Chapter 1: Introduction to Human Anatomy and Physiology.

# Overview of Human Anatomy and Physiology

1. \_\_\_\_\_\_\_\_\_\_\_\_ – the study of the *structure* of the body and the relationships of the various parts of the body
   1. Gross or macroscopic (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   2. Microscopic (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
   3. Developmental – structural changes over time (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the study of the *functions* of the parts of the body, includes specific organ systems and molecular and cellular levels (neurophysiology, cardiovascular physiology, electrophysiology)

# Introduction:

1. The early students of anatomy and physiology were most likely concerned with treating illnesses and injuries.
2. Early healers relied on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. Later, herbs were used to treat certain ailments.
4. Eventually, after much controversy, the study of medicine with standardized terms in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ began.

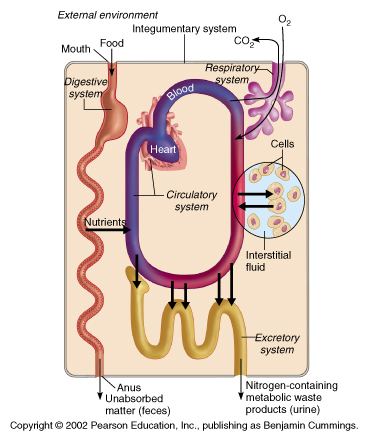
# Levels of Structural Organization

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – atoms combine to form molecules
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – molecules interact to make up cells
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – cells are grouped into tissue
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – tissues compose organs
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – organs function together to form organ systems
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (individual) – made up of the organ systems

# Basic Structures of the Human Body

1. \_\_\_\_\_\_\_\_\_\_\_\_ – A group of similar cells that performs a specific function
2. \_\_\_\_\_\_\_\_\_\_\_\_ – A structure consisting of a group of tissues with a specialized function
3. \_\_\_\_\_\_\_\_\_\_\_\_ – Organs working together to allow the body to perform a function.

# Organ Systems

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Forms the external body covering
   2. Composed of skin, sweat glands, oil glands, hair, and nails
   3. Protects deep tissues from injury and synthesizes vitamin D
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of bone, cartilage, and ligaments
   2. Protects and supports body organs
   3. Provides the framework for muscles
   4. Site of blood cell formation
   5. Stores minerals
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of muscles and tendons
   2. Allows manipulation of the environment, locomotion, and facial expression
   3. Maintains posture
   4. Produces heat
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Integrates and coordinates body functions
   2. Composed of the brain, spinal column, and nerves
   3. Is the fast-acting control system of the body
   4. Responds to stimuli by activating muscles and glands
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Integrates and coordinates body functions
   2. Includes all glands that secrete chemical messengers, also called hormones
   3. Hormones alter the metabolism of target cells
   4. Examples of organs of the ES are the pituitary, thyroid, parathyroid, adrenal glands, pancreas, ovaries, testes, pineal gland, and thymus gland
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of the heart and blood vessels
   2. The heart pumps blood
   3. The blood vessels transport blood throughout the body
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of red bone marrow, thymus, spleen, lymph nodes, and lymphatic vessels
   2. Picks up fluid leaked from blood vessels and returns it to blood
   3. Disposes of debris in the lymphatic stream
   4. Houses white blood cells involved with immunity
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of the nasal cavity, pharynx, trachea, bronchi, and lungs
   2. Keeps blood supplied with oxygen and removes carbon dioxide
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Composed of the oral cavity, esophagus, stomach, small intestine, large intestine, rectum, anus, and liver
   2. Breaks down food into absorbable units that enter the blood
   3. Eliminates indigestible foodstuffs as feces
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    1. Composed of kidneys, ureters, urinary bladder, and urethra
    2. Eliminates nitrogenous wastes from the body
    3. Regulates water, electrolyte, and pH balance of the blood
11. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    1. Composed of prostate gland, penis, testes, scrotum, and ductus deferens
    2. Main function is the production of offspring
    3. Testes produce sperm and male sex hormones
    4. Ducts and glands deliver sperm to the female reproductive tract
12. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    1. Composed of mammary glands, ovaries, uterine tubes, uterus, and vagina
    2. Main function is the production of offspring
    3. Ovaries produce eggs and female sex hormones
    4. Remaining structures serve as sites for fertilization and development of the fetus
    5. Mammary glands produce milk to nourish the newborn

