




O.B. Montessori Center
PROFESSIONAL HIGH SCHOOL

SCIENCE 9

SCHOOL YEAR 2023-2024 | QUARTER 3
Angeles | Fairview | Greenhills | **Las Pinas** | Sta. Ana

Professional High School
THIRD QUARTER
SCIENCE 9
QUARTERLY WORK PLAN



FORCE, MOTION, AND ENERGY (CONTINUATION)

- I. **MOTION IN TWO DIMENSIONS**
 - ☐ A. Free Fall
 - ☐ B. Projectile Motion
- II. **CONSERVATION OF MECHANICAL ENERGY**
 - ☐ A. Mechanical Energy
 - ☐ B. Law of Conservation of Mechanical Energy

LIVING THINGS AND THEIR ENVIRONMENT

- I. **CIRCULATION AND GAS EXCHANGE**
 - ☐ A. The Circulatory System
 - ☐ B. The Respiratory System
 - ☐ C. Coordinated Functioning of the Organ Systems
 - ☐ D. Proper Care of the Organ Systems
- II. **HEREDITY AND VARIATION**
 - ☐ A. Genes and Chromosomes
 - ☐ B. Mendelian Patterns of Inheritance
 - ☐ C. Non-Mendelian Patterns of Inheritance



CHAPTER 1

CIRCULATION AND GAS EXCHANGE



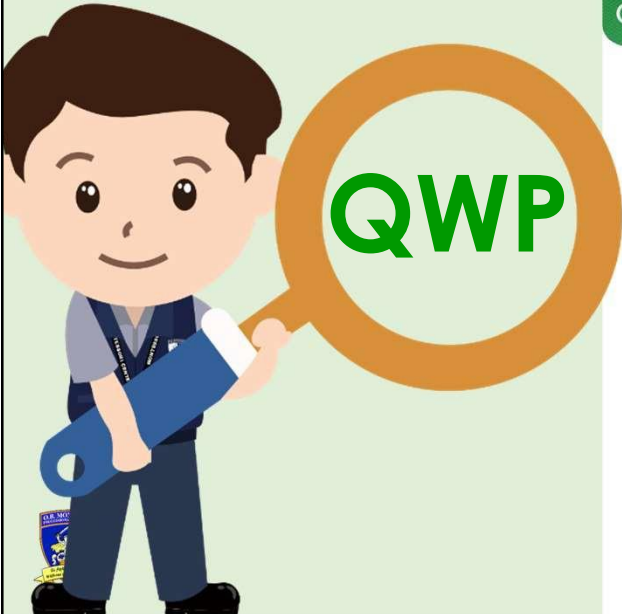
Chapter 1

Circulation and Gas Exchange




Essential Questions

- How do the respiratory and circulatory systems work with each other?
- How do the diseases in the circulatory and respiratory systems begin to develop?
- How can a person's lifestyle affect the performance of the respiratory and circulatory systems?



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CHAPTER 1

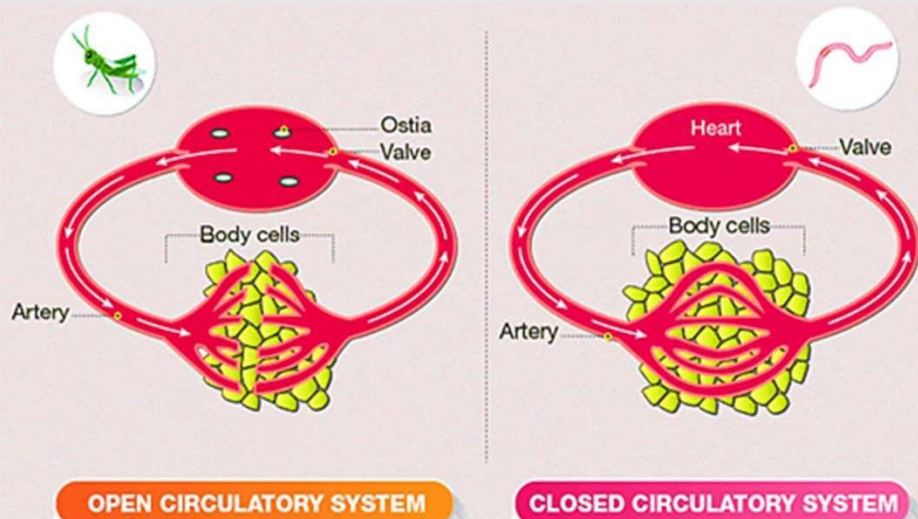
CIRCULATION AND GAS EXCHANGE



TOPIC 1

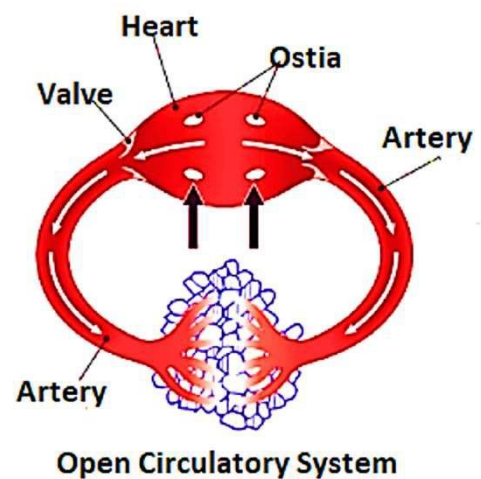
CIRCULATORY SYSTEM

TWO BASIC TYPES OF CIRCULATORY SYSTEM



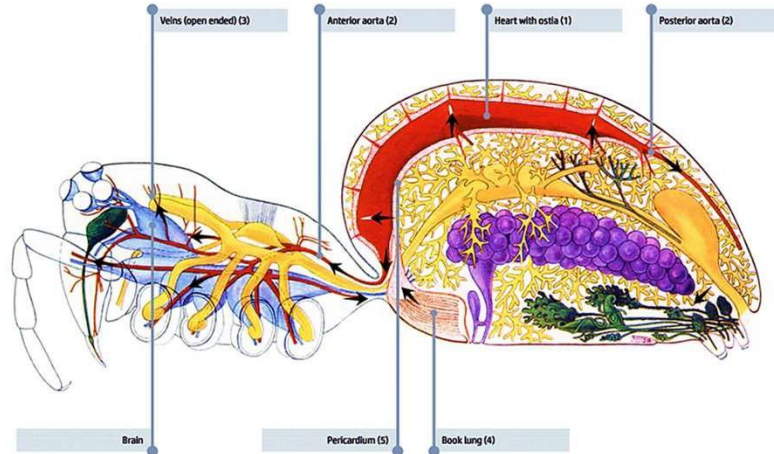
TYPE 1: OPEN CIRCULATORY SYSTEM

- ◆ hemolymph (blood) is pumped through open-ended vessels and diffuses out of the body, bathing all organs it passes through.
- ◆ common in invertebrates such as crustaceans, insects, and arachnids.





