

ANATOMY AND PHYSIOLOGY

-GUIDED NOTES-

THE HUMAN BODY

- _____ - the study of the structure of living organisms
 - Ex: studying the structure of the heart.
- _____ - the study of how the body works.
 - Ex: how the heart works to pump blood, etc.

CELL SPECIALIZATION

- _____ - formed during the first few divisions of the zygote. Have the potential to become any type of cell in the body.
- _____ - stem cells become committed to develop into only one type of cell.
 - Following this, these cells are considered to be _____.
- _____ - cells acquire the structures and functions of highly specialized cells.

APOPTOSIS

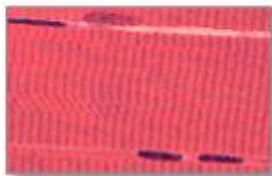
- **Apoptosis-** _____
 - ie: webbing between human fingers- may also be used to rid the body of cells that aren't functioning properly.

LEVELS OF ORGANIZATION

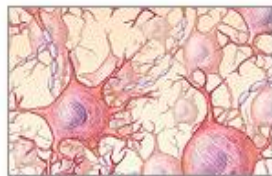
- _____ - basic unit of structure and function.
- _____ - groups of similar cells working together to perform a specialized function.
- _____ - different types of tissues that function together.
- _____ two or more organs working in a coordinated way.
- _____ - all of the systems interacting and working together.

4 TYPES OF TISSUES

- **Epithelial**- protective sheets of tightly packed cells connected by special junctions.
 - Ex: _____
- **Connective**- supports and binds together and protects organs and tissues.
 - Ex: _____
- **Muscle**- contracts to produce movement.
 - Includes _____ (involuntary) and _____ (voluntary) muscles.
- **Nervous**- transmits and receives information in response to stimuli. Processes information and regulates the body's response to the environment.



Muscle tissue



Nervous tissue



Connective tissue



Epithelial tissue

MAJOR BODY SYSTEMS

- There are 11 major body systems:

- _____

ANATOMICAL TERMS

- **Proper Anatomical Position**

- The body is _____
- Feet are _____
- Palms facing _____, with thumbs pointed _____
- Right and left refer to the right and left side of the _____ -
not your right and left.

- **Skeletal Terms**

- _____ **Skeleton**- includes the head, neck and trunk.
- _____ **Skeleton**- includes the arms and legs (appendages)

- **Proximal/Distal**

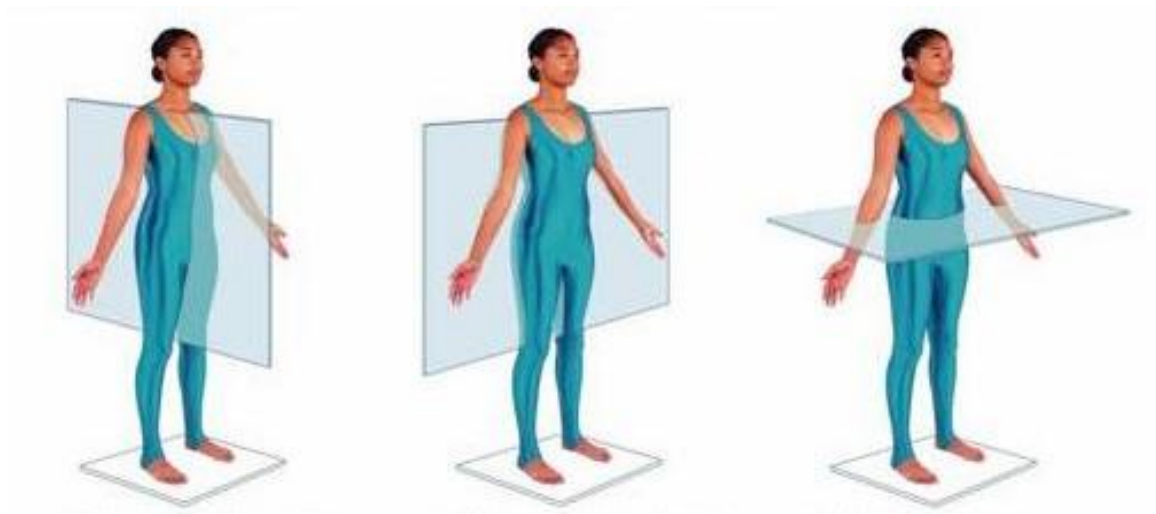
- _____ - closer to the point of origin (trunk)
- _____ - further away from point of origin (trunk)

- **Superficial/Deep**

- _____ - on the exterior
- _____ - on the inside

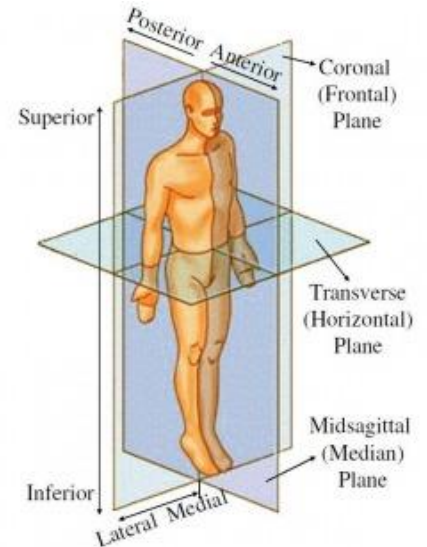
BODY PLANES




- _____ **Plane**- a vertical plane that divides the body into right and left parts.
 - **Midsagittal (Median) Plane**- a sagittal plane that lies exactly in the midline.
 - **Parasagittal (Lateral) Plane**- a sagittal planes offset from the midline.
- _____ **Plane**- divides the body into anterior and posterior
 - **Anterior**- _____ (ventral)
 - **Posterior**- _____ (dorsal)
- _____ **Plane**- divides the body into superior and inferior.
 - **Superior**- toward the _____
 - **Inferior**- toward the _____



EXIT SLIP

- What organ systems must work together to bring oxygen to the body's cells?
- A cell has undergone determination to become an endocrine gland cell. If it is transplanted to a leg muscle, what do you think will happen to this cell?



System	Major structures	Functions
Circulatory	Heart, blood vessels, blood (cardiovascular) lymph nodes and vessels, lymph (lymphatic)	Transports nutrients, wastes, hormones, and gases
Digestive	Mouth, throat, esophagus, stomach, liver, pancreas, small and large intestines 	Extracts and absorbs nutrients from food; removes wastes; maintains water and chemical balances
Endocrine	Hypothalamus, pituitary, pancreas and many other endocrine glands	Regulates body temperature, metabolism, development, and reproduction; maintains homeostasis; regulates other organ systems
Excretory	Kidneys, urinary bladder, ureters, urethra, skin, lungs	Removes wastes from blood; regulates concentration of body fluids
Immune	White blood cells, lymph nodes and vessels, skin	Defends against pathogens and disease
Integumentary	Skin, nails, hair	Protects against injury, infection, and fluid loss; helps regulate body temperature
Muscular	Skeletal, smooth, and cardiac muscle tissues	Moves limbs and trunk; moves substances through body; provides structure and support
Nervous	Brain, spinal cord, nerves, sense organs 	Regulates behavior; maintains homeostasis; regulates other organ systems; controls sensory and motor functions
Reproductive	Testes, penis (in males); ovaries, uterus, breasts (in females)	Produces gametes and offspring
Respiratory	Lungs, nose, mouth, trachea	Moves air into and out of lungs; controls gas exchange between blood and lungs
Skeletal	Bones and joints 	Protects and supports the body and organs; interacts with skeletal muscles, produces red blood cells, white blood cells, and platelets

HOMEOSTASIS AND FEEDBACK

- _____ - the regulation and maintenance of a constant internal environment.
 - Includes: temperature, fluids, salts, pH, nutrients, and gases.
 - Homeostasis is maintained through positive and negative _____.
- _____ **Feedback**- the end product of a reaction speeds up/amplifies its own production.
 - Ex: Growth hormones during puberty, blood clotting, milk production
- _____ **Feedback**- an accumulation of an end product of a process slows down that process
 - Ex: Holding your breath, hunger, body temperature, ATP production
 - Most regulation occurs through negative feedback.

REGULATION OF BODY TEMPERATURE

- _____ - the process of maintaining a steady body temperature under a variety of conditions.
 - _____ - a region in the brain that monitors and regulates body temperature.

DIABETES

- **Normal Glucose Control**- when glucose levels gets too high in blood, pancreas releases _____ which causes cells to uptake glucose and liver stores glucose as glycogen. When glucose is low, _____ is released from liver and broken down into glucose until blood glucose levels reach a certain point.
- **Type ____** - occurs when the body's immune system destroys the ability of specialized cells to produce insulin. (Cells can't uptake glucose)
- **Type ____** - when insulin production decreases or when insulin cannot move glucose into cells.

HOW ORGANISMS COMMUNICATE

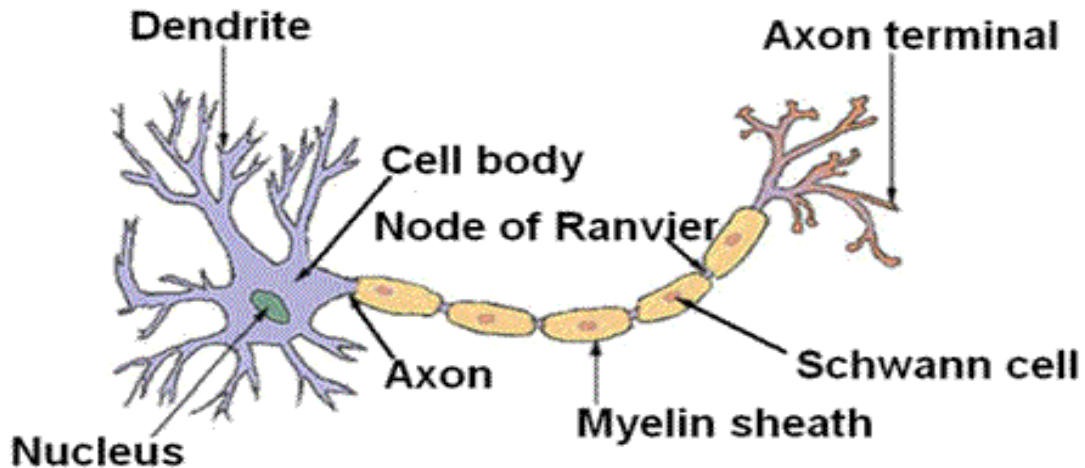
- Two major systems allow cells to communicate:
 - _____ - a network of connected cells tissues and organs that help control many life processes.
 - The nervous system sends messages that run along a specific pathway through specialized tissues until they reach their target cell.
 - Works _____ with short _____ response.
 - _____ - a collection of organs that help control growth, development and response to the environment.
 - The endocrine system sends a broad message, through the _____ stream in the form of molecules called _____.
 - Only cells with receptors for a specific hormone can respond to its signal.
 - Responds more _____, but the duration of the response is _____.
- _____ - anything that causes a response.
 - Change can be _____, _____, or _____.