# Organ System Interrelationships

1. The integumentary system protects the body from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ environment
2. Digestive and respiratory systems, in contact with the external environment, take in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Nutrients and oxygen are distributed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Metabolic wastes are eliminated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Characteristics of life include:

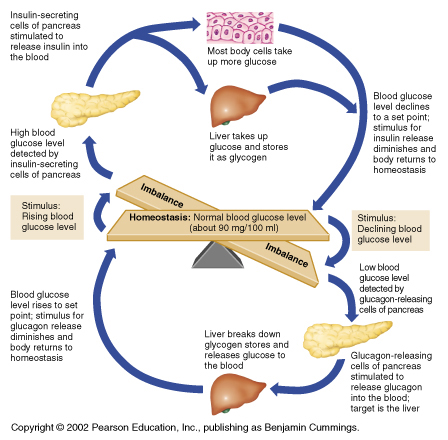
1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (internal or gross)
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (reaction to internal or external change)
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (increase in size without change in shape)
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (new organisms or new cells)
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (use of oxygen; removal of CO2)
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (breakdown of food into simpler forms)
7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (movement of substances through membranes and into fluids)
8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (movement within body fluids)
9. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (changing nutrients into chemically different forms)
10. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (removal of metabolic wastes)

The total of all the chemical reactions that are continuously at work to maintain these characteristics constitutes metabolism.

# Metabolism-side note

1. ***Metabolism:*** A broad term used for all the chemical reactions that occur within cells of the body
   1. ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** - breaking down substances into simpler components
   2. ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** – synthesizing more complex substances or structures from simpler substances

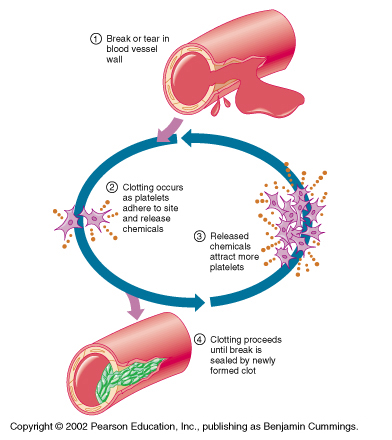
# ap1lf0104_aHomeostasis

1. Maintenance of a stable internal environment is called **homeostasis.** Homeostasis is regulated through control systems that have receptors, a set point, and effectors in common. Examples include:
   1. Homeostatic mechanisms regulate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. Another homeostatic mechanism employs pressure-sensitive receptors to regulate blood pressure.
2. Homeostatic Control Mechanisms
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the factor or event being regulated
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ monitors the environment and responds to changes (stimuli)
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ determines the set point at which the variable is maintained
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ provides the means to respond to the stimulus

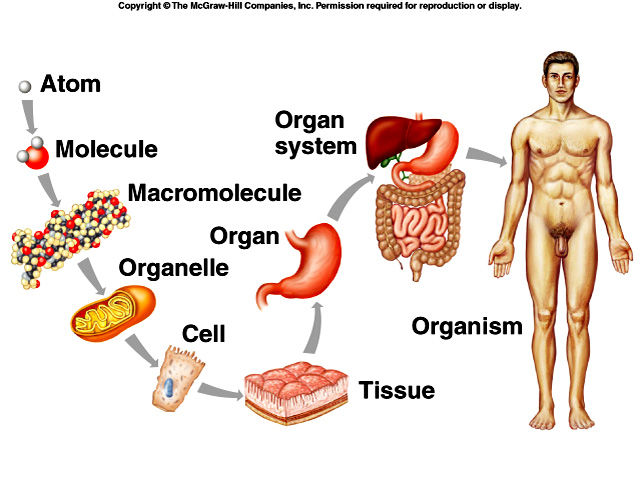
# Negative Feedback

2. Example: Regulation of blood glucose levels

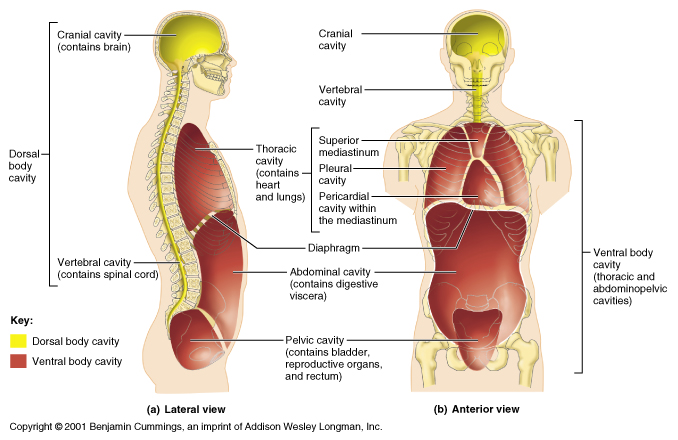
# Positive Feedback

1. 
2. Examples: Regulation of blood clotting, Uterine contractions during labor.