ARACHNID/SPIDER

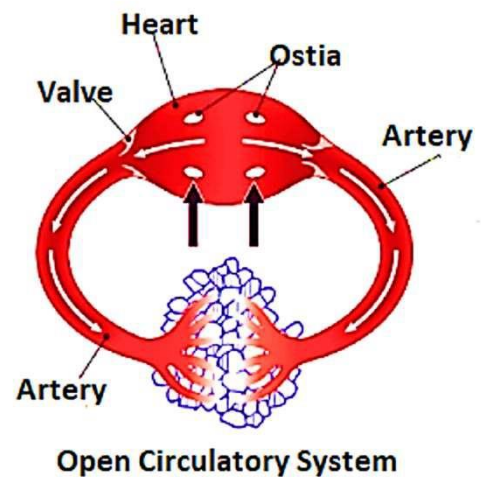


Open circulatory system of haemolymph in a spider © John Henry Comstock (1849 - 1931), Dennis Van Vierberghe • www.theraphosidae.be/en



OPEN CIRCULATORY SYSTEM continued

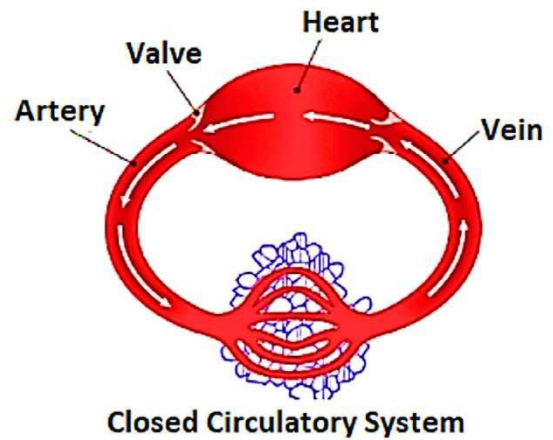
- ◆ there are no arteries in which increased blood pressure may occur.
- ◆ requires less energy for pumping blood
- ◆ suits animals with a small body and slow metabolism
 - ◆ because it takes time for the oxygenated blood to reach the cells.



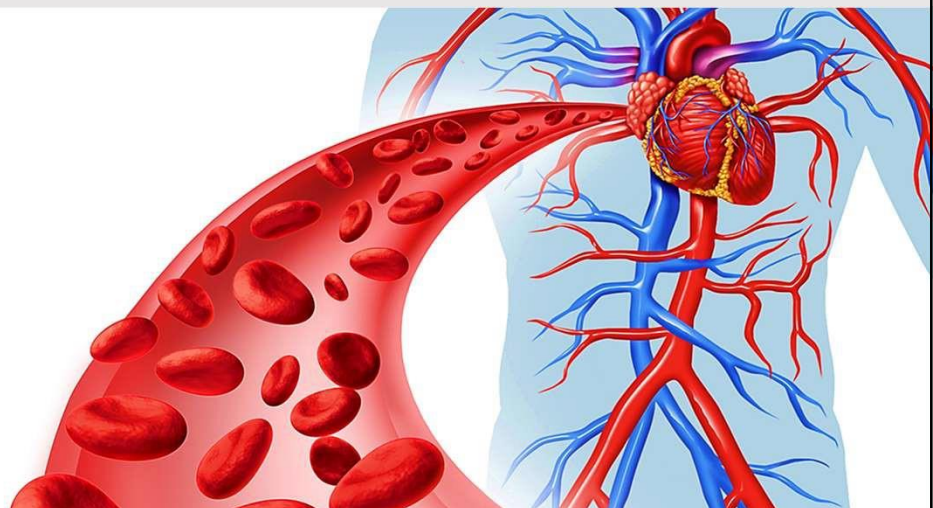


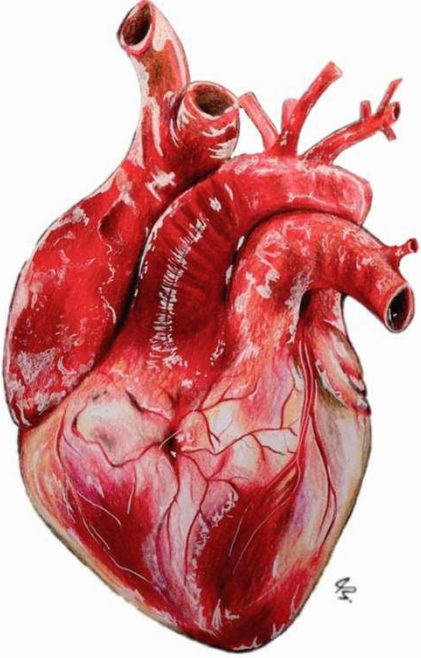

TYPE 2: CLOSED CIRCULATORY SYSTEM

- ◆ common to vertebrates
- ◆ suitable for organisms with fast metabolism
- ◆ also known as the *"Cardiovascular System"*
 - ◆ Consists of a heart and a network of vessels
 - ◆ Blood is confined to the vessels




PARTS OF THE CARDIOVASCULAR SYSTEM



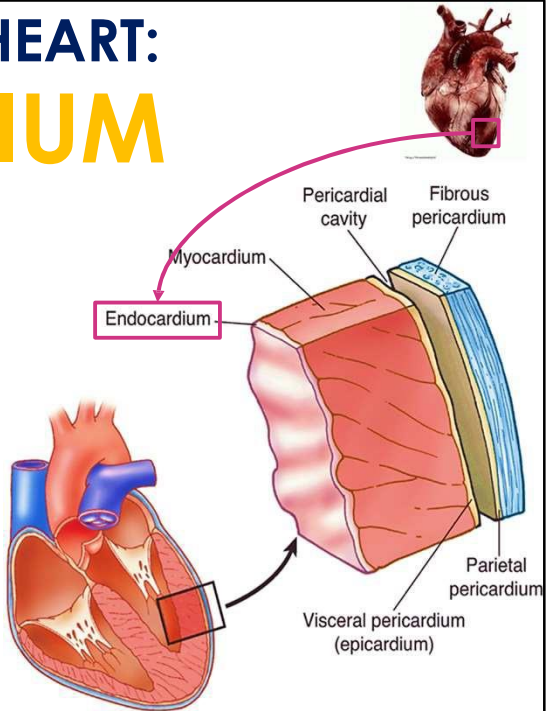
HEART

- a muscular organ that drives the blood through the blood vessels
- located between the lungs and is slightly pointed to the left
- contracts about 72 times per minute (more than 100,000 times a day)