THE NERVOUS SYSTEM

- The nervous system is divided into 2 major parts:
 - _____ - includes the brain and the spinal cord.
 - Interprets messages from other nerves in the body and stores some of the messages for later use.
 - _____ - includes nerves extending from the brain and spinal cord.
 - Helps transmit messages between the brain and other organs in the body.

NEURONS

- **Neuron**- a specialized cell that stores information and carries messages within the nervous system and between other body systems.

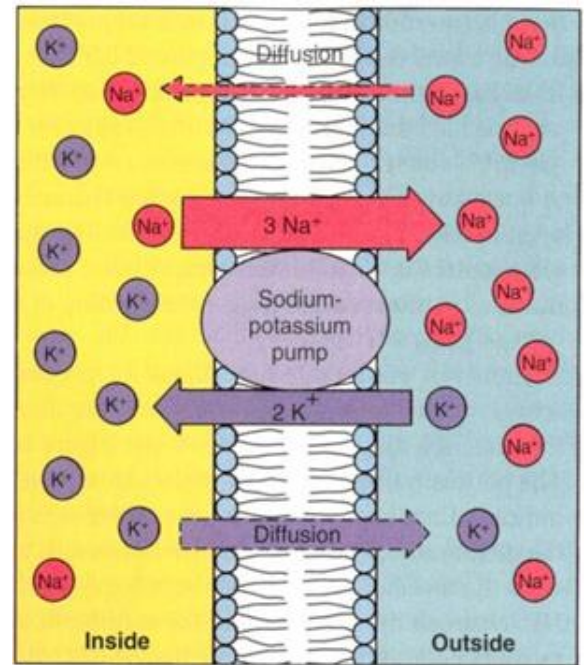


My notes on how a nerve signal is transmitted

- There are three main types of neurons
 - _____ - detect stimuli and transmit signals to the brain and spinal cord.
 - _____ - make up the brain and spinal cord. Receive signals from sensory neurons and process the information to pass the signals on the motor neurons.
 - _____ - pass messages from the nervous system to other tissues in the body, such as muscles.

RESTING POTENTIAL

- Neurons transmit information in the form of _____ and _____ impulses.
- When neurons aren't transmitting a signal, they are considered to be "_____." While at rest, the neuron maintains a negative charge, called the _____ - this is the potential energy needed to transmit a nerve impulse.
- Two types of ions (_____) allow for the resting potential.
 - More Na^+ ions are present on the _____ than inside, and _____ K^+ ions are present on the outside than inside.
- _____ - protein channel found in the membrane of the neuron- transports Na^+ out and brings K^+ ion. (active transport)
 - This helps maintain _____.



EXIT SLIP

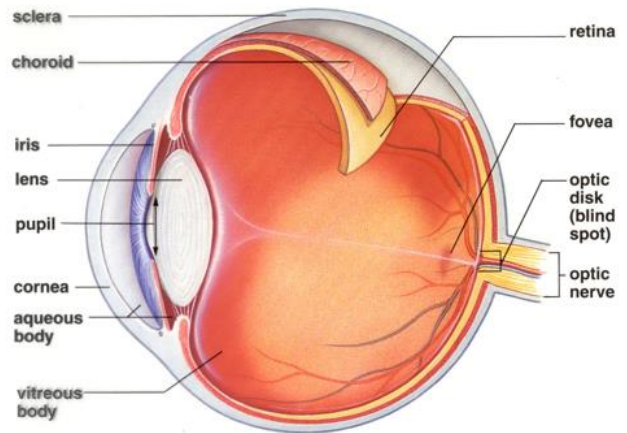
- Which system- nervous or endocrine- allows you to react to slam on your brakes when someone stops quickly in front of you?
- How might a clogged blood vessel affect the nervous system's and endocrine system's abilities to deliver signals?
- How does a neuron's shape allow it to send signals across long distances?

THE SENSES

- _____ sense light.
- _____ respond to pressure, movement and tension.
- _____ detect changes in temperature.
- _____ detect chemicals that are dissolved in fluid.
- _____ (called _____) respond to extreme heat, cold, and pressure, and to chemicals released by damaged tissues.

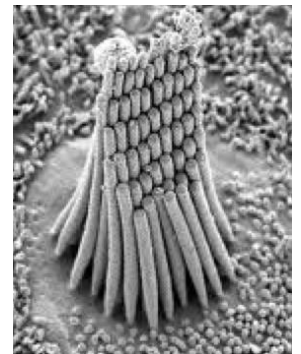
VISION

- Most of the photoreceptors in the body are found on the _____ in the back wall of the eye. The retina contains two types of photoreceptors:
 - _____ - detect light intensity and are used in black and white vision. Sensitive to low amounts of light.
 - _____ - detect color. Need bright light to function.
- When light stimulates the rods and cones, they generate a nerve impulse which travels along the _____ which carries the impulses to the brain.

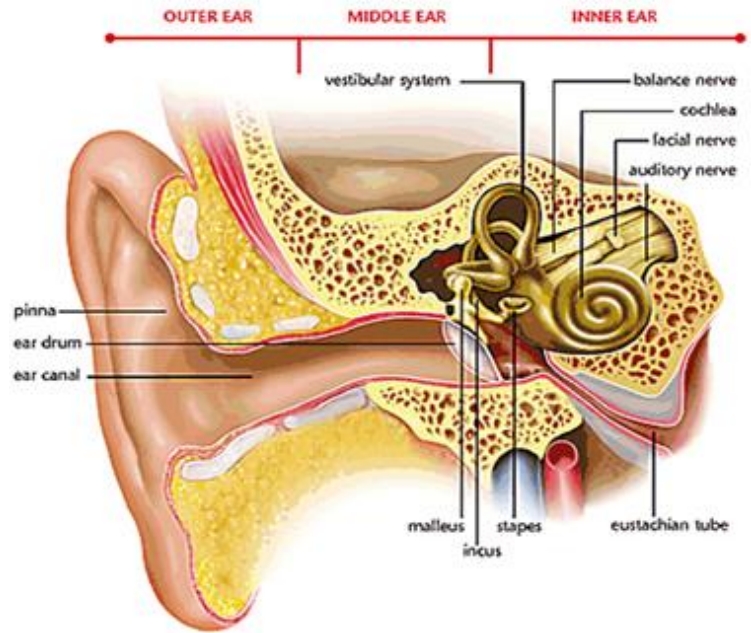


HEARING

- _____ - specialized cells in the inner ear that contain mechanoreceptors that detect vibrations from sound waves. Hair cells produce action potentials when they are bent.
- The ear collects sounds and funnels them into the _____ where they vibrate the eardrum (called the _____). These vibrations are amplified by 3 bones in the inner ear: the _____, _____, and _____.



- Vibrations in the ear are transferred to the _____ - a fluid filled canal where the _____ are located.
- Ear also has organs that regulate balance- this is called the _____.

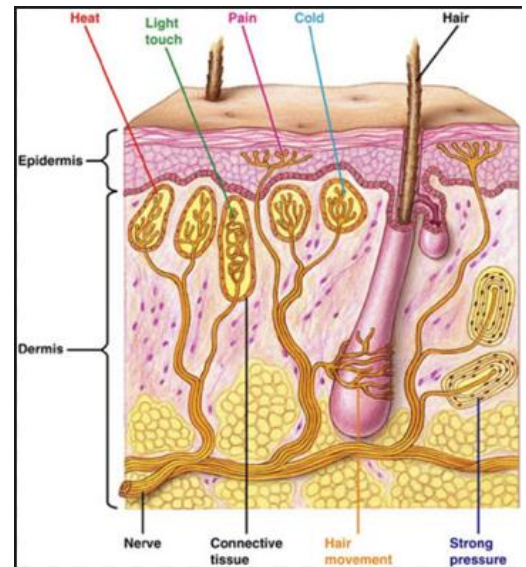


SMELL AND TASTE

- _____ - deliver impulses from the nose to the brain.
 - _____ = _____
- _____ - bumps on the tongue (_____) that detect tastes. Generate impulses that are sent to the brain.
 - Your tongue can only detect 5 basic tastes: _____, _____, _____, _____, and _____.

TOUCH, TEMPERATURE AND PAIN

- Your skin contains receptors that sense _____, _____, and _____.
 - Touch can be detected as pressure, movement, or tension.
 - Thermo and nociceptors in the skin detect pain and temperature.