# Levels of Structural Organization

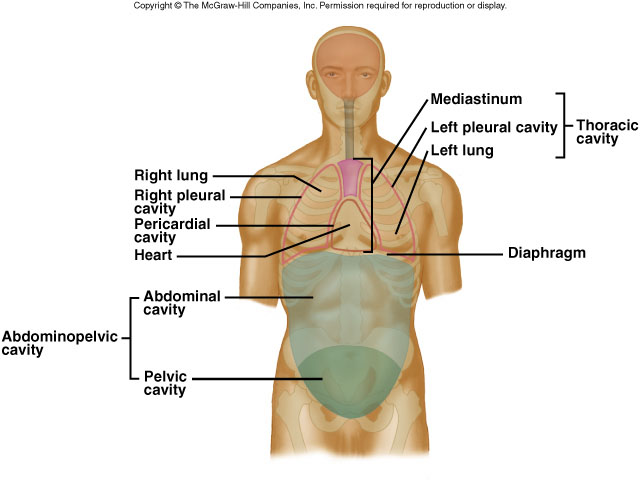
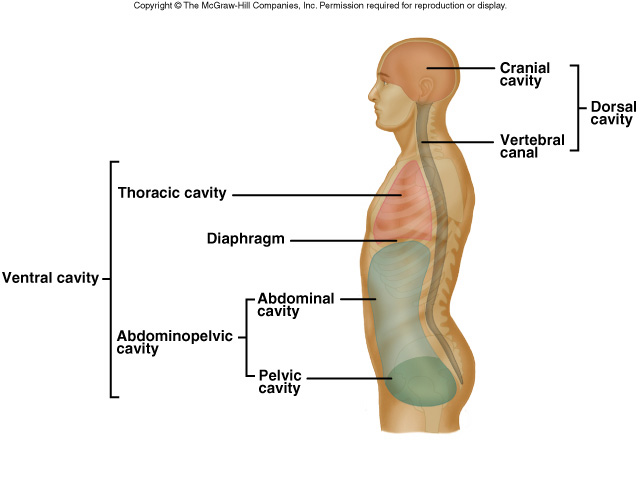
1. The human body is the sum of its parts and these parts can be studied at a variety of levels of organization.
   1. Atoms are the simplest level.
   2. Two or more atoms comprise a molecule.
   3. Macromolecules are large, biologically important molecules inside cells.
   4. Organelles are aggregates of macromolecules used to carry out a specific function in the cell.
   5. Cells are the basic living unit.
   6. Tissues are groups of cells functioning together.
   7. Groups of tissues form organs.
   8. Groups of organs function together as organ systems.
   9. Organ systems functioning together make up an organism.