STRUCTURE OF THE HEART: ENDOCARDIUM

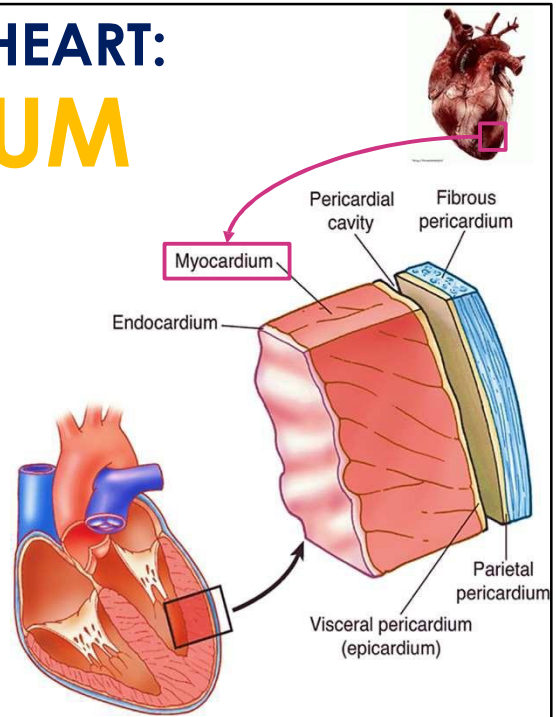
- ◆ membrane that lines the interior of the heart
- ◆ made up of thin, smooth layer of cells like the walls of the oral cavity
- ◆ *'Endo' (Greek) – Internal, within*





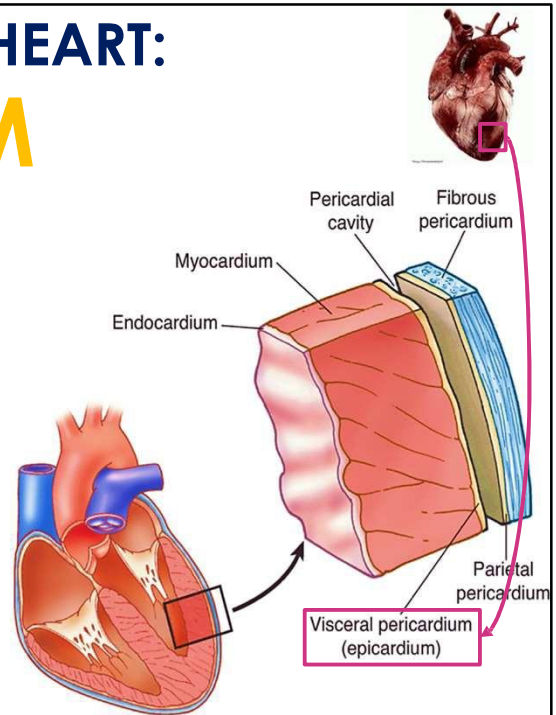
STRUCTURE OF THE HEART: MYOCARDIUM

- ◆ thickest layer of the cardiac muscles
- ◆ responsible for pumping blood through the blood vessels
- ◆ *'Myo' (Greek) – of muscle, relating to muscle*



STRUCTURE OF THE HEART: EPICARDIUM

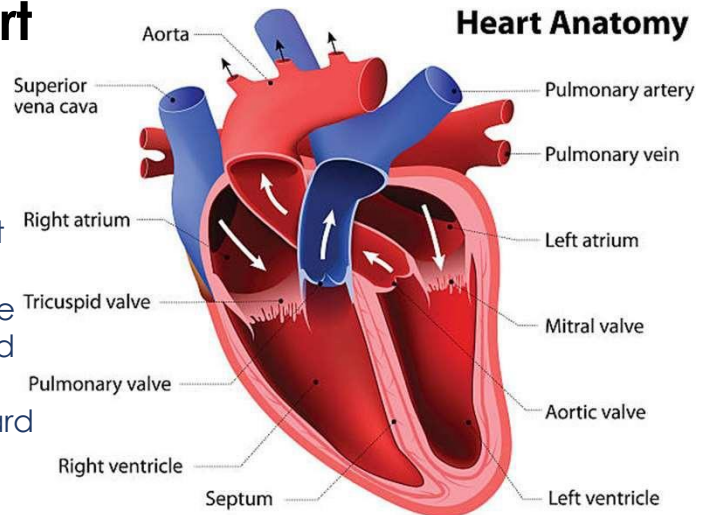
- ◆ thin, outermost layer of the heart wall
- ◆ the space between the two pericardium membranes protects the heart from friction
- ◆ *'Epi' (Greek) – upon, on, over, after*





Parts of the Heart

1. **Atrium (L, R)**
 - a. receives the blood
2. **Ventricle (L, R)**
 - a. pumps the blood out
3. **Valves**
 - a. present between the chambers and blood vessels
 - b. prevent the backward flow of blood