EXIT SLIP

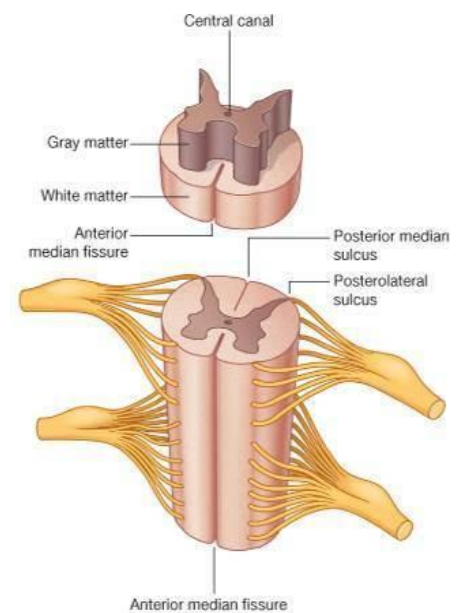
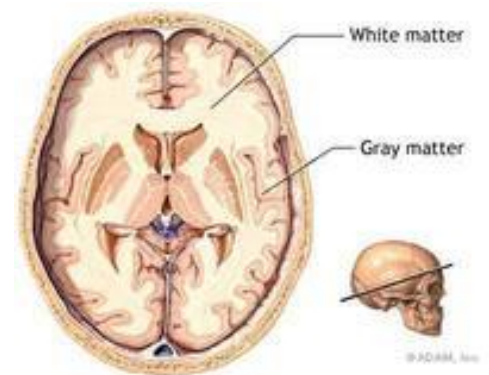
- Why do you think that you can perceive some sounds as loud and others as very soft?
- In the human eye, there are 20 rod cells for every 1 cone cell. How would your vision be different if you had 5 rod cells for every 20 cone cells?

TWO PARTS OF NERVOUS SYSTEM

- _____ **Nervous System (CNS)**- composed of interneurons that interact with other nerves in the body.
 - Receives, interprets, and sends signals to the PNS.
- _____ **Nervous System (PNS)**- connects CNS to all organ systems. Uses sensory neurons to detect stimuli from inside and outside your body, and motor neurons to send signals from the CNS to other parts of the body.

CENTRAL NERVOUS SYSTEM

- _____ - the collection of neuron cell bodies.
- _____ - the collection of axons. (white in appearance because of myelin sheath)
 - In the _____, gray matter is on the outside and white matter is on the inside. The _____ has the opposite arrangement.

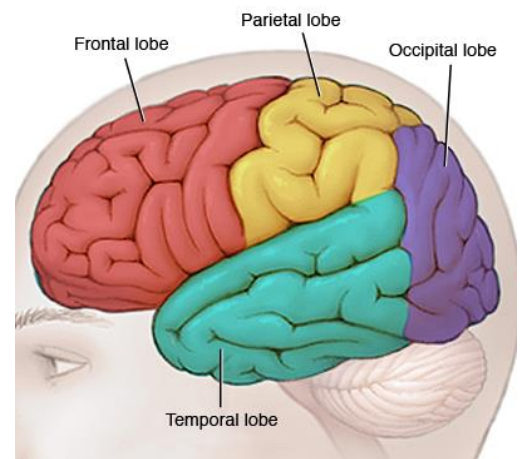
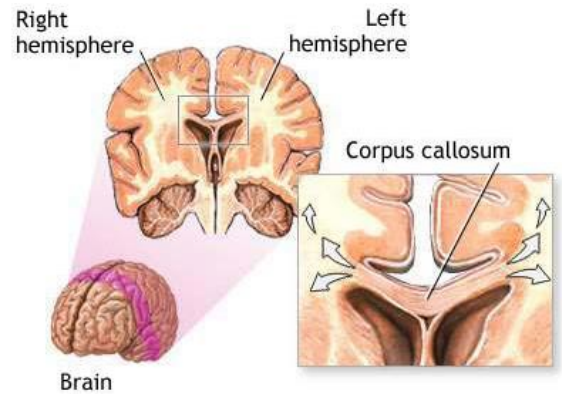


THE BRAIN

- Contains over _____ neurons.
- Protected by 3 layers of connective tissue called the _____. Between these layers lies a fluid- called _____ (_____) that helps to cushion the brain against the skull.
- The brain has 3 main structures: the _____, the _____, and the _____.

THE CEREBRUM

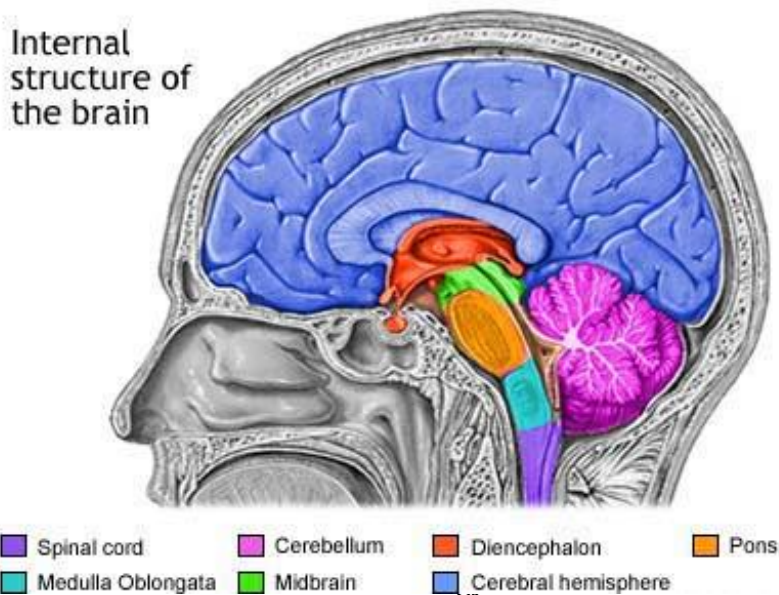
- _____ - interprets signals from your body and forms a response (ex: hunger, thirst, pain, emotion, etc)
 - Divided into 2 halves, called _____.
 - Each hemisphere controls the _____ side of your body.
 - The two hemispheres are connected by a thick band of nerves in the brain, called the _____.
- The outer layer of the cerebrum is called the _____ - its job is to interpret signals from sensory organs and generate responses. Neurons in the cerebral cortex are arranged in groups that work together to perform specific tasks:
 - _____ - helps coordinate movement.
 - _____ - detects touch.
- Scientists divide the cerebral cortex into 4 different _____, based on their function.
 - _____ - personality, reasoning and judgment are controlled in this lobe. It also coordinates voluntary movement, and speech production.
 - _____ - the sensory cortex, which deals specifically with touch, is contained in this lobe.
 - _____ - speech interpretation and hearing are functions carried out in this lobe. It also plays a role in memory.
 - _____ - processes visual information.



- Underneath the cerebrum are many smaller areas with different functions.
 - _____ - involved in learning and emotion- includes the hippocampus and the amygdala.
 - _____ - sorts information from your sensory organs and passes signals between the spinal cord and other parts of the brain.
 - _____ - gathers information about body temperature, hunger, and thirst- sends signals that help your body adjust and maintain homeostasis.

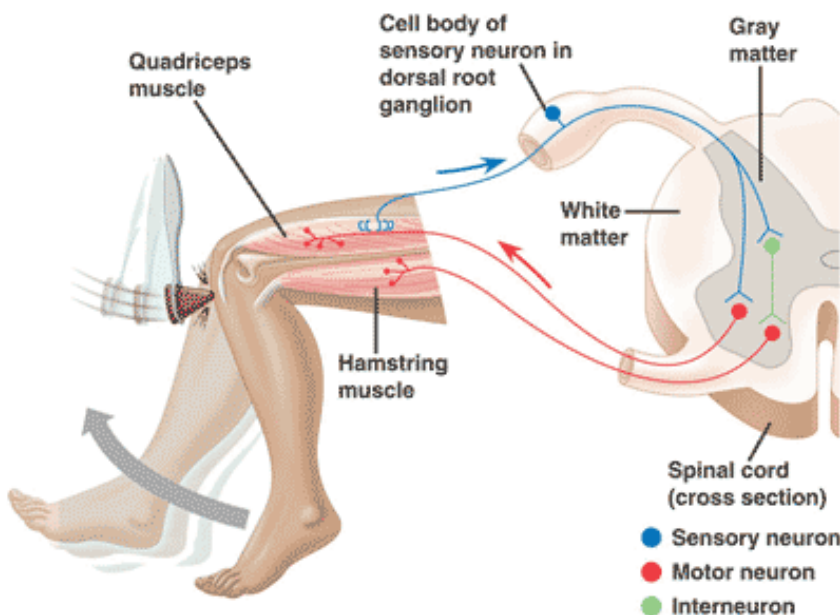
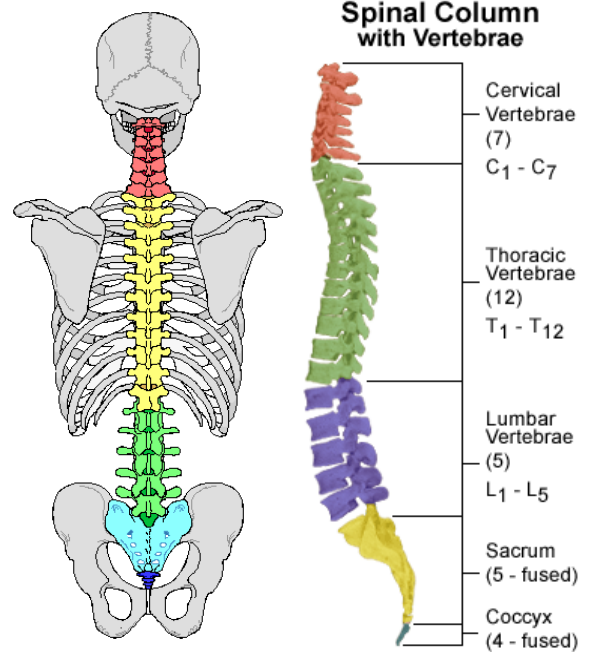
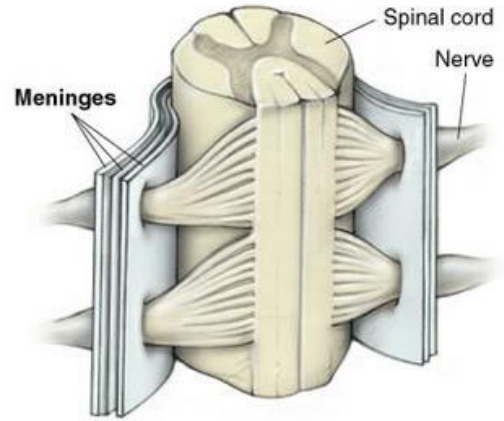
THE CEREBELLUM AND BRAINSTEM

- _____ - coordinates movement and helps maintain posture and balance.
- _____ - connects the brain to the spinal cord and controls the most basic activities required for life, including breathing and heartbeat. The brainstem has three major parts.
 - _____ - controls reflexes (ex: changing the size of the pupil to control light entering the eye).
 - _____ - regulates breathing and passes signals between brain and spinal cord.
 - _____ - connects brain to spinal cord- controls heart function, vomiting, coughing, and swallowing.



