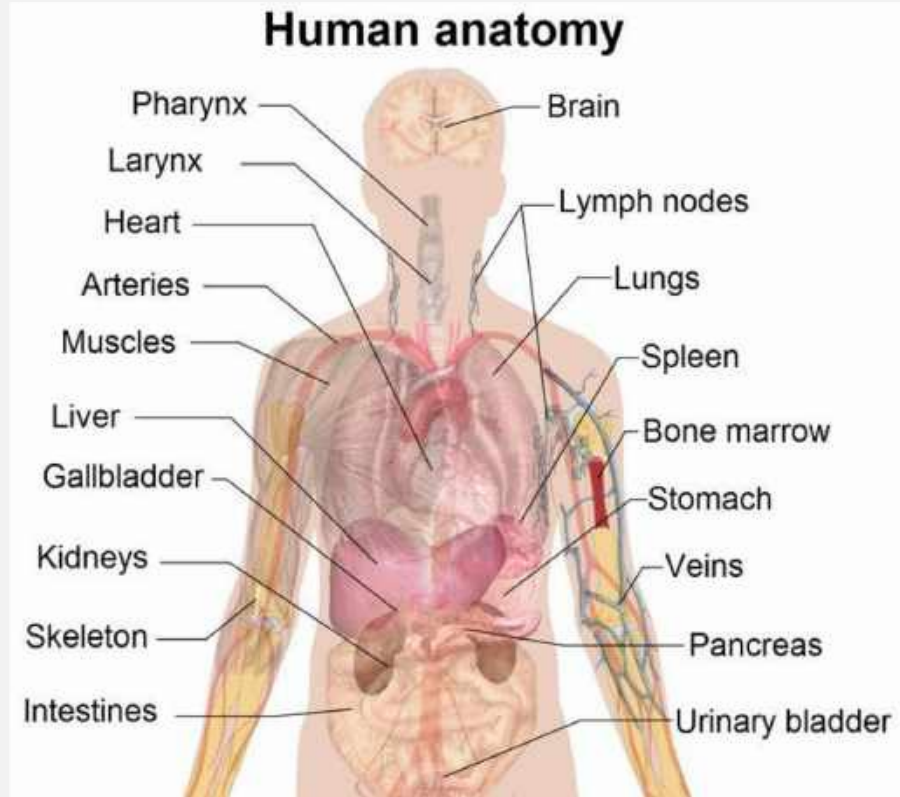


# HUMAN ANATOMY AND ORGANS

By: Perisa Ashar

STEMinate

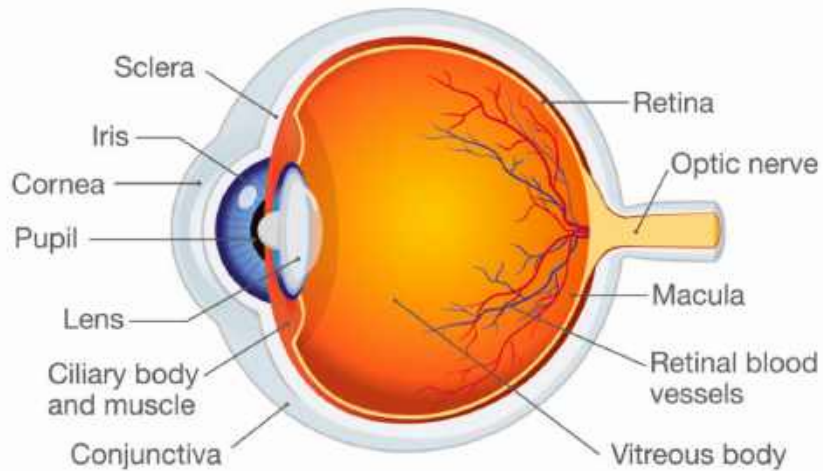
# HUMAN BODY AND ORGANS: INTRODUCTION



- Human Body: “Best best of machinery in the world”
- Has a multitude of organs that characterize various functions
- Anatomy: name of science dedicated to studying the human body and how it works
- Culmination of these functions help us survive and carry out our everyday activities

# EYES

## Human Eye Anatomy

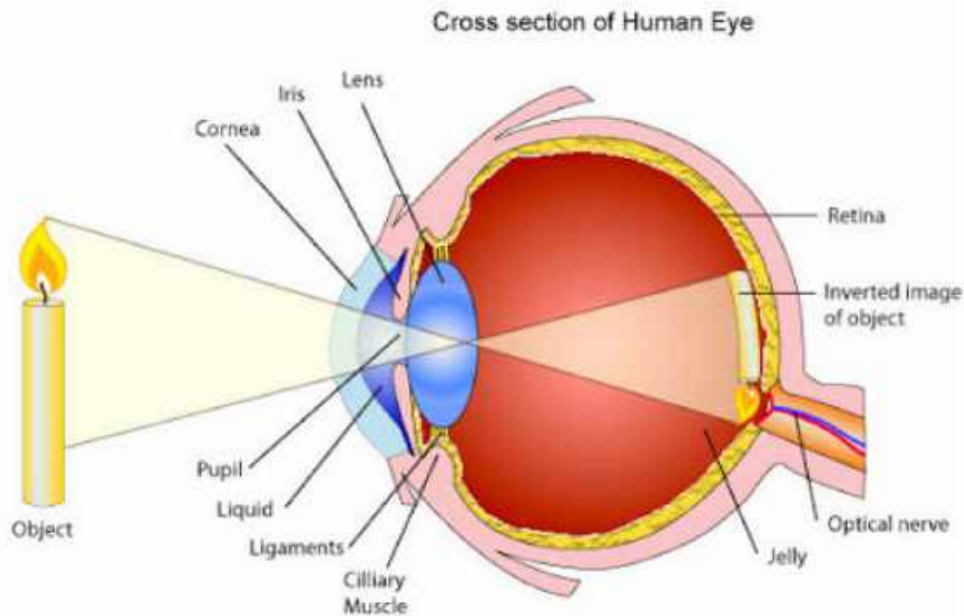


- Have 3 layers
  - Outer layer = sclera (tough layer), the “white part” of the eye, with the cornea (transparent layer forming the front of the eye) at the front
  - Middle layer = choroid, which contains the lens (helps create clear images of objects) and tiny blood vessels
  - Inner layer = retina, which is the light-sensitive part of the eye
- Lens = transparent disk that focuses light on to retina
- Iris = colored part of the eye
- Pupil = opening in iris that lets light into the eye
- Cornea = transparent dome that bends incoming light
- Retina = packed with light-sensitive cells called rods and cones
  - Rods = important for seeing in dim light
  - Cones = function best in bright light
  - Rods are more abundant than cones