Heart Anatomy

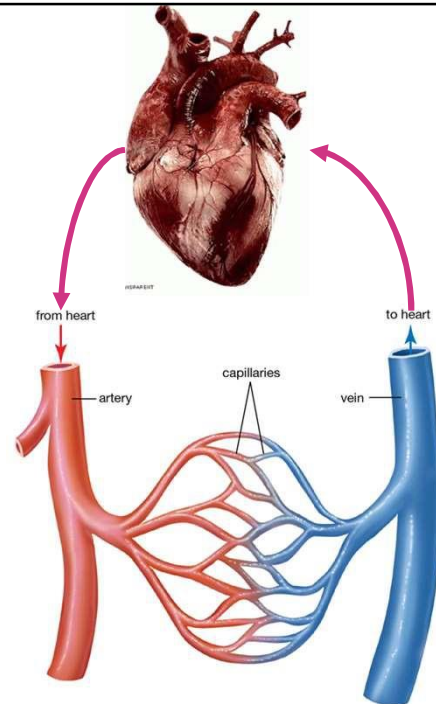
THE BLOOD VESSELS

Responsible for the transport of blood to and from the body tissues



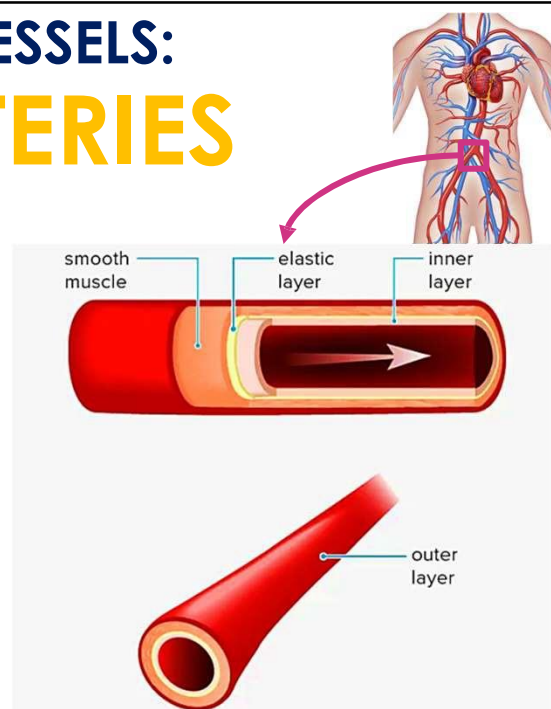
THE BLOOD VESSELS

- ◆ Three major types of blood vessels
 - ◆ Arteries
 - ◆ Veins
 - ◆ Capillaries



TYPES OF BLOOD VESSELS: ARTERY/ARTERIES

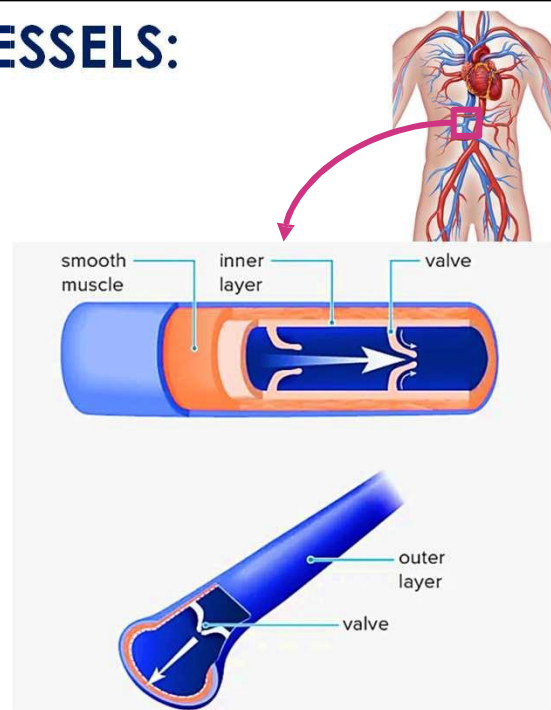
- ◆ Function:
 - ◆ carry blood **"AWAY"** from the heart.
- ◆ Specialized structure:
 - ◆ have thick and elastic walls that can withstand high-pressure
- ◆ Largest Artery: AORTA
- ◆ Smallest: ARTERIOLES – thin walls
- ◆ *Note: "Red" represents oxygenated blood. "Blue" represents deoxygenated blood.*





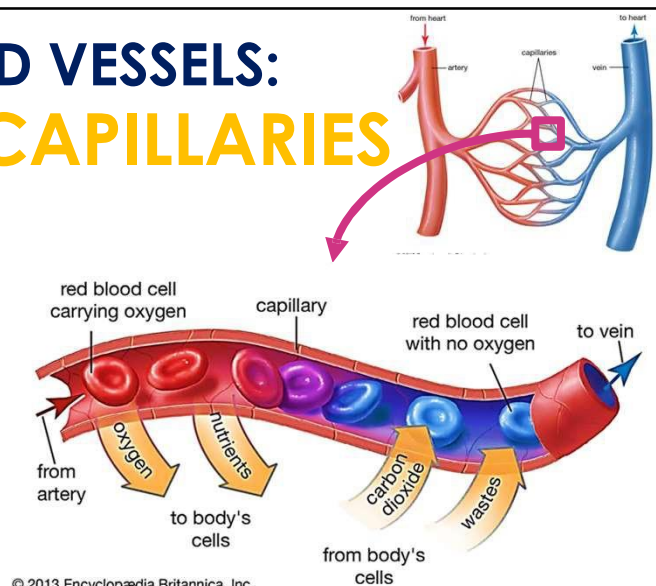
TYPES OF BLOOD VESSELS: VEIN/VEINS

- ◆ Function:
 - ◆ return the blood **"BACK"** to the heart and drain the capillaries
- ◆ Specialized structure:
 - ◆ thinner walls but wider than arteries
 - ◆ equipped with one-way valves
- ◆ Smallest: VENULES
- ◆ *Note: "Red" represents oxygenated blood.
"Blue" represents deoxygenated blood.*



TYPES OF BLOOD VESSELS: CAPILLARY/CAPILLARIES

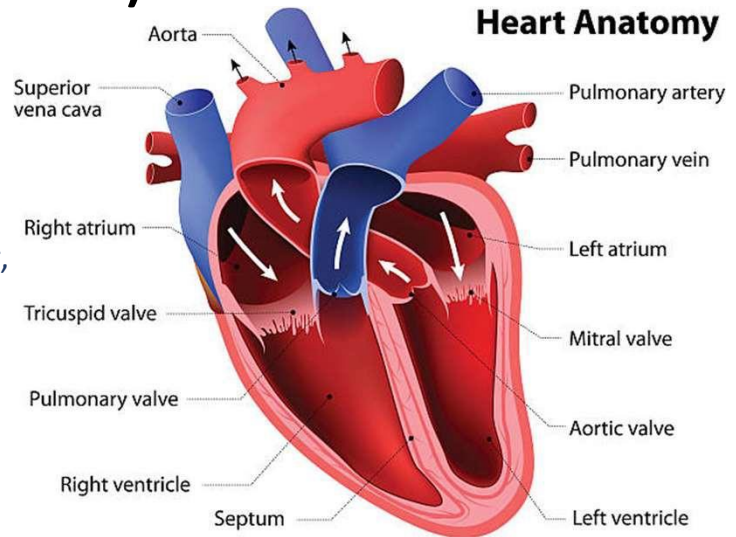
- ◆ Function:
 - ◆ facilitate the exchange of materials between the blood and body cells or between the blood and the lung tissues
- ◆ Specialized Structure:
 - ◆ very thin walls, only 2 cells thick.



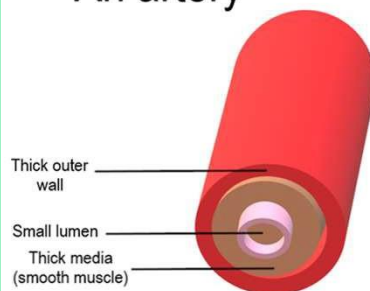


Blood Vessels (Heart)

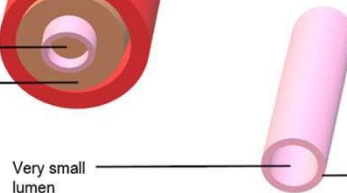
1. **Arteries**
 - a. Aorta
 - b. Pulmonary Artery
2. **Veins**
 - a. Vena cava (superior, inferior)
 - b. Pulmonary Vein