THE SPINAL COLUMN

- The spinal column consists of _____, _____, _____ and the _____.
- The spine is divided into three main parts:
 - _____ - contains 7 vertebrae (C1-C7)
 - _____ - contains 12 vertebrae (T1-T12)
 - _____ - contains 5 vertebrae (L1-L5)
 - _____ - the back side of the pelvis
 - _____ - the tailbone
- _____ - only have to cross _____ synapses before producing a response- because the signal never has to travel brain



PERIPHERAL NERVOUS SYSTEM

- The peripheral nervous system includes 12 pairs of _____ nerves, and 31 pairs of _____ nerves.
- The Peripheral Nervous System can be broken down into two parts:
 - _____ - regulates all voluntary movements. Connects CNS to target organs.
 - _____ - controls automatic functions that you do not have to think about. Works closely with hypothalamus.

AUTONOMIC NERVOUS SYSTEM

- The Autonomic Nervous System can be broken down into two parts:
 - _____ - prepares the body for action and stress. Called the “_____” response.
 - _____ - calms the body and helps the body to conserve energy. Called the “_____” response.

PARASYMPATHETIC NERVES

"Rest and digest"

Constrict pupils

Stimulate saliva

Slow heartbeat

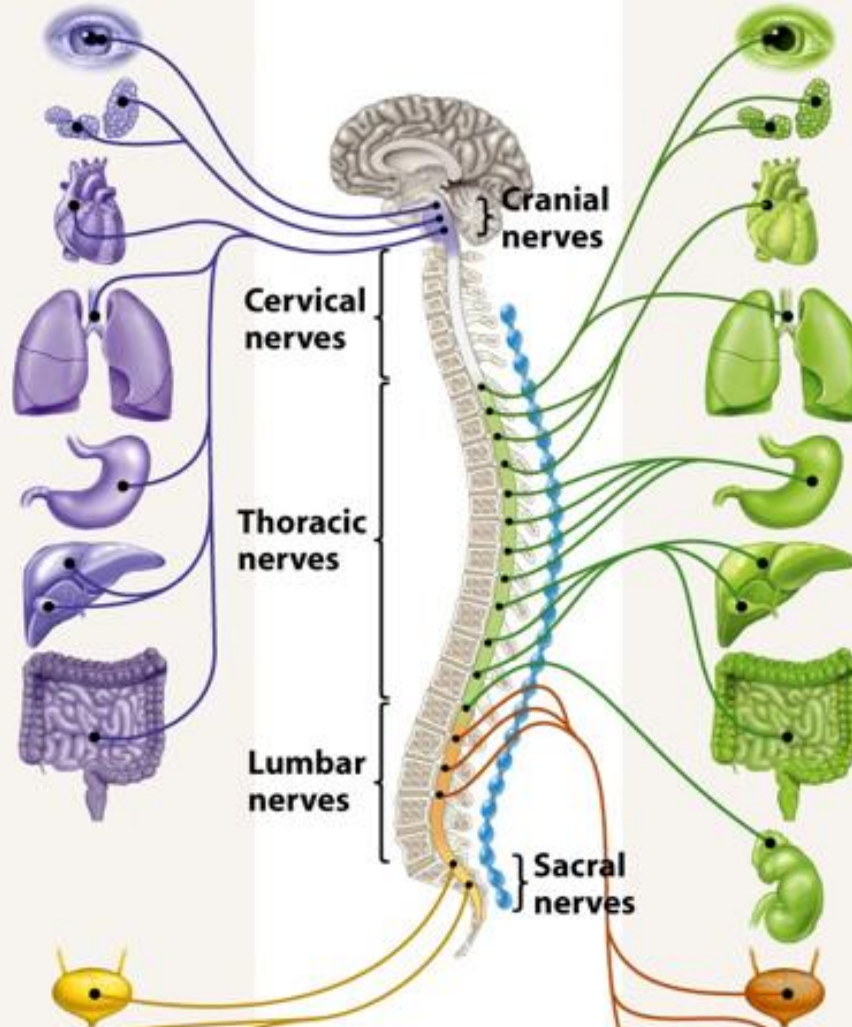
Constrict airways

Stimulate activity of stomach

Inhibit release of glucose; stimulate gallbladder

Stimulate activity of intestines

Contract bladder



SYMPATHETIC NERVES

"Fight or flight"

Dilate pupils

Inhibit salivation

Increase heartbeat

Relax airways

Inhibit activity of stomach

Stimulate release of glucose; inhibit gallbladder

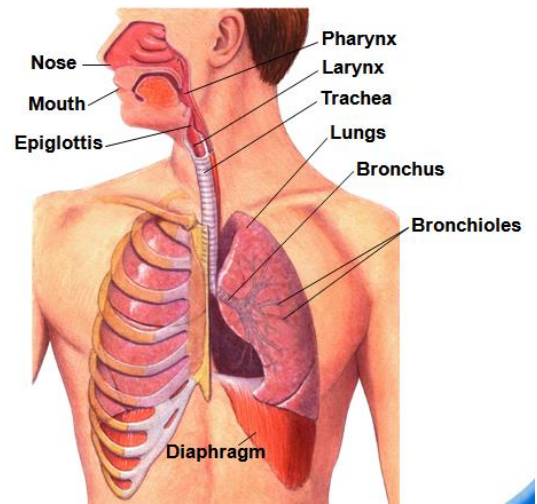
Inhibit activity of intestines

Secrete epinephrine and norepinephrine

Relax bladder

THE RESPIRATORY SYSTEM

- **Function:** to exchange _____ and _____ between the blood, air, and tissues.
- _____ carries O_2 from the lungs to the body's tissues and carries CO_2 (a waste product of cell respiration) in the opposite direction.

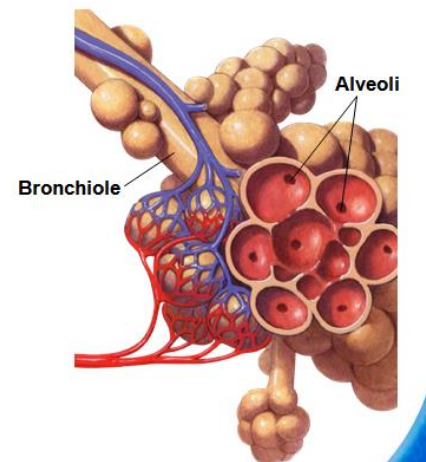


THE FLOW OF AIR

- _____ or _____
- _____ - (or throat)- passageway for both air and food
- _____ - (or windpipe)
 - The trachea is covered by the _____ to keep food from entering your windpipe when you swallow.
- _____ - (at the top of trachea) contains the _____.
- _____ - two large passageways that lead into each of the lungs where they subdivide into smaller bronchi, then to smaller _____.
- _____ - tiny air sacs surrounded by capillaries

GAS EXCHANGE

- Alveoli provide a huge _____ for gas exchange.
- O_2 diffuses across the capillaries into the _____.
 CO_2 diffuses in the opposite direction.
- O_2 binds to _____ in the blood and carries it to the rest of the cells in the body.

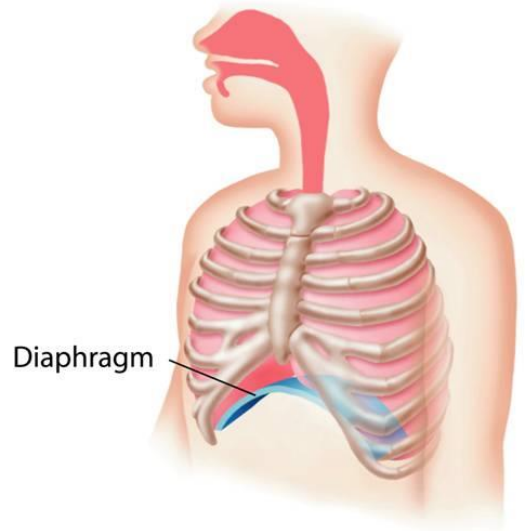


CILIA AND MUCUS

- The respiratory passageways are lined with _____ and _____ to help keep lungs clean and efficiently exchanging gas.

BREATHING

- _____ - two sacs that seal the lungs inside the chest cavity.
- _____ - large muscle at the bottom of the chest cavity.
 - **Inhale**- diaphragm _____, rib cage _____. Expands volume of chest cavity. Air rushes into the lungs.
 - **Exhale**- diaphragm _____, rib cage _____. Air rushes back out of the lungs.

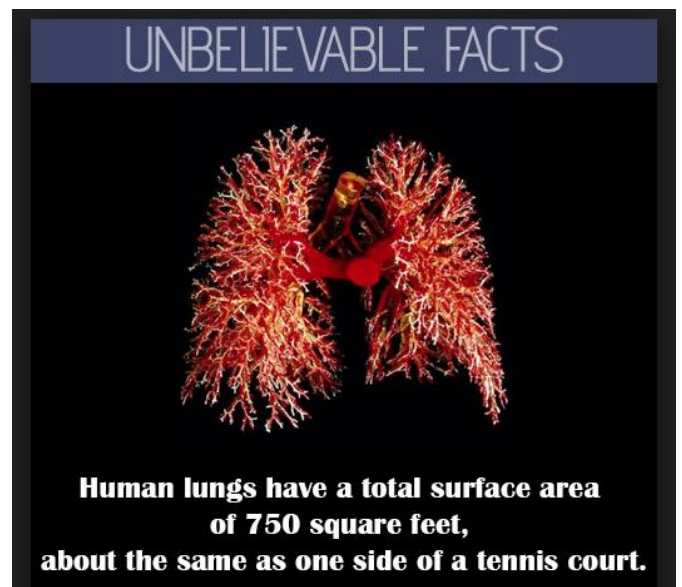


HOW BREATHING IS CONTROLLED

- Breathing is controlled by a part of the brain called the _____, which monitors the amount of _____ in the blood. These levels signal nerve impulses that cause the diaphragm to contract, bringing air into the lungs.