# EYES (SIGHT)

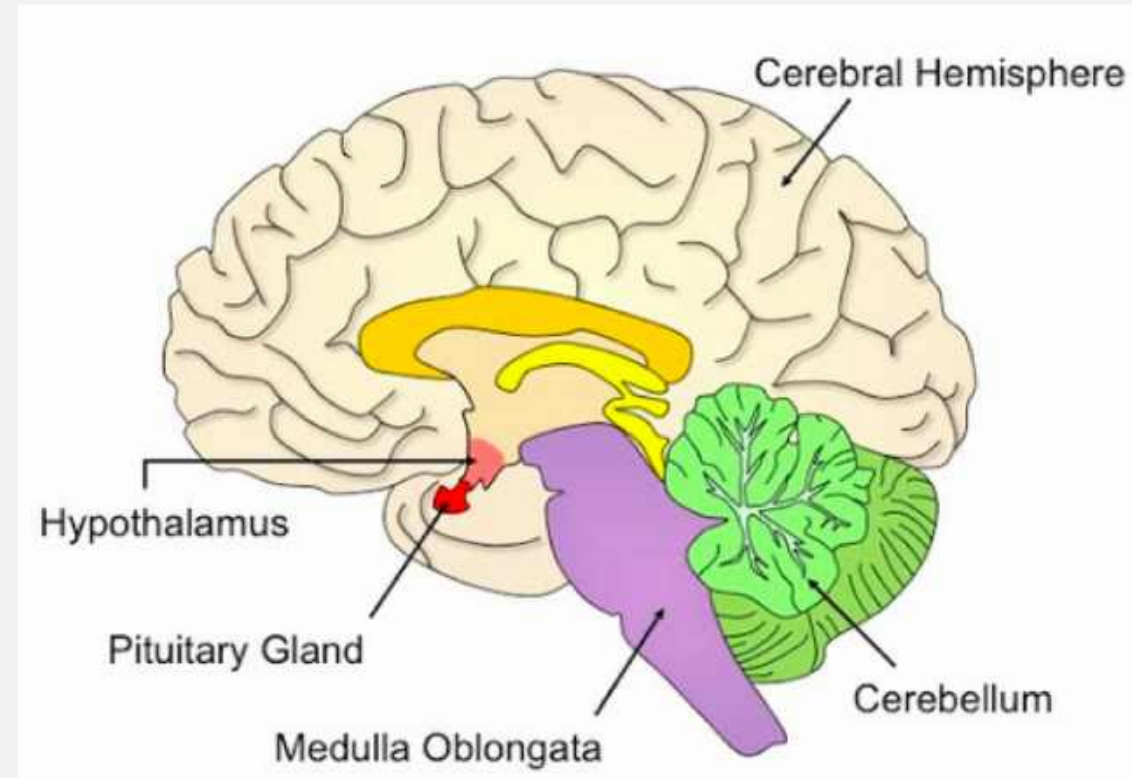
## Sight

- Receive information from light rays
  - Rays are either absorbed or reflected
- When you look at an object, the light rays reflected from the object enter the eye.
- Light is refracted by the cornea (transparent layer forming the front of the eye) and passes through the watery aqueous humor (clear, **watery** fluid that flows between and nourishes the lens and the cornea) and pupil (hole in the center of the eye) to the lens
- Iris: controls the amount of light entering the eye
  - Refers to color of your eye
- Lens: focus the light through the vitreous humor onto the retina, forming an image in reverse and upside-down
  - The brain is able to flip the image right-side up
- Light-sensitive cells in retina transmit the image to the brain by electrical signals



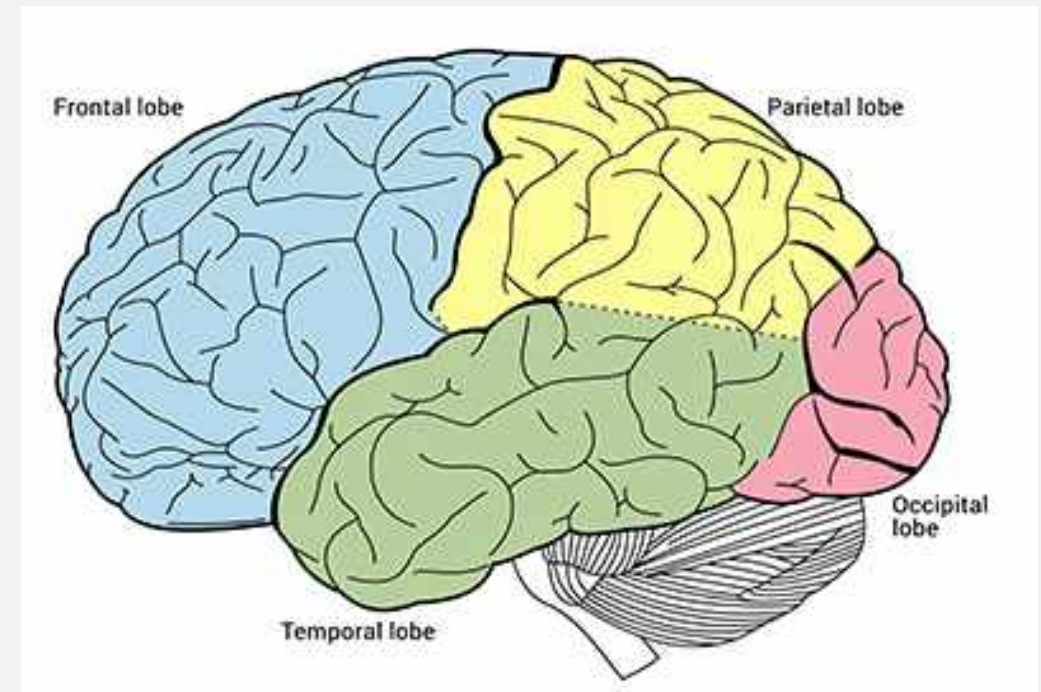
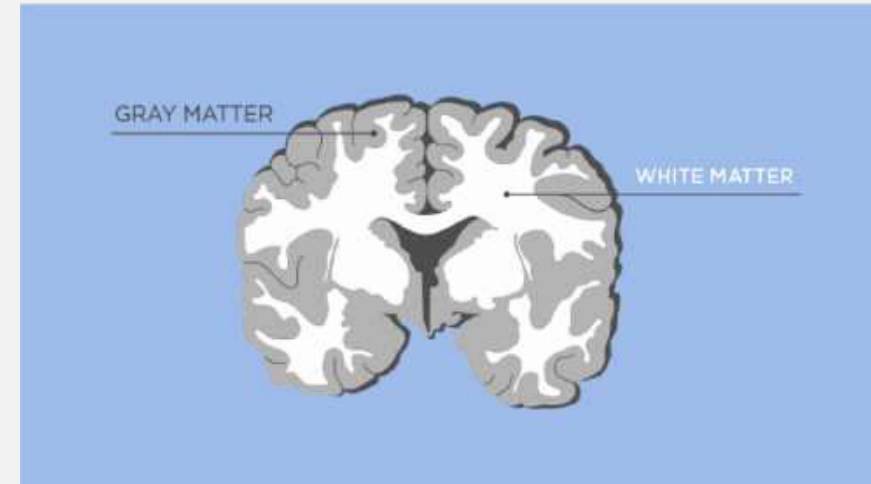
# BRAIN