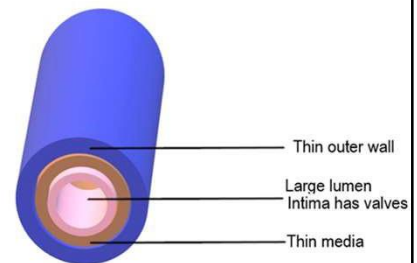
An artery

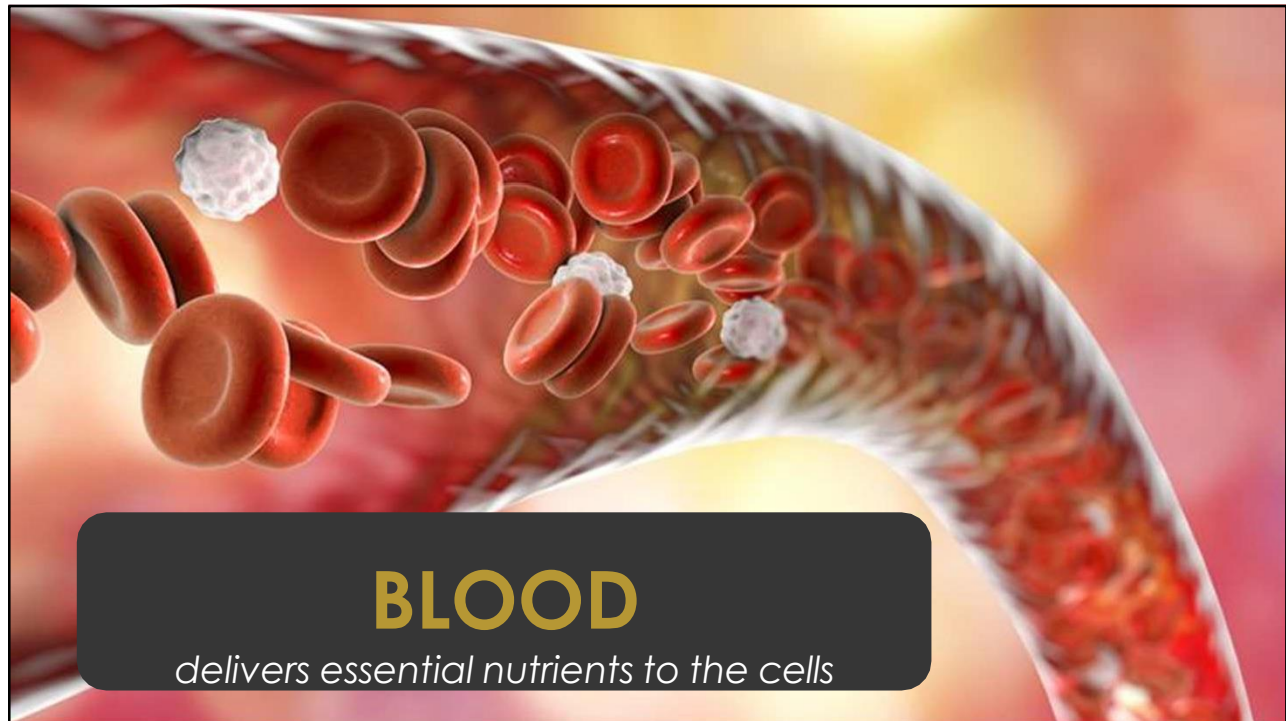


A capillary



A vein



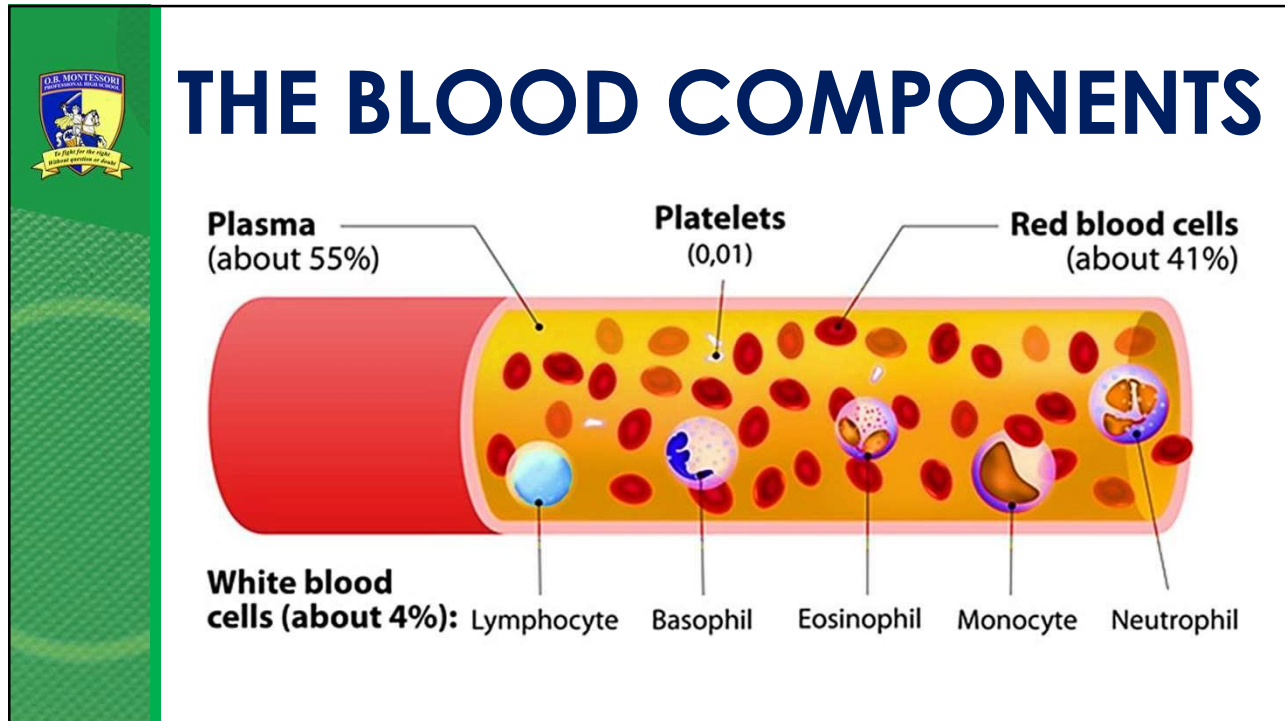


THE BLOOD

- ◆ blood accounts for about 7% to 8% of the total body weight
- ◆ blood helps in the homeostasis
 - ◆ homeostasis refers to the stability, balance, or equilibrium of factors such as temperature, pH, and oxygen concentration in the body.
- ◆ helps boost the immune system

BLOOD

Volume Percentage	Component	Details
55%	PLASMA	- MOSTLY WATER - PROTEINS (ALBUMIN) - ELECTROLYTES - DISSOLVED GASES (O_2 + CO_2)
<1%	BUFFY COAT	(PLATELETS & LEUKOCYTES)
45%	ERYTHROCYTES	



BLOOD COMPONENT:

PLASMA

- ◆ comprises about 55% of the blood
- ◆ liquid part of the blood
- ◆ components:
 - ◆ 90% Water
 - ◆ 10% Dissolved Components:
 - ◆ Glucose
 - ◆ Fats
 - ◆ Amino acids
 - ◆ Electrolytes
 - ◆ Vitamins
 - ◆ Metabolic waste products
 - ◆ Hormones
 - ◆ Proteins

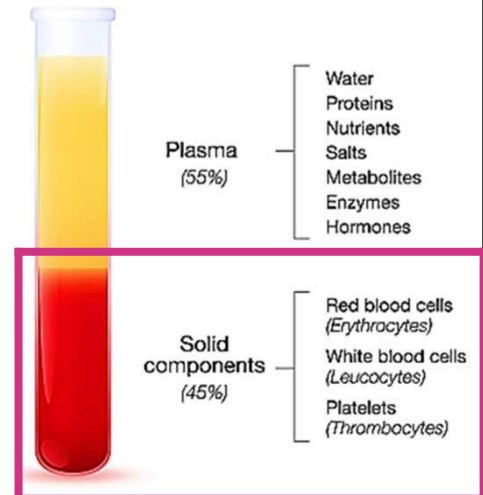
On the right, a test tube shows a yellow liquid (plasma) on top of a red liquid (red blood cells). Arrows point from the plasma to three protein components:

- ALBUMIN PROTEIN** – Regulates blood flow
- CLOTTING FACTORS** – helps seal damaged blood vessels
- ANTIBODIES** – helps fight infections



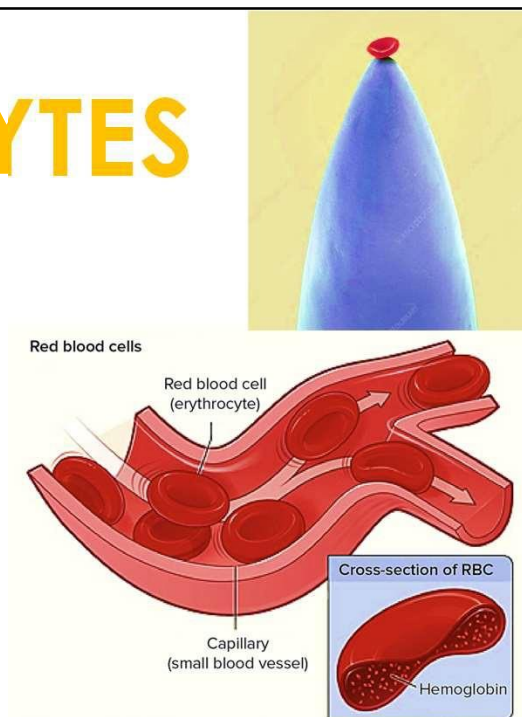
BLOOD COMPONENT: FORMED ELEMENTS

- ◆ make up about 45% of the blood volume
- ◆ consists of:
 - ◆ Red blood cells
 - ◆ White blood cells
 - ◆ Platelets



FORMED ELEMENTS: ERYTHROCYTES

- ◆ also known as “**Red Blood Cells**”
- ◆ make up 40% of the blood volume
- ◆ as red blood cells mature, the nucleus and other organelles disappear, creating more space for oxygen
- ◆ hemoglobin – iron-containing protein, carries oxygen
 - ◆ the reason why it is red in color; the brighter the red, the more oxygen it contains.
- ◆ ‘*Erythros*’ (Greek) – Red, Reddish

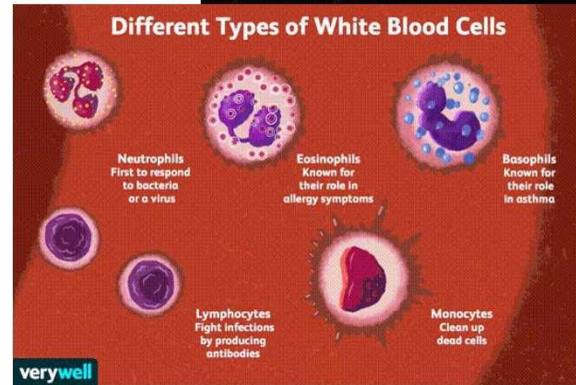




FORMED ELEMENTS: LEUKOCYTES

- ◆ also known as white blood cells, but are colorless
- ◆ outnumbered by RBCs by a ratio of 700 to 1
- ◆ responsible for defending the body against infection

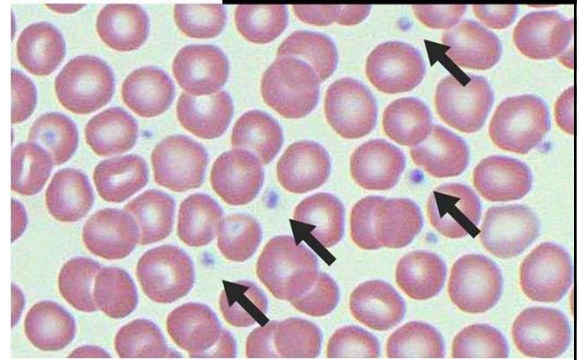
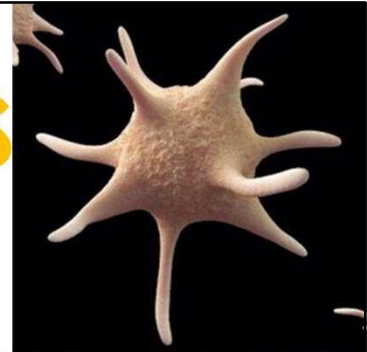
◆ *'Leukos' (Greek) – White, Bright*

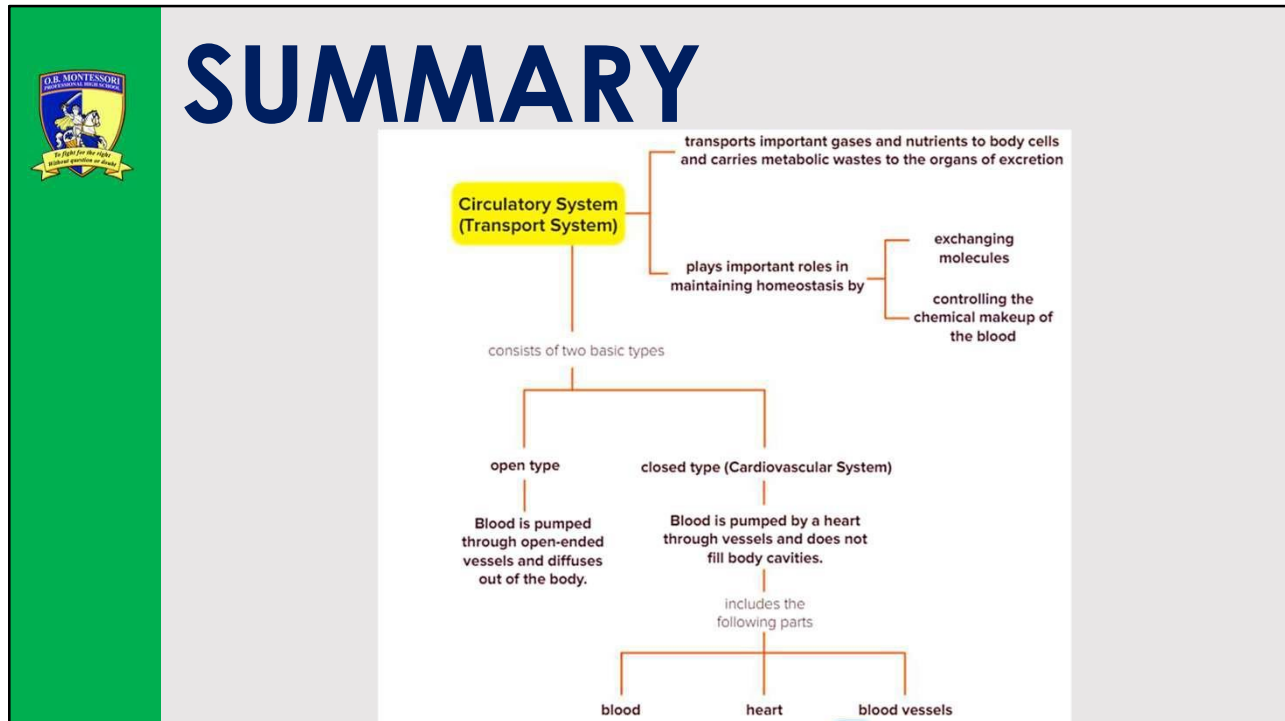



FORMED ELEMENTS: THROMBOCYTES

- ◆ also called as Platelets
- ◆ smallest formed element of the blood
- ◆ fragment of cells
- ◆ ratio of platelet to red blood cells: 1:20
- ◆ platelets clump together to form a plug that helps seal a blood vessel