EXIT SLIP

- Why can't you breathe through your mouth while swallowing food? What would happen if you could do this?



THE CIRCULATORY SYSTEM

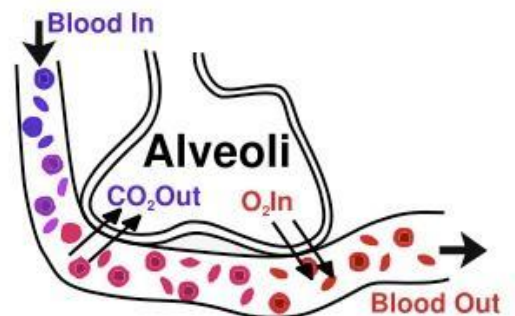
- The circulatory system is made of 3 main parts:
 - _____ - a muscular pump that keeps blood moving to every part of your body.
 - _____ - the average adult contains about _____ of blood. Your blood makes a round trip from your heart to body tissues and back to the heart every _____.
 - _____ - in our circulatory system, blood stays within vessels, so it is considered to be a _____ system.
 - _____ - carry blood away from the heart to the rest of the body.
 - _____ - blood vessels that carry blood from the rest of the body back to the heart.
 - _____ - tiny blood vessels that transport blood to and from cells of the body. Connect arteries and veins.

HOMEOSTASIS AND CIRCULATION

- The circulatory system collects _____ produced in the body and delivers it to the _____ and _____ to be filtered out of the body.
- The circulatory system helps maintain _____ by distributing heat produced by muscles and internal organs.

GAS EXCHANGE

- Red blood cells pick up _____ in the lungs (specifically the _____) and deliver it to all of the cells in the body.
- Oxygen specifically binds to an iron-rich protein in the blood, called _____.
 - Each molecule of hemoglobin binds with ____ O₂ molecules.
 - The _____ in the hemoglobin gives blood its reddish color.



RESPIRATORY DISEASES

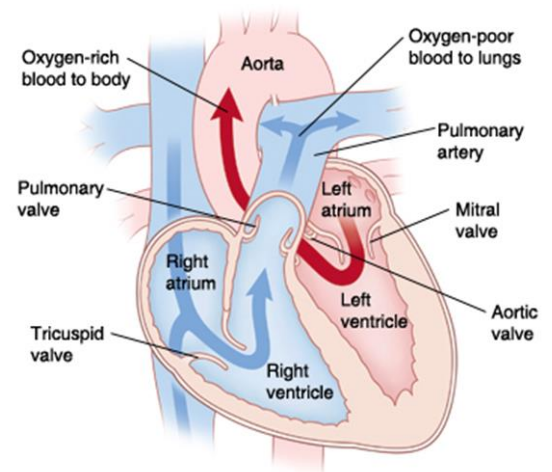
- _____ - caused by smoking, destroys alveoli, which reduces surface area for gas exchange.
- _____ - bronchioles constrict due to muscle spasms. May be triggered by allergies, stress, smoke, exercise, or other chemicals.
- _____ - lungs produce thick sticky mucus that blocks airways and allows for infections.

HEART SOUNDS

- **Lub-Dub (Shhh)**
 - _____ - the sound that occurs when the valves between the upper and lower chambers of the heart snap shut.
 - _____ - the sounds made by valves closing the two arteries that carry blood out of the heart.
 - _____ - the sound made by a heart with a leaky valve.

STRUCTURE OF THE HEART

- The heart is divided into 4 main chambers:
 - _____ (right and left)- the _____ of the chambers
 - _____ (right and left)- the _____ of the chambers
 - Separated by the _____ - a thick wall of tissue.
- _____ - flaps of tissue that prevent blood from flowing backward.
 - They _____ when the atria or ventricles _____, and _____ when they _____.



THE HEARTBEAT

- The heartbeat is regulated by the _____, which is known as the heart's _____. The cells of this node (located in the _____) generate a nerve impulse that spreads through both atria, causing them to contract, sending a rush of blood down through the right and left ventricles.
- The nerve impulse moves along the neural pathway and stimulates the _____ (located in the wall of the _____) which causes both ventricles to contract simultaneously, pushing the blood upward into the aorta and pulmonary vein.

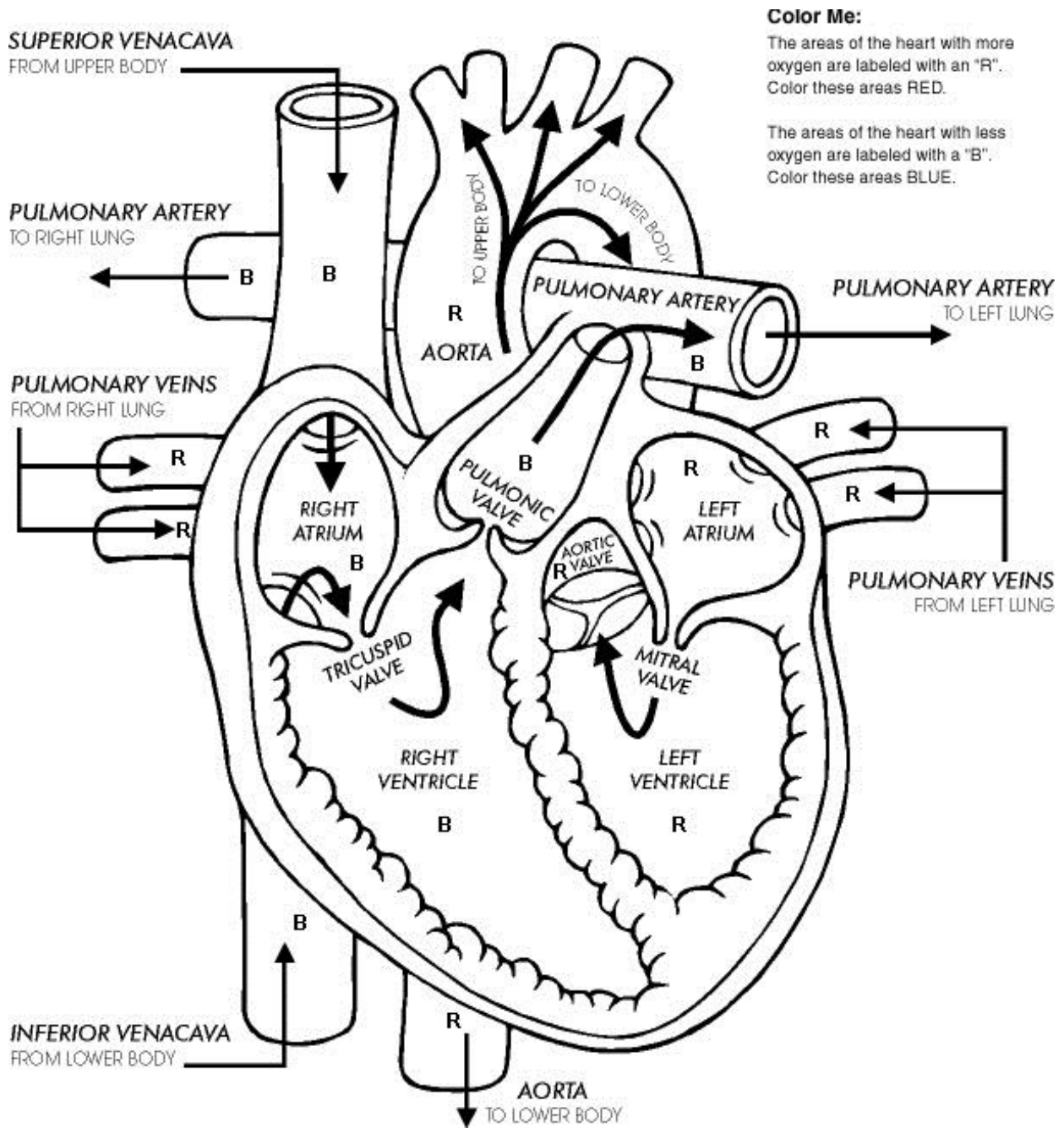
THE FLOW OF BLOOD

- Oxygen-poor blood enters the _____. SA node signals atria to contract, and blood flows into _____ and to the _____ (which goes to the _____).
 - Blood enters lungs where CO₂ diffuses into the alveoli and O₂ diffuses into the blood.
- Oxygen-rich blood returns to the heart through the _____ and enters _____. When the atria contract, blood is pumped into _____. When the ventricles contract, blood is pumped up, into the _____ and is circulated to the rest of the _____.
- After oxygen has been delivered to all the cells, oxygen-poor blood returns through the _____ to the heart, and it starts again.

PATHWAYS OF BLOOD

- Circulating blood follows two separate pathways that meet at the heart:
 - _____ - occurs only between the heart and the lungs. Functions to carry _____ blood to the _____, where it picks up O₂ and expels CO₂ and carries oxygen-rich blood back to the heart.

- _____ - occurs between the heart and the rest of the body, except for the lungs. Functions to carry _____ blood to all _____ and transport oxygen-poor blood back to the heart. Begins when blood leaves the left ventricle.

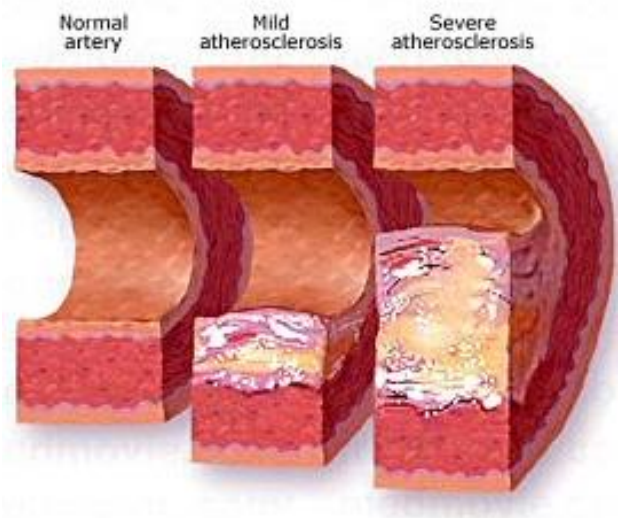


CIRCULATION AND BLOOD PRESSURE

- _____ - the force with which blood pushes against the wall of an artery.
 - A healthy, resting blood pressure of a young adult is around _____ mmHg
 - The top number is known as the _____ - the pressure in the artery when the left ventricle _____.
 - The bottom number is the _____ - the pressure in the artery when the left ventricle _____.