- Divided into different departments
- Brain stem: life support system
  - Controls automatic functions, like breathing and digestion.
- Cerebellum: “mini-brain” in charge of balance and moving around
- Thalamus: Processes information sent via nervous system
  - Located in the core (center) of the brain
- Hypothalamus: Important in responses to cold, hunger, and pain
- Cerebral cortex: Outer layer of brain (cerebrum)
  - Important for complex functions like reading, writing, and speaking
  - Cerebrum is divided into the left and right hemispheres
- Corpus Callosum: connects right and left hemispheres
- Right hemisphere of cerebrum controls left side of the body, and the left hemisphere controls the right side of the body

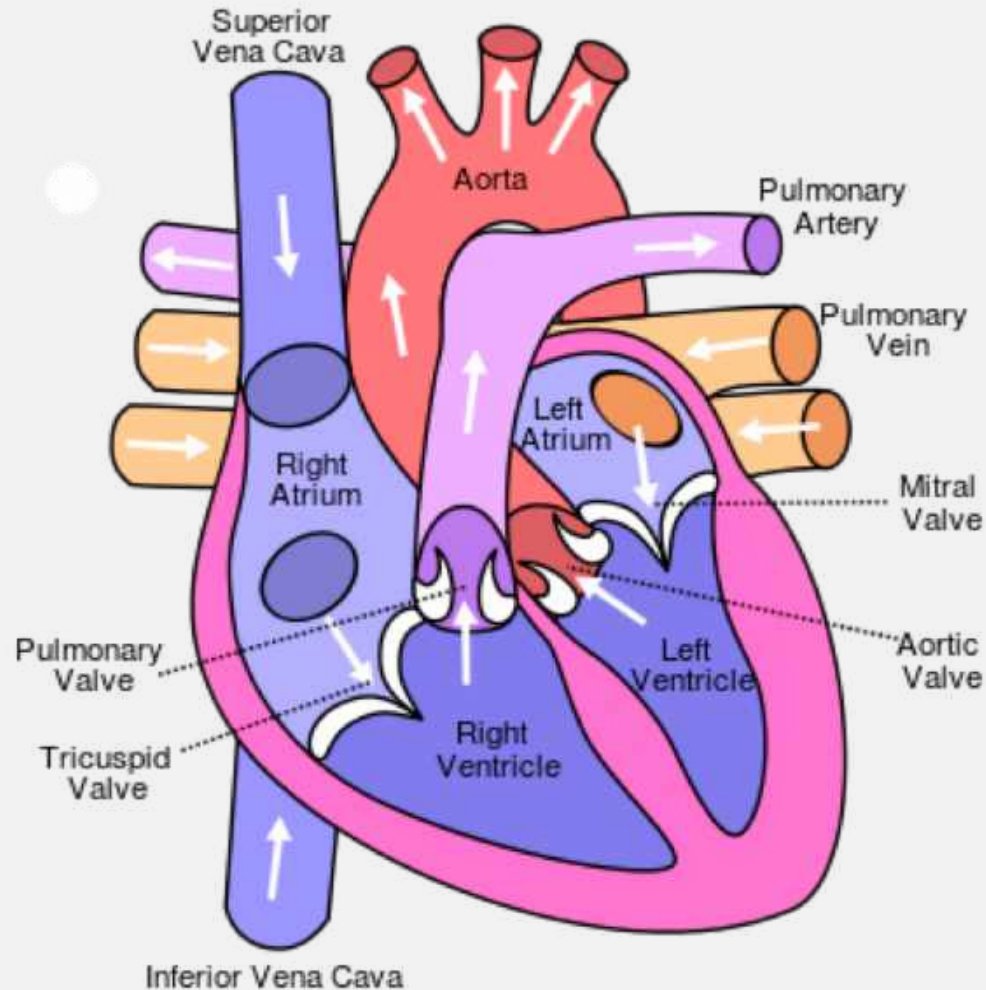


# BRAIN

- Grey matter: Made up of tightly-packed nerve cell bodies
  - Forms outer layer of the brain
- White matter: tissue through which messages pass between different areas of grey **matter** within the central nervous system. The **white matter** is **white** because of the fatty substance (myelin) that surrounds the nerve fibers (axons)
- Lobes in Brain
  - Frontal Lobe: part of the brain that controls important cognitive skills in humans, such as emotional expression, problem solving, memory, language, judgment, and sexual behaviors. It is, in essence, the “control panel” of our personality and our ability to communicate.
  - Parietal Lobe: processes sensory information it receives from the outside world, mainly relating to touch, taste, and temperature. Damage to the **parietal lobe** may lead to dysfunction in the senses.
  - Temporal Lobe: involved in primary auditory perception, such as hearing, and holds the primary auditory cortex.
  - Occipital Lobe: visual processing center of the mammalian brain containing most of the anatomical region of the visual cortex.