◆ *'Thrombos' (Greek) – Lump, Clump*








QWP

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CHAPTER 1 CIRCULATION AND GAS EXCHANGE



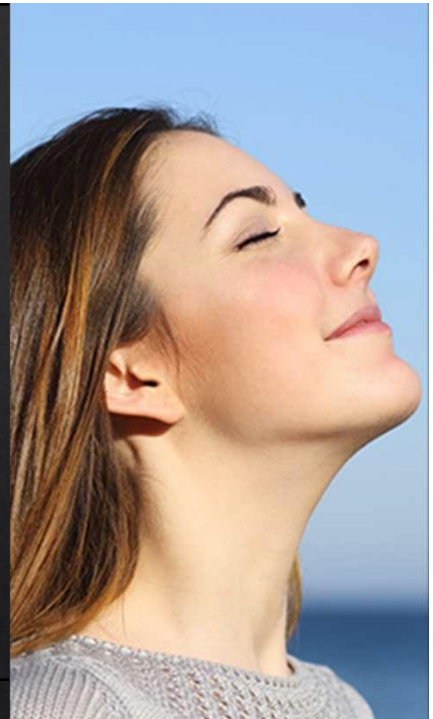
TOPIC 2 RESPIRATORY SYSTEM

RESPIRATION

- ◇ oxygen is obtained from the environment and delivered to the cells
- ◇ carbon dioxide gas is transported and removed from the body
- ◇ necessary in the production of "energy" of cells.

Involves three events:

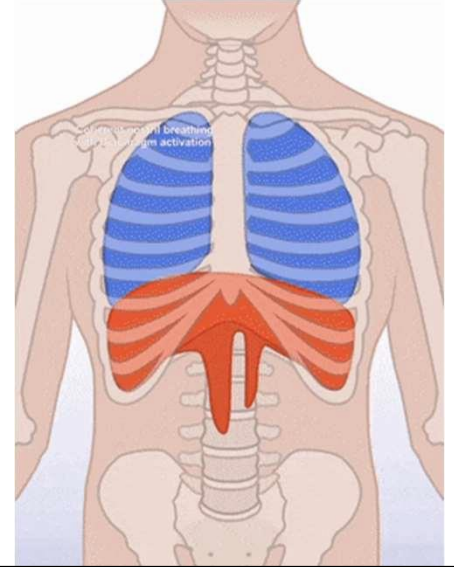
1. Breathing
2. Diffusion
3. Transport of gases





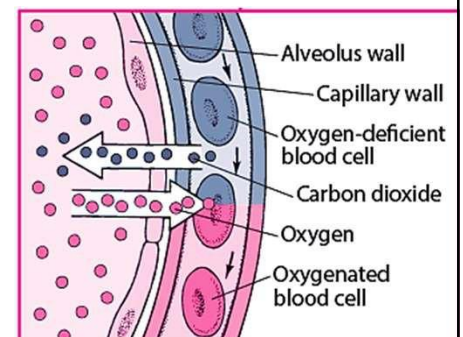
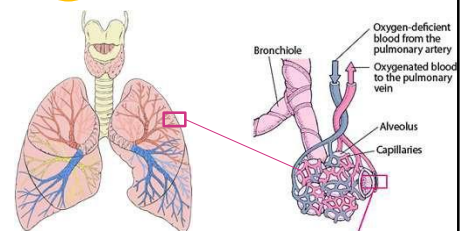
EVENT 1: BREATHING

- ◆ ventilation
- ◆ exchange of air between the atmosphere and the Lungs
 - ◆ inhalation
 - ◆ exhalation
- ◆ **LUNGS ↔ ENVIRONMENT**



EVENT 2: DIFFUSION

- ◆ cellular Level
- ◆ transfer of O_2 and CO_2 across the respiratory membrane
 - ◆ O_2 - from the lungs to the blood
 - ◆ CO_2 - from blood to the lungs
- ◆ **LUNGS ↔ BLOOD**

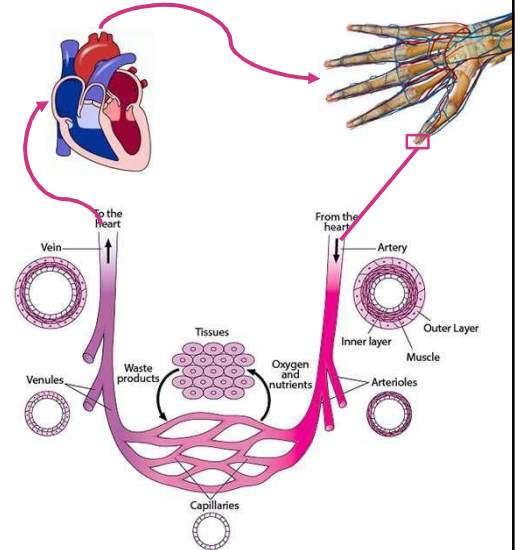




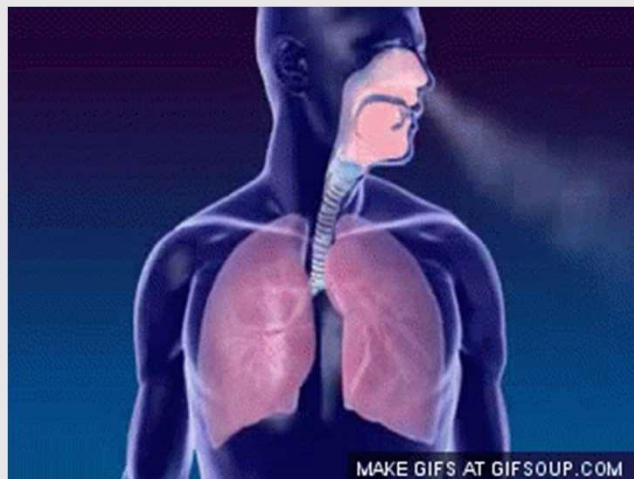
EVENT 3: TRANSPORT OF GASSES

- ◆ transport of blood from lungs to different body parts and vice versa.
- ◆ transfer of O_2 and CO_2 across the body cells
 - ◆ O_2 - from the blood to the body cells
 - ◆ CO_2 - from body cells to the blood