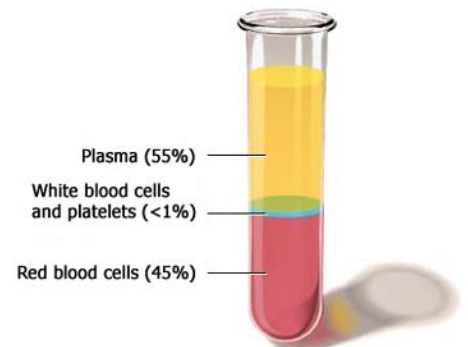
CIRCULATORY DISEASES

- _____ - permanently high blood pressure- can lead to a heart attack or stroke.
 - _____ - when arteries to the heart muscle are damaged or blocked.
 - _____ - blood flow to the brain is interrupted.
- _____ - blood flow is partially or fully blocked by a sticky material, called _____, that collects on the walls of the arteries.

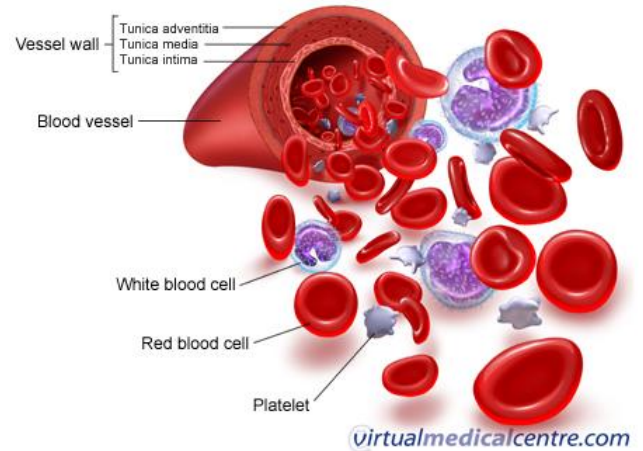


COMPONENTS OF BLOOD

- _____ - straw colored fluid in which the blood cells are suspended.
- _____ - cell fragments that help in blood clotting.
- _____ - functions to transport O₂ to cells and carry CO₂ away from them.
 - Have a lifespan of ~ _____ days. Red blood cells are unique because they have no nucleus.

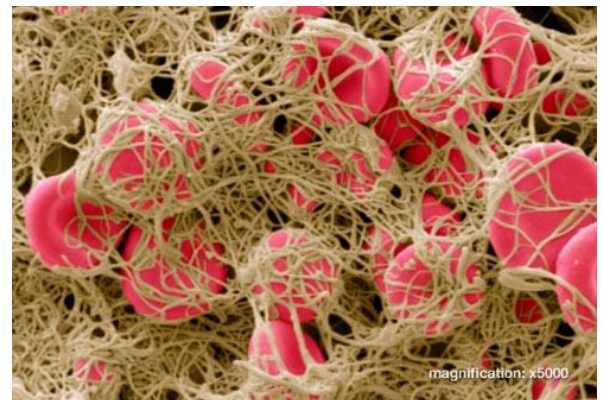
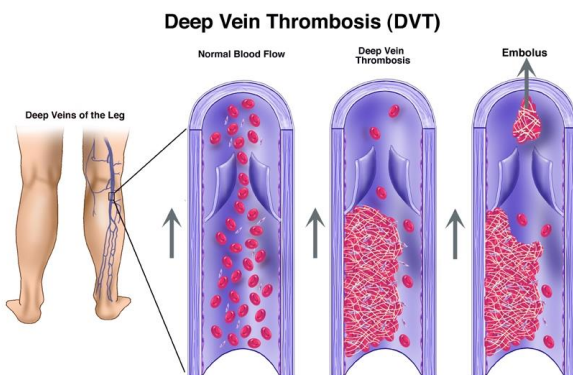


- _____ - defend the body against infection and remove foreign and dead cells.
 - WBC's are part of _____ and _____ systems because they can leave the blood vessels to fight infection
 - Platelets, red blood cells, and white blood cells are manufactured in the _____.



PLATELETS AND CLOTTING DISORDERS

- Clotting Disorders
 - _____ - individuals lack specific clotting factors and bleed freely.
 - Other individuals form clots (called a _____) inside blood vessels. This can lead to pain, heart attack, or stroke.



EXIT SLIP

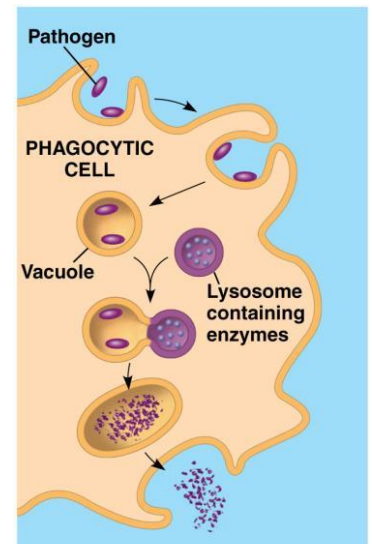
- Explain how the blood helps in maintaining homeostasis.
- How does narrowing of the arteries effect blood flow and blood pressure? Explain.

PATHOGENS AND HUMAN ILLNESS

- _____ - proposed that specific microorganisms cause infectious disease.
 - This was proposed by _____ in the 1850s and tested by Joseph Lister and Robert Koch.
- These diseases causing agents are called _____.
 - These can be _____, _____, _____, _____, _____, etc.
 - Many pathogens are transmitted by a _____ - another organism that carries and transmits the disease.

IMMUNE SYSTEM

- _____ - fights off infection and pathogens.
 - Relies on _____ to keep pathogens out. This is called _____.
 - Another type of immunity relies on _____ to fight pathogens that do breach the physical barriers. This is called _____.
- _____ - destroy pathogens by engulfing them and breaking them down. (_____)



LYMPHOCYTES

- White blood cells, called _____, help to initiate specific immune responses. There are two main types of white blood cells:
 - _____ - destroys body cells that are infected with pathogens.
 - _____ - inactivate pathogens that have not yet infected cells.They do this through the use of _____ - proteins that make pathogens ineffective.

ACTIVE AND PASSIVE IMMUNITY

- _____ - occurs without the body undergoing an immune response.
 - Transferred from mother to child during through the _____, and through _____.
- _____ - occurs when your body produces a response to a specific pathogen.
 - Keeps you from getting the same virus twice.
 - _____ are an example of active and passive immunity.

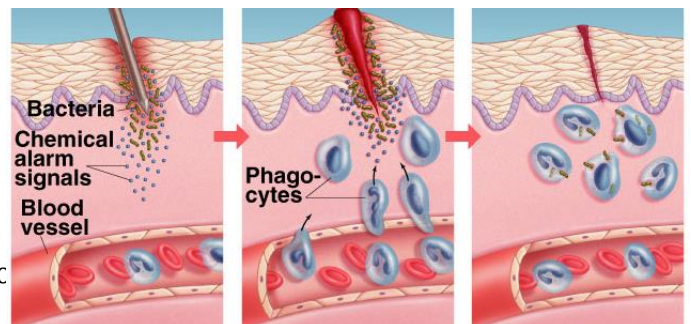
EXIT SLIP

- Name some ways that pathogens can be spread.

- If a person had a disease that prevented lymphocytes from maturing, how would the immune system's response to infection change?

INFLAMMATION

- _____ - a nonspecific response characterized by swelling, redness, itching, and increased temperature at the affected site.
 - Occurs when a pathogen enters the body or when the tissues become _____.
 - In an inflammatory response, _____ release chemicals called _____ to respond to the invasion. This causes blood vessels to _____.

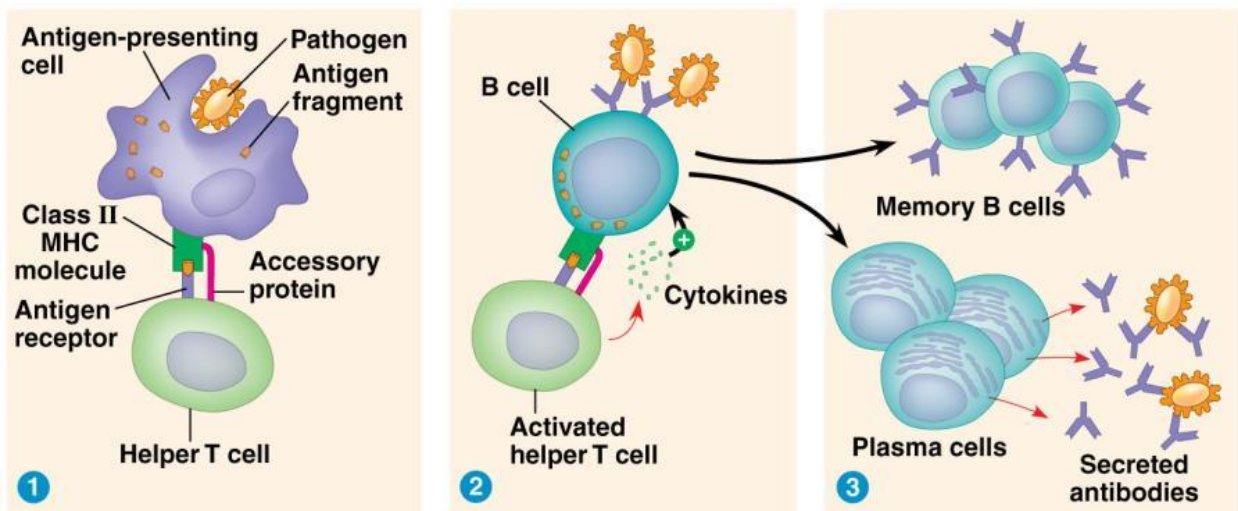


ANTIGENS AND MEMORY CELLS

- _____ - markers on the surface of pathogens that help the immune system to identify a foreign cell.
- _____ - specialized T cells and B cells that are stored in the body to fight a specific antigen in a second attack.

