THE DIGESTIVE SYSTEM

• **Function**: to help convert food into simpler molecules that can be absorbed and used by the cells of the body.

• **Alimentary Canal**: a one way tube that passes through the body. (found in other chordates)
TYPES OF DIGESTION

- **Mechanical Digestion** - the physical breakdown of large pieces of food into smaller pieces.
- **Chemical Digestion** - large food molecules are broken down into smaller food molecules.
THE DIGESTIVE SYSTEM

• **Mouth** - physical and chemical digestion begin here. Saliva contains enzymes (lysozyme and amylase) which help in chemical digestion.

• **Pharynx** - (throat) - opening in back of mouth.
  • The tongue and muscles in the throat, push the chewed clump of food, or **bolus**, down the throat.

• **Esophagus** - passageway from throat to stomach.
  • **Peristalsis** - muscle contractions that squeeze food through the esophagus and into the stomach.
  • **Pyloric Sphincter** - closes esophagus after food has passed into the stomach
THE DIGESTIVE SYSTEM

• **Stomach**
  - Pepsin and hydrochloric acid in stomach break down proteins.
  - Stomach muscles and fluids mix food to form chyme, which is passed to the small intestine, through the pyloric valve.

• **Small Intestine**—functions in absorption of nutrients. (6 m long)
  - Contains 3 parts: duodenum, jejunum, and the ileum.
  - Lined with numerous folds, and finger-like projections called villi/microvilli, which provide more surface area for nutrient absorption.

• **Large Intestine/Colon**—removes water from waste materials, remains are excreted by rectum.
THE SMALL INTESTINE
ACCESSORY STRUCTURES

- **Salivary Glands**
  - Helps moisten the food and make it easier to chew.
  - Contains enzymes that help with chemical digestion.

- **Pancreas**
  - Produces hormones that regulates blood sugar levels.
  - Produces enzymes that break down macromolecules.
  - Produces Sodium Bicarbonate, that neutralizes stomach acid so enzymes can be effective.

- **Liver**
  - Produces bile (stored in gallbladder) that helps dissolve and break down fat molecules.
• One person eats a beef steak in a few bites, while another chews the same amount of beef well. If all other conditions are equal, will both people digest the beef at the same rate? Explain.
WARM UP EXERCISE

• What are the three parts of the small intestine?
• What about the structure of the small intestine makes it really good at nutrient absorption?
• Explain the difference between chemical and mechanical digestion.
• Excretory System - eliminates nonsolid waste through sweat, urine, and exhalation to help maintain homeostasis in the body.
  • Wastes include toxic materials, excess water, salts, CO2, urea, minerals and vitamins.
  • Main Organs: skin, lungs, kidneys, ureters, urinary bladder, and urethra.
THE KIDNEYS

- **Kidneys** - eliminate wastes by filtering and cleaning the blood to produce urine.
  - Urine leaving the kidneys moves through the ureters, to the bladder, and the urethra.
  - The inner layer of the kidneys is called the medulla, the outer layer is the cortex.
  - Blood enters the kidneys through the renal artery and exits via the renal vein.
INTEGUMENTARY SYSTEM

- **Integumentary System**- surrounds all of your other organ systems providing protection and helping maintain homeostasis.
  - Includes skin, hair, nails, old glands, and sweat glands.
- All of the tissues of the integumentary system are housed in your skin- the largest organ of the body.
THE SKIN

• The skin is made up of three layers:
  • **Epidermis** - outermost layer of skin. Contains pores and consists mostly of dead cells that flake off. Cells in the epidermis produce the proteins **melanin** and **keratin**.
    • Keratin causes skin to become **thicker** in areas that maintain a lot of contact with the environment.
    • Melanin is a skin **pigment** that absorbs harmful **UV rays** that may otherwise damage internal organs.
THE SKIN

• **Dermis**- middle and thickest layer. Contains glands and cells that produce **elastin** and **collagen** to maintain the skin’s **structure** and **flexibility**.
  • The dermis also contains sweat glands (called **eccrine** glands), oil glands (called **sebaceous** glands), and **hair follicles**.