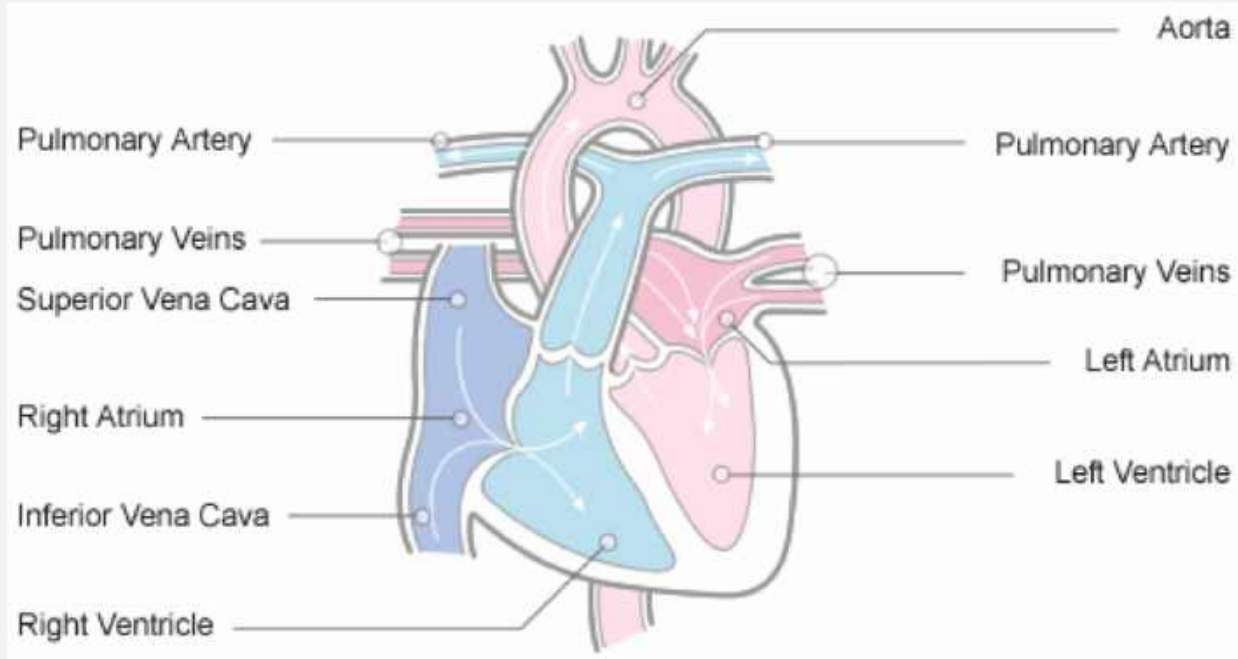


# HEART



- The heart is located between the lungs, towards the left side of the chest.
- It pumps blood via arteries throughout the body, supplying cells with oxygen and nutrients.
- Veins carry blood back to the heart.
  - Superior Vena Cava and Inferior Vena Cav (biggest veins in the heart)
- When our heart contracts, it makes a “lub-dub” sound
- The apex (blunt point of the lower edge of the heart) pulses with every beat of the heart.
- Adult human heart = size of one’s fist
- Valves: Prevent blood from flowing back in the chambers of the heart when it contracts
- Part of circulatory system, a system comprised of veins and arteries that deliver and exchange carbon dioxide and oxygen to several of the organs in our body.

# HEART (CONTINUED)

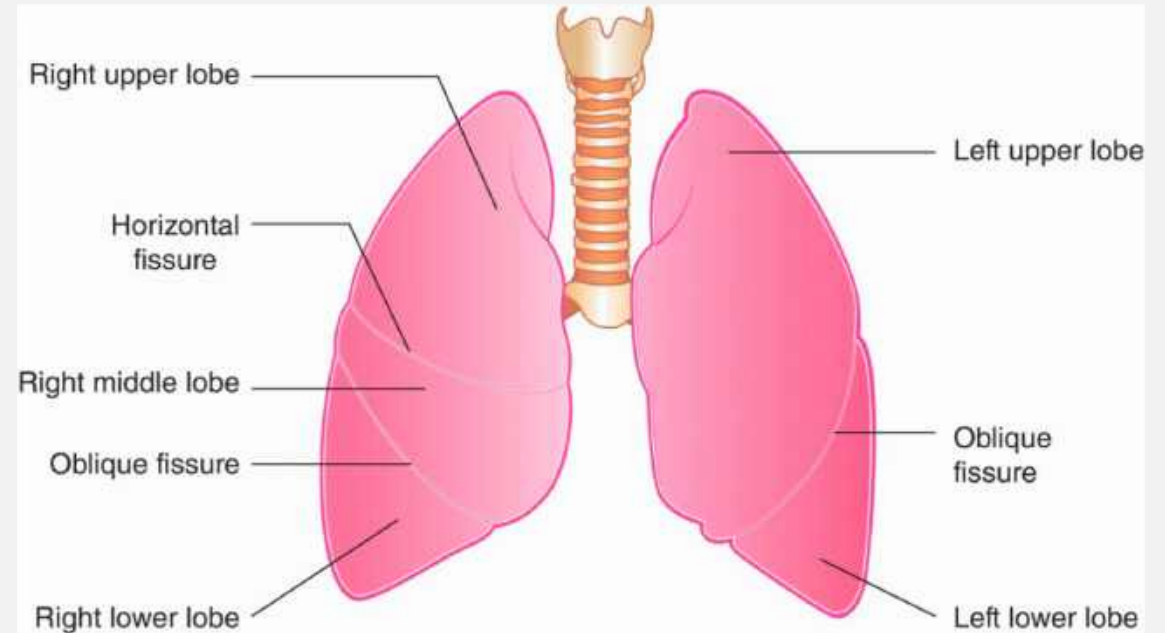


- 4 chambers in the heart
  - Left Atrium
  - Left Ventricle
  - Right Atrium
  - Right ventricle
- Mitral Valve: located between the left atrium and left ventricle
- Aortic Valve: located between left ventricle and aorta
- Tricuspid Valve: located between right atrium and right ventricle
- Pulmonary Valve: located between right ventricle and pulmonary artery
- Pulmonary artery: Delivers deoxygenated blood to lungs in order to receive oxygen, which subsequently returns back to the heart via the pulmonary vein to the left atrium
- After oxygenated blood passes through left atrium and left ventricle, it enters via the aorta and spreads oxygenated blood throughout the rest of the body via the circulatory system