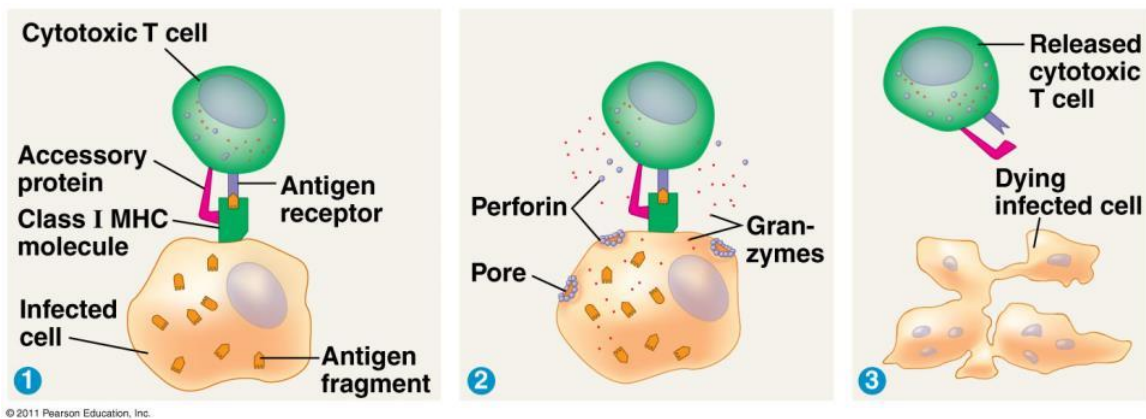
TYPES OF IMMUNE RESPONSE

- There are two types of immune response:
 - _____ - activated by B cells- depends on the production of antibodies to fight pathogens.
 - B cell recognizes foreign cell for which it is specific to. B cell binds to the _____ on the foreign cell.
 - _____ binds to the B cell, activating it.
 - Once activated, the B cell divides into _____, which produce an army of _____ to fight the pathogen, by inactivating it, and _____, which are stored to fight the same pathogen in a future encounter.



- _____ - activated by T cells- depends on T cells attacking infected cells by releasing a toxic chemical that leads to destruction of the pathogen.
 - A _____ recognizes a foreign invader and engulfs it. The invader's _____ are removed and the phagocyte displays them on its surface. This is called an _____.
 - A _____ specific for that antigen binds to the cell, and releases molecules that lead to the death of the pathogenic cell.
 - The T cell now divides into two types of T cells: _____ and _____.

The active cells go on to destroy other infected cells, and the memory cells lay stored in the body for future attacks by the same pathogen.



ANTIBODY

**This is a diagram of an antibody.*

FOREIGN TISSUES

- _____ - antigen receptors on the surface of the cell make antibodies against the donor tissue.
 - In order to help eliminate this, patients take _____ prior to surgery. Unfortunately, this lowers their ability to fight any other infections.

ALLERGIES AND ANAPHYLAXIS

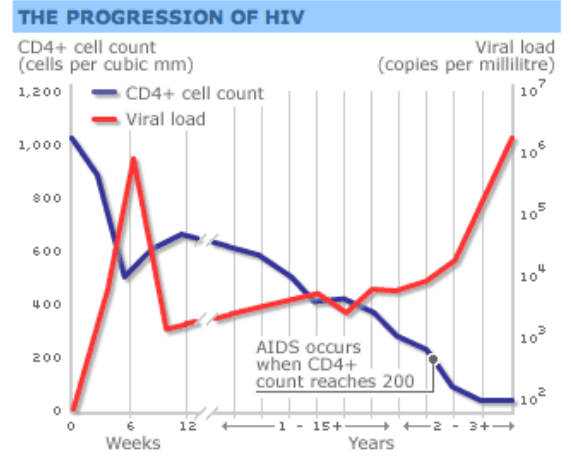
- _____ - a hypersensitivity to a normally harmless antigen.
 - Caused by _____ - an antigen that causes an allergic reaction. The immune system produces _____ in response to these allergens.
 - When allergens enter the body, specialized cells release _____ which causes an _____.
- _____ - immune system releases large amounts of histamine, which causes airways to tighten.
 - From an allergic reaction to _____, _____, _____, etc.

AUTOIMMUNE DISEASES

- **Autoimmune Disease**- occurs when the immune cannot differentiate between the body's healthy and unhealthy cells.
 - Examples: _____

HIV/AIDS

- **HIV and AIDS-** (Human Immunodeficiency Virus) (Acquired Immune Deficiency Syndrome)- caused by a _____ that infects _____.



THE LYMPHATIC SYSTEM

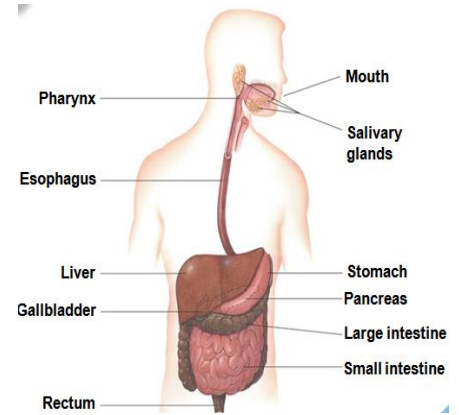
- _____ - distributes nutrients, absorbs excess fluid, fights disease, and carry wastes away from cells.
 - The lymphatic system collects excess fluid that leaks out of blood capillaries into the space between the cells (called _____). This fluid is absorbed into lymphatic capillaries where it becomes known as _____. Lymph is filtered from the vessels at areas called _____, where trapped particles are filtered out. Vessels then return the lymph to the circulatory system. The lymphatic waste is filtered through the _____.

EXIT SLIP

- Why would someone experiencing anaphylaxis need to receive medicine through an injection rather than swallowing a pill?

THE DIGESTIVE SYSTEM

- **Function:** to help convert food into simpler molecules that can be absorbed and used by the cells of the body.
- _____ - a one way tube that passes through the body. (found in other _____)

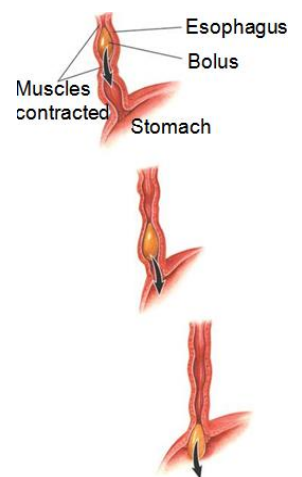


TYPES OF DIGESTION

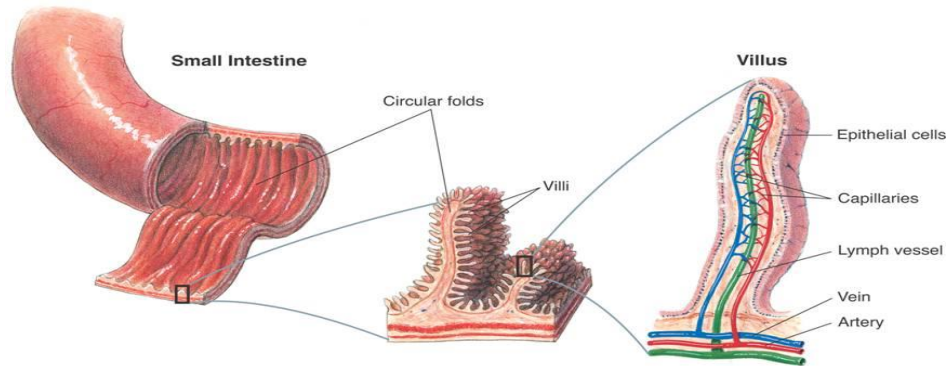
- _____ **Digestion**- the physical breakdown of large pieces of food into smaller pieces.
- _____ **Digestion**- large food molecules are broken down into smaller food molecules.

THE DIGESTIVE SYSTEM

- _____ - physical and chemical digestion begin here. Saliva contains _____ (lysozyme and amylase) which help in chemical digestion.
- _____ - (throat)- opening in back of mouth.
 - The tongue and muscles in the throat, push the chewed clump of food, or _____, down the throat.
- _____ - passageway from throat to stomach.
 - _____ - muscle contractions that squeeze food through the esophagus and into the stomach.
 - _____ - closes esophagus after food has passed into the stomach.
- _____
 - _____ and _____ in stomach break down proteins.
 - Stomach muscles and fluids mix food to form _____, which is passed to the small intestine, through the _____.



- _____ - functions in absorption of nutrients. (6 m long)
 - Contains 3 parts: _____, _____, and the _____.
 - Lined with numerous folds, and finger-like projections called _____/ _____, which provide more surface area for nutrient absorption.
- _____ - removes water from waste materials, remains are excreted by rectum.



ACCESSORY STRUCTURES

- **Salivary Glands**
 - Helps _____ the food and make it easier to chew.
 - Contains enzymes that help with _____ digestion.
- **Pancreas**
 - Produces _____ that regulates _____ levels.
 - Produces _____ that break down _____.
 - Produces _____, that neutralizes stomach acid so enzymes can be effective.
- **Liver**
 - Produces _____ (stored in _____) that helps dissolve and break down _____ molecules.