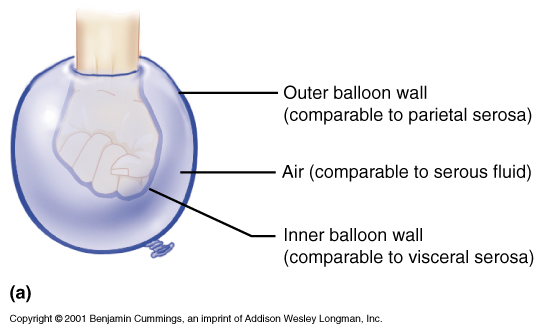
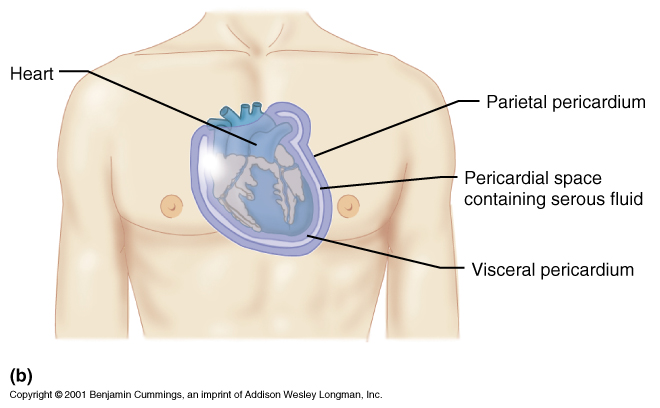
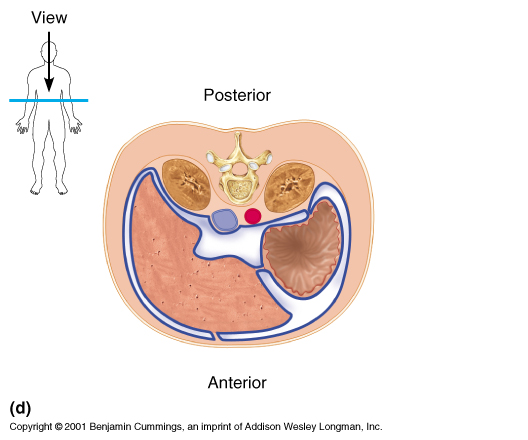
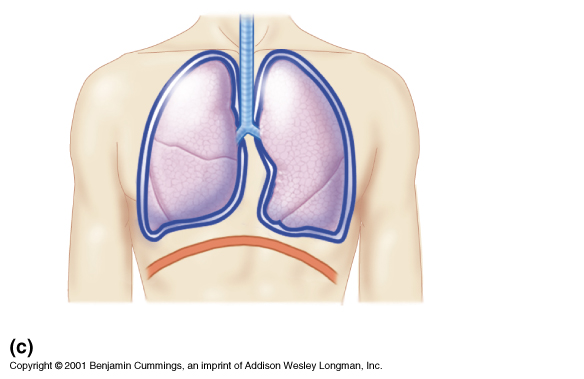
# Body Cavities



1. Thoracic cavity is subdivided into pleural cavities, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. Pleural cavities – each houses a lung
   2. Mediastinum – contains the pericardial cavity, and surrounds the remaining thoracic organs
   3. Pericardial – encloses the heart
2. Dorsal cavity protects \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and is divided into two subdivisions
   1. Cranial cavity is within the skull and encases the brain
   2. Vertebral cavity runs within the vertebral column and encases the spinal cord
3. Ventral cavity houses the internal organs (viscera), and is divided into two subdivisions:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Organization of the Human Body