• **Subcutaneous Fat**- protects and cushions larger blood vessels and neurons. Insulates the muscles and internal organs from temperature changes.
  • These cells are connected to muscles and bones by a layer of **connective tissues**.
WARM UP EXERCISE

• Explain the flow of urine following extraction from the blood in the kidneys.
SKELETAL SYSTEM

- The skeletal system is divided into two parts:
  - **Axial Skeleton** - made up of bones that support the weight of the body and protect internal tissues.
  - **Appendicular Skeleton** - allows your body to move.
- **Functions**: supports the body, protects internal organs, allows for movement, stores minerals, and provides a site for blood cell formation.
  - **Hematopoiesis** - the production of blood cells.
- The human skeleton is made up of bones, cartilage, and ligaments.
THE SKELETAL SYSTEM

- **Cartilage** - flexible connective tissue found between bones. It cushions your bones and allows for smooth movements.
- **Ligament** - long, flexible band of connective tissue that connects to bones across a joint.
- **Joint** - a place where one bone attaches to another bone.
  - Permits bones to move without damaging each other.
  - Cartilage typically covers the surface where two bones come together, which protects the bones as they move against each other.
THE SKELETAL SYSTEM

• In embryos, the skeleton is composed of cartilage. Around 2 months of development, bone begins to form in a process called ossification.
THE MUSCULAR SYSTEM

• Three Types of Muscle Tissue
  • **Skeletal Muscle** - typically attached to bones. Responsible for voluntary movement. **Striated**.
  • **Smooth Muscle** - found in blood vessels, stomach, and intestines. **Involuntary**. **Non-striated**.
  • **Cardiac Muscle** - only found in the heart. **Striated** - but cells are smaller. **Involuntary**.
Cardiac muscle cell
Skeletal muscle cell
Smooth muscle cell
THE MUSCULAR SYSTEM

- Muscle filaments are made up of 2 proteins: actin and myosin.
- **Tendons** - connective tissue that connects muscles to bones.
- Muscles typically come in **pairs** - when one muscle contracts, the other relaxes.
WARM UP EXERCISE

• What are the two divisions of the skeletal system?
• What are the four types of tissues?
• How many bones are in the human body?
• What are the two main proteins in muscle cells?
THE REPRODUCTIVE SYSTEM

- **Zygote** - the single fertilized egg from which all cells of the human body develops.
- **Puberty** - period when reproductive system becomes fully functional. (ages 9-15)
THE MALE REPRODUCTIVE SYSTEM

- **Scrotum** - external sac containing the testis.
- **Testis** - contain seminiferous tubules which produce sperm (during meiosis).
- **Epididymis** - stores fully matured sperm.
- **Vas Deferens** - carries sperm from epididymis to urethra (which leads out of the body through the penis).
MALE REPRODUCTIVE SYSTEM

- Urinary bladder
- Vas deferens
- Pubic bone
- Urethra
- Penis
- Epididymis
- Testis
- Scrotum
- Seminal vesicle
- Rectum
- Prostate gland
- Bulbourethral gland
THE FEMALE REPRODUCTIVE SYSTEM

- **Follicles** - clusters of cells surrounding an egg. (help egg mature- eggs develop within follicle)
- **Ovulation** - process where matured follicle breaks open and releases egg.
- **Fallopian Tubes** - egg moves from ovaries to fallopian tubes, where it is fertilized.
- **Uterus** - receives fertilized egg.
- **Cervix** - opening to the uterus.
- **Vagina** - canal that leads from uterus to outside of the body.
FEMALE REPRODUCTIVE SYSTEM

- Fallopian tube
- Ovary
- Uterus
- Urinary bladder
- Pubic bone
- Urethra
- Cervix
- Rectum
- Vagina
The heart is enclosed in a protective sac called the **pericardium**.

The walls of the heart are made up of connective and epithelial tissues that wrap around a thick layer of muscle called the **myocardium**.

- Contractions of the myocardium pump blood through the circulatory system.