EXIT SLIP

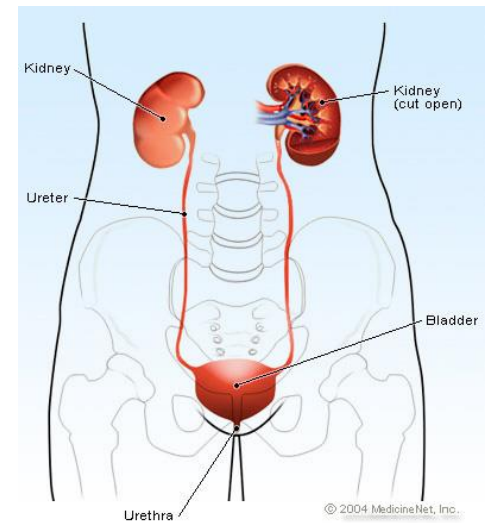
One person eats a steak in a few bites, while another chews the same amount of beef well. If all other conditions are equal, will both people digest the beef at the same rate? Explain

EXCRETORY SYSTEM

- _____ - eliminates nonsolid waste through sweat, urine, and exhalation to help maintain homeostasis in the body.
 - Wastes include _____, _____, _____, _____, _____ and _____.
 - Main Organs: _____, _____, _____, _____, _____, _____, and _____.

THE KIDNEYS

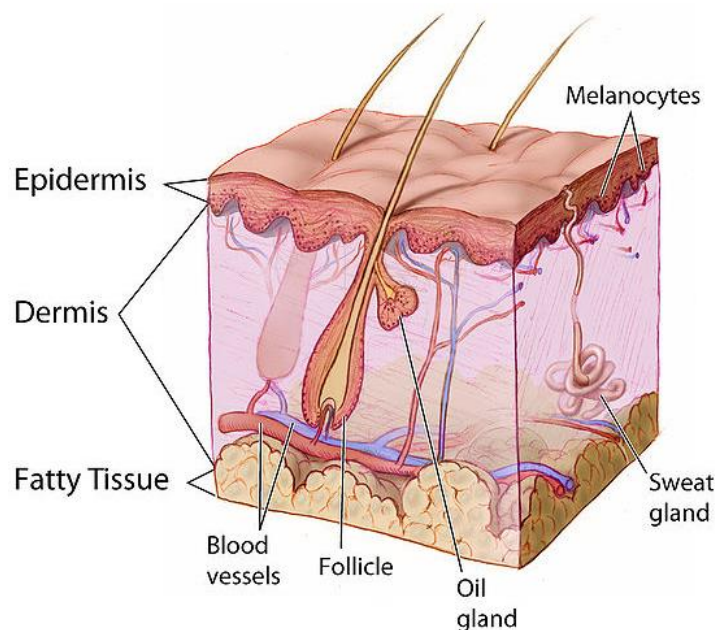
- _____ - eliminate wastes by filtering and cleaning the blood to produce urine.
 - Urine leaving the kidneys moves through the _____, to the _____, and the _____.
 - The inner layer of the kidneys is called the _____, the outer layer is the _____.
 - Blood enters the kidneys through the _____ and exits via the _____.



INTEGUMENTARY SYSTEM

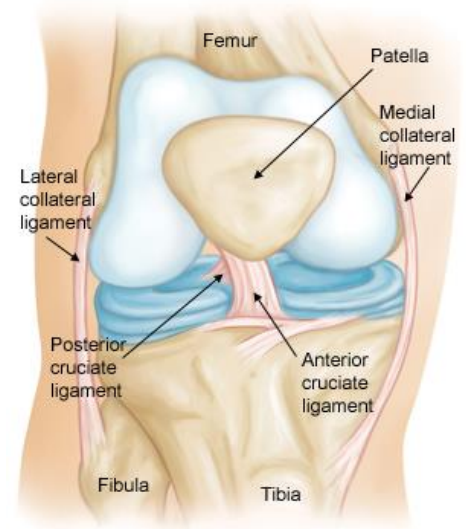
- _____ - surrounds all of your other organ systems providing protection and helping maintain homeostasis.
 - Includes _____, _____, _____, _____, _____, and _____.
- All of the tissues of the integumentary system are housed in your skin- the _____ organ of the body.

- The skin is made up of three layers:
 - _____ - outermost layer of skin. Contains pores and consists mostly of dead cells that flake off. Cells in the epidermis produce the proteins _____ and _____.
 - Keratin causes skin to become _____ in areas that maintain a lot of contact with the environment.
 - Melanin is a skin _____ that absorbs harmful _____ that may otherwise damage internal organs.
 - _____ - middle and thickest layer. Contains glands and cells that produce _____ and _____ to maintain the skin's _____ and _____.
 - The dermis also contains sweat glands (called _____ glands), oil glands (called _____ glands), and _____.
 - _____ - 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 _____.



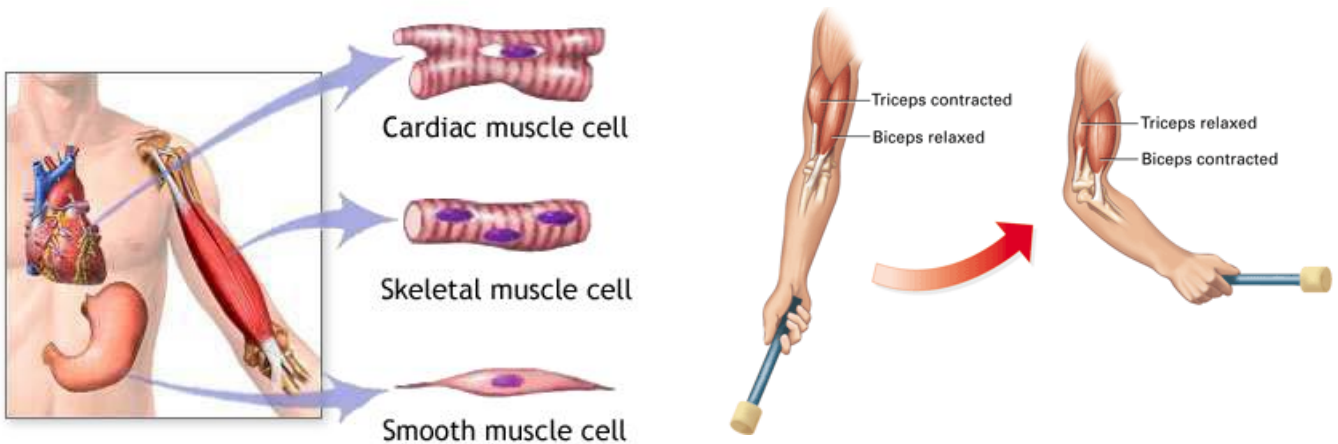
THE SKELETAL SYSTEM

- The skeletal system is divided into two parts:
 - _____ **Skeleton**- made up of bones that support the weight of the body and protect internal tissues.
 - _____ **Skeleton**- allows your body to move.
- **Functions:** _____ the body, _____ internal organs, allows for _____, stores _____, and provides a site for _____.
 - _____ - the production of blood cells.
- The human skeleton is made up of _____, _____, and _____.
- _____ - flexible connective tissue found between bones. It cushions your bones and allows for smooth movements.
- _____ - long, flexible band of connective tissue that connects to bones across a 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.
- In embryos, the skeleton is composed of _____. Around 2 months of development, bone begins to form in a process called _____.



THE MUSCULAR SYSTEM

- Three Types of Muscle Tissue
 - _____ **Muscle**- typically attached to bones. Responsible for _____ movement. Striated.
 - _____ **Muscle**- found in blood vessels, stomach, and intestines. _____.
 - _____ **Muscle**- only found in the heart. _____ - but cells are smaller. _____.



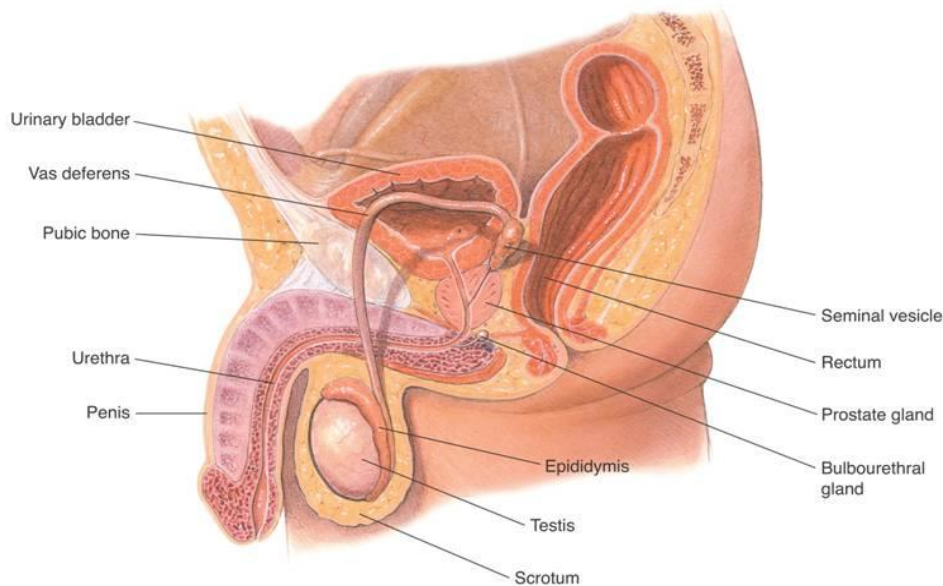
- Muscle filaments are made up of 2 proteins: _____ and _____.
- _____ - connective tissue that connects muscles to bones.
- Muscles typically come in _____ - when one muscle _____, the other _____.

THE REPRODUCTIVE SYSTEM

- _____ - the single fertilized egg from which all cells of the human body develops.
- _____ - period when reproductive system becomes fully functional. (ages _____)

THE MALE REPRODUCTIVE SYSTEM

- _____ - external sac containing the testis.
- _____ - contain seminiferous tubules which produce _____ (during _____).
- _____ - stores fully matured sperm.
- _____ - carries sperm from epididymis to urethra (which leads out of the body through the penis).



THE FEMALE REPRODUCTIVE SYSTEM

- _____ - clusters of cells surrounding an egg. (help egg mature- eggs develop within follicle)
- _____ - process where matured follicle breaks open and releases egg.
- _____ - egg moves from ovaries to fallopian tubes, where it is fertilized.
- _____ - receives fertilized egg.
- _____ - opening to the uterus.
- _____ - canal that leads from uterus to outside of the body.