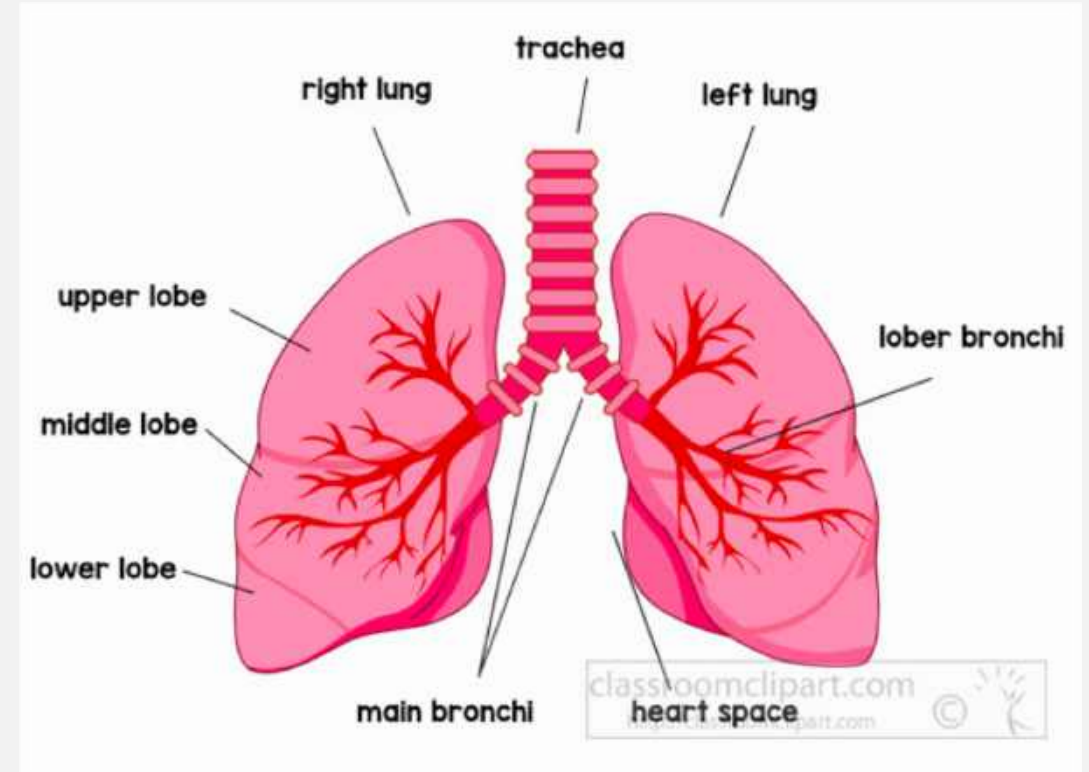
# LUNGS

- Bubble-shaped chambers that are made up of the softest, pinkest flesh called alveoli.
- Oxygen in the air gets exchanged for carbon dioxide
  - Our windpipe divides many times inside us, making millions of microscopic tubes that spread out to all of the lungs' alveoli.
  - Capillaries carry blood through the alveoli, which picks up oxygen, ready to transport to nearby cells.
  - As oxygenated blood is being transported, it deposits carbon-dioxide waste, which we breathe out before breathing in again.
- Lungs lie inside our chest, or thorax.
- Left lung is smaller than the right one because it shares space with your heart.
- Walls of the thorax are formed by our rib cage
  - Protects delicate organs inside

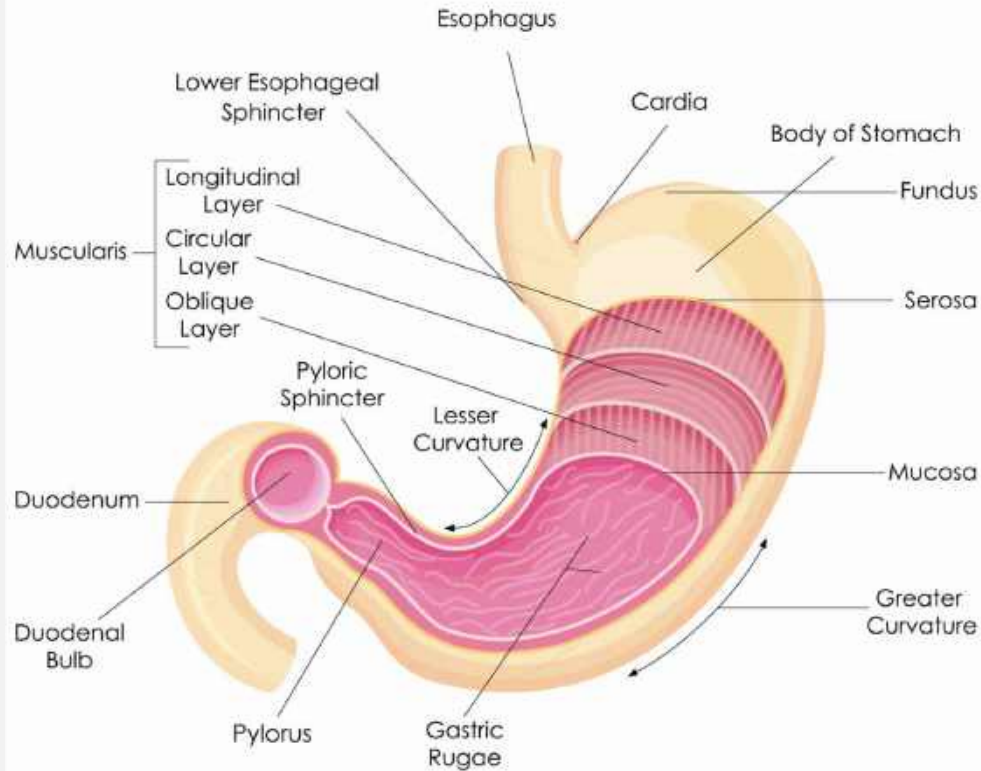


# LUNGS

- Lungs are designed to bring air into contact with our bloodstream.
  - Air travels down a large tube called the trachea, which branches out into two smaller tubes called bronchi.
    - Larynx: located at the head of the trachea
  - Ultimately, these small tubes form a tree-like network of fine bronchioles.
  - Bronchioles end in tiny air sacs, called alveoli, where gases pass between the air and blood.
- **Breathing**
  - Controlled by muscles.
  - Diaphragm = large-shaped muscle that lies under the rib cage. When it contracts, it flattens and pulls down, expanding the chest and drawing air into the lungs
  - The intercostal (rib) muscles also contract, lifting the rib cage upward and outward to expand the chest still further.
  - **Fun Fact** -Number of breaths in a lifetime: 500,000