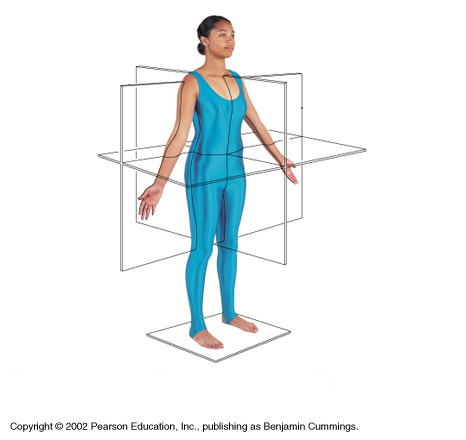


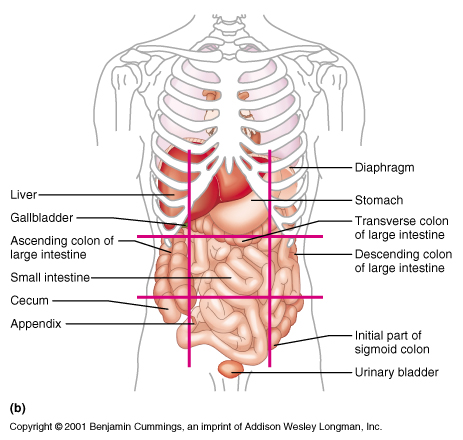
1. Major features of the human body include its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The body can be divided into an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ portion (upper and lower limbs) and an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ portion (head, neck, and trunk), which includes a dorsal and a ventral cavity. Organs within these cavities are called viscera.
2. Regional Terms
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – head, neck, and trunk
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – appendages or limbs
   3. Specific regional terminology
3. Regional Terms
   1. The dorsal cavity can be divided into the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. The ventral cavity is made up of a thoracic cavity and an abdominopelvic cavity, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * 1. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ divides the thorax into right and left halves.
        2. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cavity can be divided into the abdominal cavity and the pelvic cavity.
   3. Smaller cavities within the head include the oral cavity, nasal cavity, orbital cavities, and middle ear cavities.
4. Thoracic and Abdominopelvic Membranes:
   1. The thoracic cavity is lined with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_; the parietal pleura lines the cavities while the visceral pleura covers the lungs. A thin layer of serous fluid separates the two layers.
   2. The heart is surrounded by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The visceral pericardium covers the heart and the parietal pericardium makes up an outer sac. Serous fluid separates the two layers.
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines the abdominopelvic cavity; a parietal peritoneum lines the wall while visceral peritoneum covers the organs.
5. Ventral Body Cavity Membranes
   1. Parietal serosa covering the body walls
   2. Visceral serosa covering the internal organs
   3. Serous fluid separates the serosae
   4. Parietal Pleura - pleura lining the inner chest walls and covering the diaphragm
   5. Visceral Pleura - pleura covering the lungs
   6. Peritoneum – the serous membrane lining the abdominal cavity and covering most of the viscera
6. Nomenclature for Serous Membranes
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - the thin serous membrane around the lungs and inner walls of the chest
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – the serous membrane lining the abdominal cavity and covering most of the viscera
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - the membrane that lines the cavities of the heart and forms part of the heart valves
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ - a double-layered serous membrane that surrounds the heart
   5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (epicardium) - the innermost of the two layers of the pericardium
   6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_ - the tough outermost layer of the pericardium that is attached to the diaphragm and the sternum

# Organ Systems:

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The integumentary system, including skin, hair, nails, and various glands, covers the body, senses changes outside the body, and helps regulate body temperature.
2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The skeletal system is made up of bones and ligaments. It supports, protects, provides frameworks, stores inorganic salts, and houses blood-forming tissues.
   2. The muscular system consists of the muscles that provide body movement, posture, and body heat.
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The nervous system consists of the brain, spinal cord, nerves, and sense organs. It integrates incoming information from receptors and sends impulses to muscles and glands.
   2. The endocrine system, including all of the glands that secrete hormones, helps to integrate metabolic functions.
4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The cardiovascular system, made up of the heart and blood vessels, distributes oxygen and nutrients throughout the body while removing wastes from the cells.
   2. The lymphatic system, consisting of lymphatic vessels, lymph nodes, thymus, and spleen, drains excess tissue fluid and includes cells of immunity.
5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The digestive system is made up of the mouth, esophagus, stomach, intestines, and accessory organs. It receives, breaks down, and absorbs nutrients.
   2. The respiratory system exchanges gases between the blood and air and is made up of the lungs and passageways.
   3. The urinary system, consisting of the kidneys, ureters, bladder, and urethra, removes wastes from the blood and helps to maintain water and electrolyte balance.
6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   1. The reproductive system produces new organisms.
      1. The male reproductive system consists of the testes, accessory organs, and vessels that conduct sperm to the penis.
      2. The female reproductive system consists of ovaries, uterine tubes, uterus, vagina, and external genitalia. The female reproductive system also houses the developing offspring.

# Anatomical Terminology

1. Relative Positions:
   1. Terms of relative position are used to describe the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a part relative to another part.
   2. Terms of relative position include: superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial (peripheral), and deep.
2. Directional Terms
   1. \_\_\_\_\_\_\_\_\_\_\_\_\_ (Cranial) and \_\_\_\_\_\_\_\_\_\_\_\_\_ (Caudal) – toward and away from the head or upper part of a structure - above and below-
   2. \_\_\_\_\_\_\_\_\_\_\_\_ (Ventral) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Dorsal) – toward the front and back of the body - in front of and behind-
   3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – toward the midline, away from the midline, and between a more medial and lateral structure
   4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – closer to and farther from the origin of the body part or the point of attachment of a limb
   5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (External) and \_\_\_\_\_\_\_\_ (Internal) – toward and away from the body surface
3. Body Sections:
   1. A sagittal section divides the body into right and left portions.
   2. A transverse section divides the body into superior and inferior portions. It is often called a “cross section”.
   3. A coronal section divides the body into anterior and posterior sections.



1. Abdominopelvic Regions

