Appendicular Skeleton

- Shoulder
  - Clavicle (collar bone)
  - Scapula (shoulder blade)
- Arm
  - Humerus
- Forearm
  - Radius
  - Ulna
- Wrist
  - Carpals
- Hand
  - Metacarpals
- Fingers
  - Phalanges

- Pelvis
  - Sacrum (posterior)
    - Ilium
      • Acetabulum
    - Ischium
    - Symphysis Pubis
- Thigh
  - Femur
    • Head
    • Neck
    • Greater Trochanter
- Knee
  - Patella
- Leg
  - Tibia
  - Fibula
- Ankle
  - Calcaneus
  - Tarsals
- Foot
  - Metatarsals
- Toes
  - Phalanges

Muscular System

- Physiology
  - Movement
  - Muscles only contract
  - Must have opposing groups

- Types
  - Skeletal
    - Striated
    - Voluntary
    - End in tendons
    - Surrounded by fascial membranes
  - Smooth
    - Visceral
    - Involuntary
    - Lines organs
    - Usually in two layers
      - Circular
      - Longitudinal
  - Cardiac
    - Heart
    - Has characteristics of both smooth and skeletal muscle
    - Can stimulate self to contract

- Sternocleidomastoid
- Deltoid
- Biceps
- Triceps
• Pectoralis
• Abdominal Oblique
  - Rectus Abdominis
  - Exterior Oblique

• Quadriceps Femoris (Anterior thigh)
  - Rectus Femoris
  - Vastus Lateralis
  - Vastus Medialis
  - Sartorius
• Hamstrings (Posterior thigh)
• Gastrocnemius
  - Calf

Integumentary System

• Physiology
  - Barrier to infection
  - Barrier to evaporation
  - Heat regulation
  - Creation of Vitamins
    • Exposing the skin to sunlight creates vitamin D

• Epidermis
• Dermis
  - Blood vessels
  - Nerves
  - Sebaceous glands
  - Sweat glands
  - Hair follicles
• Subcutaneous tissue
  - Adipose fat
• Fascia
• Muscle
• Fascia
• Bone

Urinary System
- Physiology
  - Waste removal
  - Water regulation
  - Salt regulation
  - Acid-base balance
    - relative acidity of blood/body

- Kidney
  - Nephron
    - Plasma separated from solid portion of blood
    - Liquid moved through tubule
    - Tubule surrounded by blood vessels
    - Materials are selectively reabsorbed
  - Ureters
  - Urinary bladder
  - Urethra

**Endocrine System**

- Physiology
  - Chemical control & communication
- Ductless glands
  - Pituitary
    - Master control gland located at the base of the brain
  - Thyroid
  - Adrenal
    - Epinephrine
  - Ovaries
  - Testes

**Special Organs of Sense**

- Eye
  - External tissues
• Conjunctiva
• Sclera
• Cornea
  - Anterior chamber
  • Aqueous humor
  • Iris
    – Pupil
  • Lens
  - Posterior chamber
  • Vitreous humor
  • Retina
  - Optic nerve

• Ear
  - Outer ear
    • Auricle (Pinna)
    • External auditory canal
    • Typanum (ear drum)
  - Middle ear
    • Ossicles
      – Malleus (Hammer)
      – Incus (Anvil)
      – Stapes (Stirrup)
  • Eustachian tubes
  - Inner ear
    • Cochlea (Hearing)
    • Semicircular canals (Equilibrium)
    • Nerves
      – Vestibular (Equilibrium)
      – Cochlear (Hearing)

Gross Abdominal Anatomy

• Right upper quadrant
  – Gallbladder
  – Liver
  – Pancreas
  – Colon
• Ascending
• Hepatic flexure
• Transverse
  - Small bowel

• Left upper quadrant
  - Liver
  - Pancreas
  - Spleen
  - Stomach
  - Duodenum
  - Colon
    • Transverse
    • Splenic flexure
    • Descending
  - Small bowel

• Left lower quadrant
  - Colon
    • Descending
    • Sigmoid
  - Small bowel
  - Ureter
  - Top of urinary bladder
  - Female organs of reproduction
    • Ovaries
    • Fallopian tubes
    • Superior uterus

• Right lower quadrant
  - Colon
    • Cecum
    • Appendix
    • Ascending
  - Small bowel
  - Ureter
  - Top of urinary bladder
  - Female organs of reproduction
    • Ovaries
    • Fallopian tubes
    • Superior uterus

*Digestive System*
• Physiology
  - Nutrient absorption
    • Sugars
    • Proteins
    • Fats
    • Salts & minerals
    • Vitamins
  - Two major divisions
    • Alimentary canal
    • Accessory digestive organs

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• Alimentary Canal
  - Oropharynx
    • Mouth
    • Tongue
    • Teeth
      - Mastication
  - Laryngopharynx
    • Throat
  - Esophagus
    • Cardiac Sphincter

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• Stomach
  - HCl
  - Pepsin
  - Peristalsis
  - Pyloric Sphincter

65
• Small Bowel
  - Duodenum
    • 10 inches
    • Bile
    • Bicarbonate
  - Jejunum
    • 16 feet
    • Site of true absorption (mostly solids)
  - Ileum
    • 12 inches

66
• Large Bowel (Colon)
  - Cecum
    • Appendix
  - Ascending Colon
  - Hepatic Flexure
  - Transverse Colon
- Splenic Flexure
- Descending Colon
- Sigmoid Colon
- Rectum
- Anus

• Accessory Digestive Organs
  - Salivary glands
    • Amylase
  - Pancreas
    • Insulin
    • Bicarbonate
  - Liver
    • Bile
  - Gall Bladder