# STOMACH

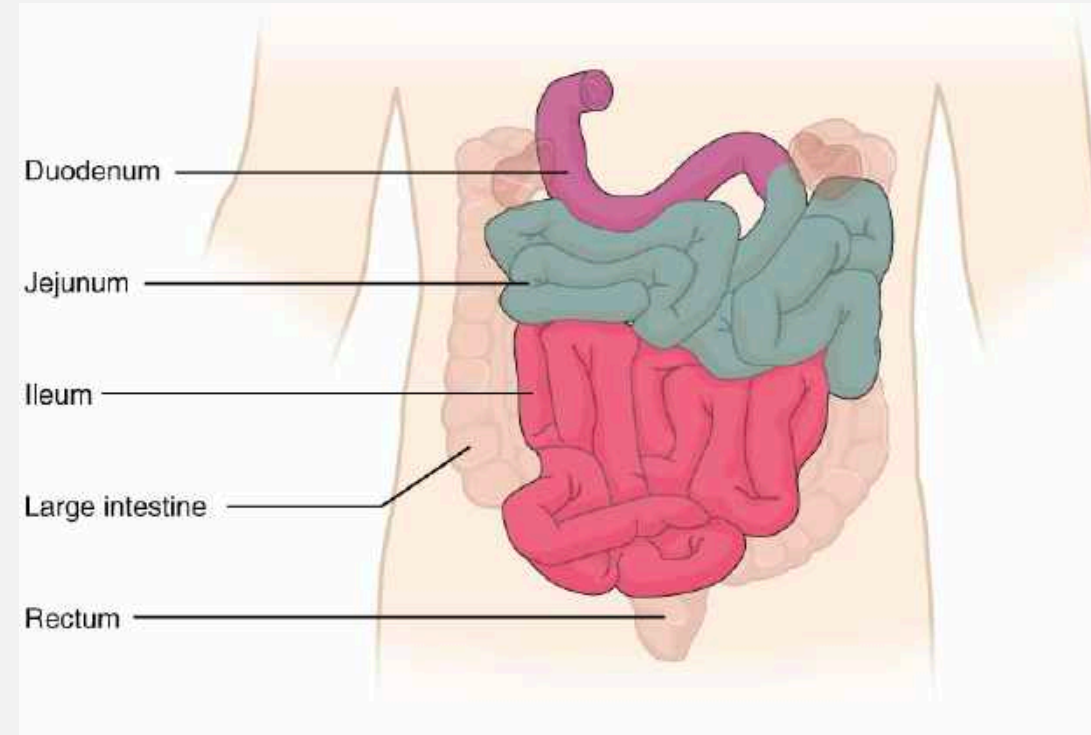


Stomach

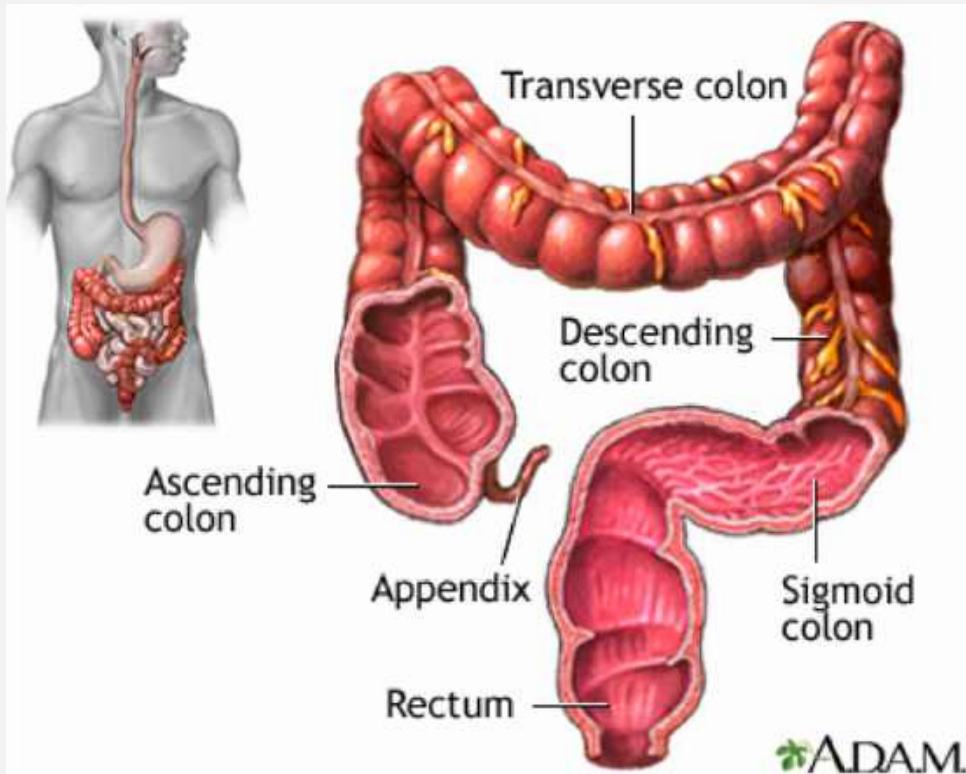
- One of the primary organs of the digestive system
- Located in the middle of the abdominal cavity and extends from the lower end of the esophagus to the duodenum.
  - Duodenum = first part of small intestine
- The bolus (small mass of food) of food waste travels down your esophagus to your stomach via peristaltic waves, where muscles in the stomach wall start to contract, churning up the food.
  - Peristaltic waves: waves of muscle contraction behind the food squeeze the food along.
- Stomach lining secretes powerful gastric juices like hydrochloric acid as well as enzymes (pepsin, rennin, and lipase) which help digest carbohydrates, proteins, and fats in food.
  - Stomach is lined with a durable mucous lining which protects it from the gastric juices so that the stomach itself is not digested.
- After about 3 hours, a ring of muscle called the pyloric sphincter opens to release the digested food mixture into the duodenum.

# INTESTINES: SMALL INTESTINE

- About 20 ft (6 meters) long and is made up of three parts:
  - Duodenum
  - Jejunum
  - Ileum
- Responsible for completing digestion (breaking down food into small particles or nutrients).
- These particles/nutrients are absorbed by millions of tiny projections called villi that line the intestine. The nutrients are then absorbed into the lymphatic system and are passed into your blood to be carried throughout the body.
- The small intestine extends from the duodenum, where it accepts the chyme (predigested food) to the ileocecal orifice, where it passes semifluid food by-products into the large intestine.



# INTESTINES: LARGE INTESTINE



- About 5 feet (1.5 meters) long and is much wider than the small intestine
- The main part of the large intestine is the colon.
- The large intestine accepts the by-products of digestion from the small intestine
- Here, glands secrete mucus and absorb water from any undigested food waste.
  - This turns the waste into a semisolid feces that are eventually passed out of the body
- Stomach, small intestines, and large intestines form the **digestive system**

# LIVER

- Largest of the body's glands, weighing about three pounds.
- Its red-brown organ features a high degree of vascularity (lot of veins), which is responsible for its dark color.

Can perform over 500 vital tasks!

NOT directly related to the digestive system

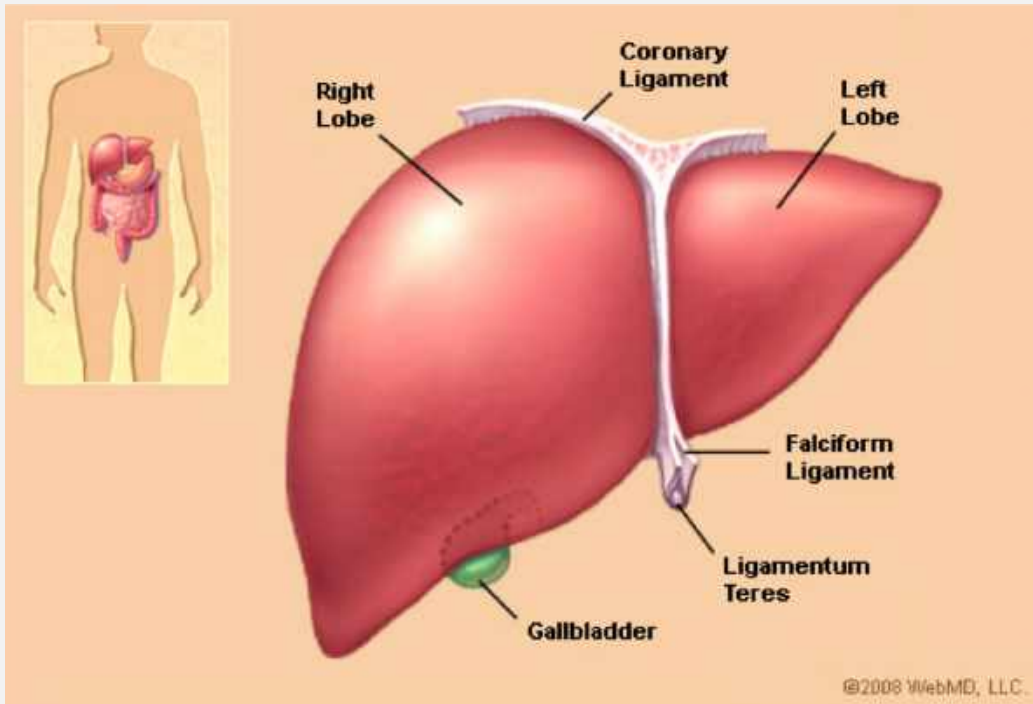
- However, it does help aid in digestion of fats by secreting bile into the duodenum
  - Bile= green-liquid used to break down food

Key role: processing nutrients

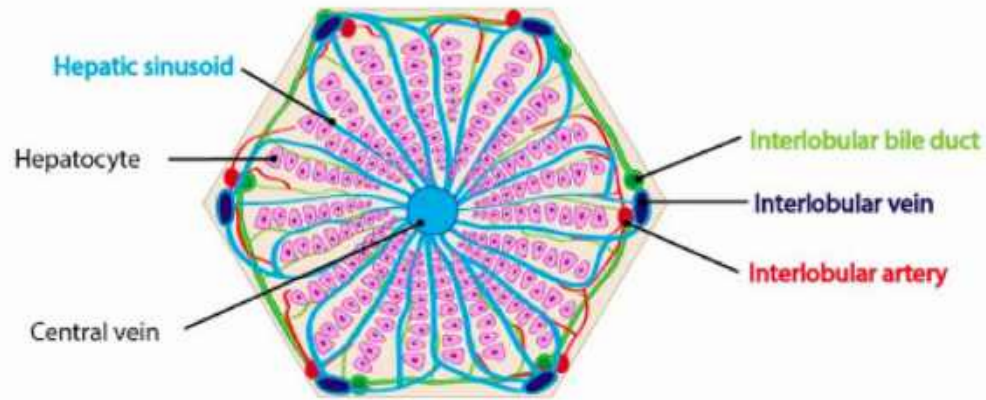
- Before going to the rest of the body, blood from the small intestine carries nutrients to the liver. The liver breaks some of these down and builds new, more useful chemicals that it stores for future use.

Also is responsible for cleaning your blood, removing toxins that could harm your body

- Destroys red blood cells, forms urea for excretion of nitrogenous wastes, forms fibrinogen (used in blood coagulation or blood-clot formation), stores glycogen (for energy in future use), helps in the metabolism and storage of vitamins, and produces protective and antitoxic substances.



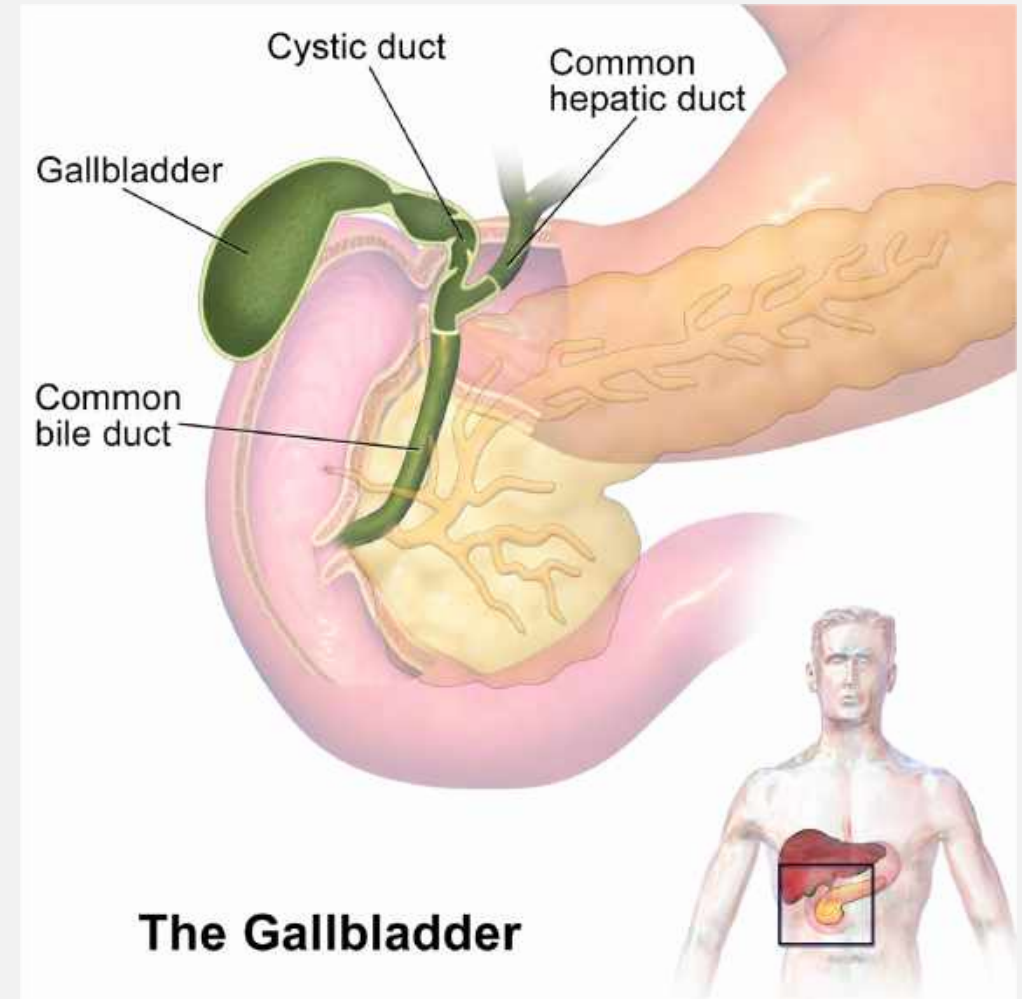
# LIVER: FOOD PROCESSORS



- Liver is made up of thousands of tiny processing units, called lobules, that act like miniature factories
- Each lobule is formed from billions of cube-shaped cells, called hepatocytes.
- One of their main jobs is to modify the chemicals in food into forms that are more useful to your body, or that can be stored.
- The dark circle in the center of liver lobule is a vein. It carries processed blood from the liver back to the heart.

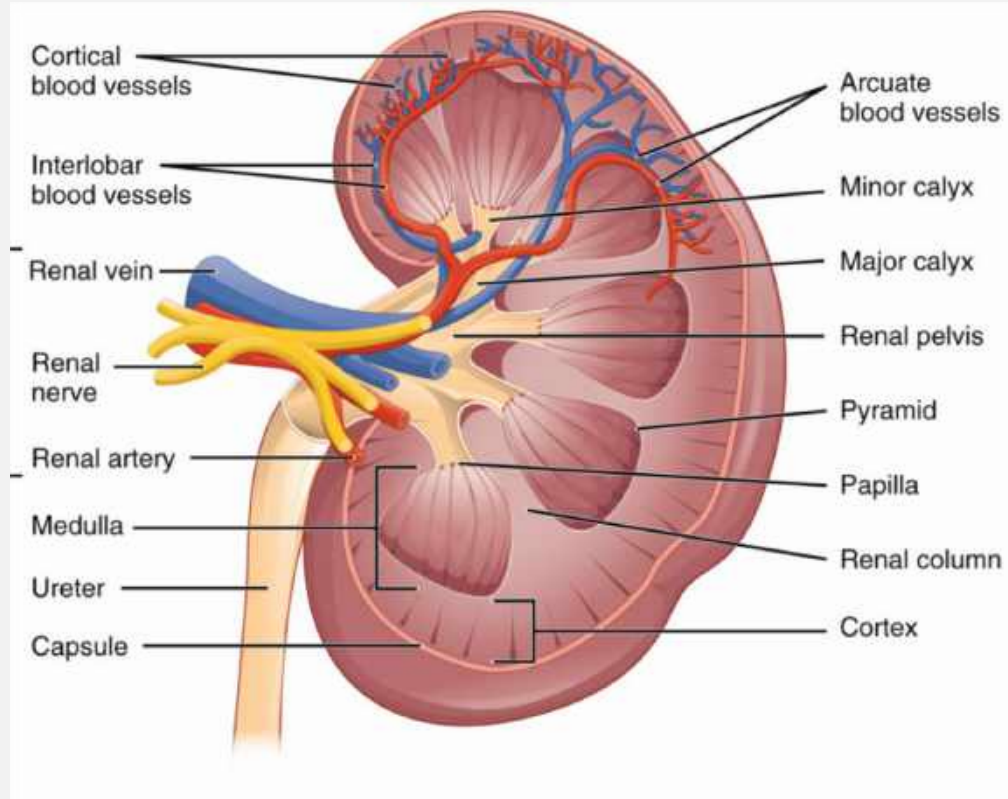
# GALL BLADDER

- The gall bladder is a small, muscular bag, tucked away behind the liver.
- It concentrates and stores bile, initially produced in dilute form by the liver.
  - This is used during digestion to break down fats in the food
  - When it is needed, the bile flows along the bile duct into the duodenum, where it is secreted through the cystic duct.
- Gall bladder is blue-green in color
- Interesting fact: the gall bladder is not critical for survival, and may be removed without significant effects.
- Health problem: crystallization of bile salts in the gall bladder gives rise to gall stones, which often require surgical removal.





# KIDNEYS



- Responsible for filtering toxins, wastes, ingested salts, and minerals salt out of the bloodstream.
- Kidneys are also responsible for regulating the acidity (low pH) of the blood by excreting alkaline (basic) salts when necessary.
- At the top of each kidney is an adrenal gland
  - Adrenal glands secrete hormones which help the body reduce stress
- Main and final function of kidneys: producing urine.