◆ **BLOOD ↔ CELL**



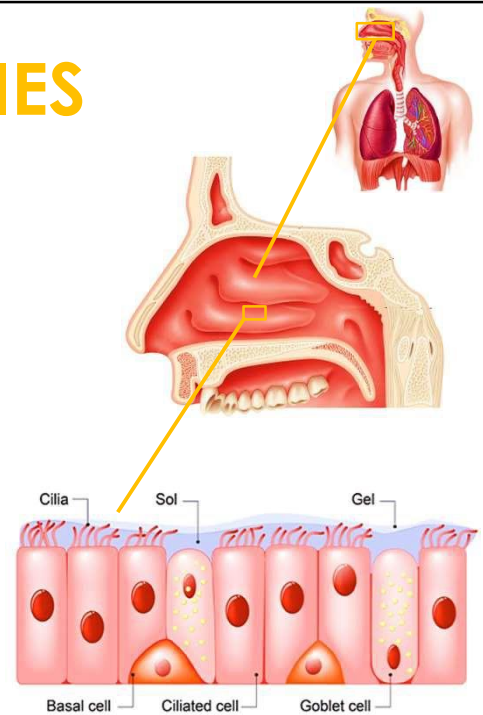
PARTS OF THE RESPIRATORY SYSTEM





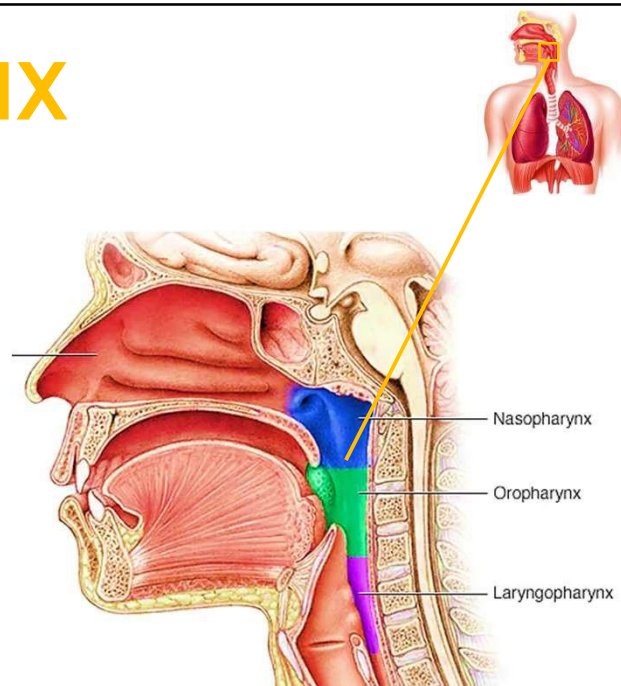
THE NASAL CAVITIES

- ◆ Upper Respiratory Tract
- ◆ Short Nose Hairs
 - ◆ blocks and collects particles.
- ◆ Mucous Membranes
 - ◆ lines the surface of nasal cavities
 - ◆ contains small blood vessels that moistens and warms the air.
 - ◆ produce mucous that traps small particles.
- ◆ Ciliated Cells
 - ◆ Cilia - microscopic, hair-like projections for trapping particles.



THE PHARYNX

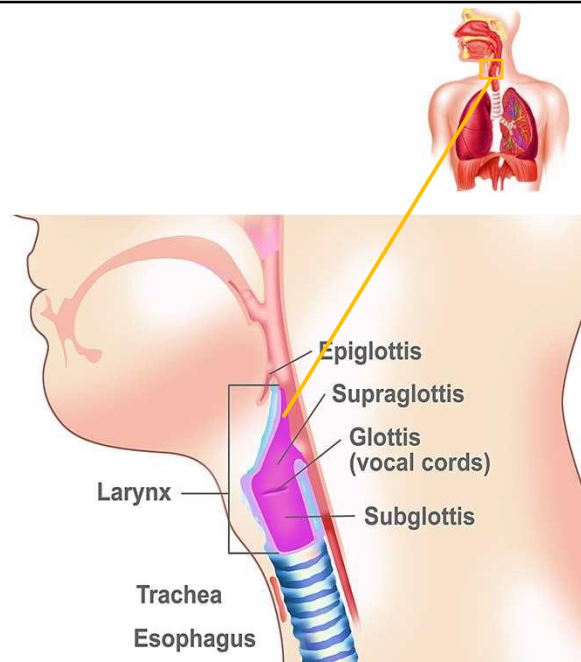
- ◆ Upper Respiratory Tract
- ◆ also known as the "throat"
- ◆ common passageway for air and food





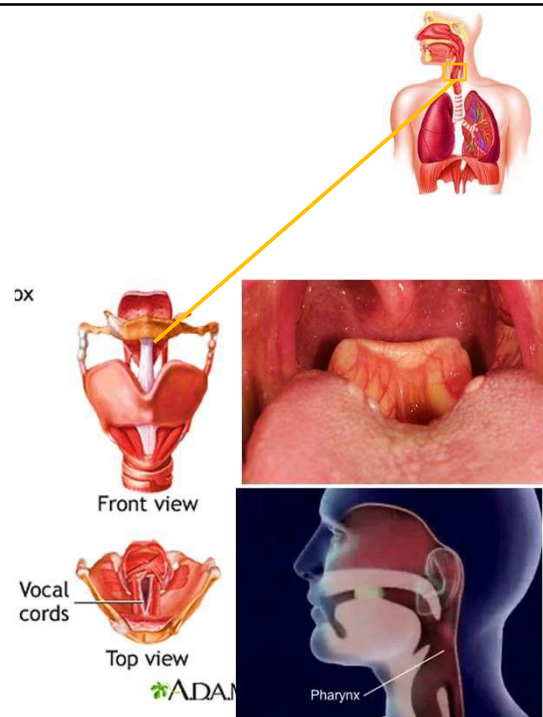
THE LARYNX

- ◆ Upper Respiratory Tract
- ◆ also known as the voice box
- ◆ has two elastic ligaments (vocal cords)
 - ◆ air from the lungs causes the vocal cords to vibrate and produce sound



LARYNX CONTINUED

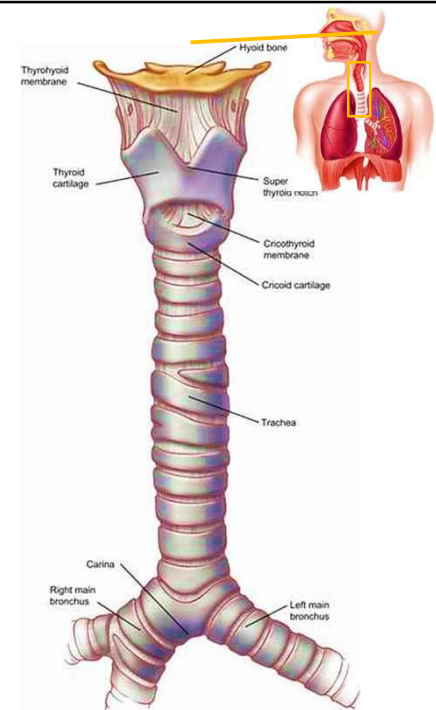
- ◆ Glottis – space between the vocal cords
- ◆ Epiglottis - a flap of elastic tissue that forms a cover on top of the larynx
 - ◆ ensures that food and air enter the body through different pathways





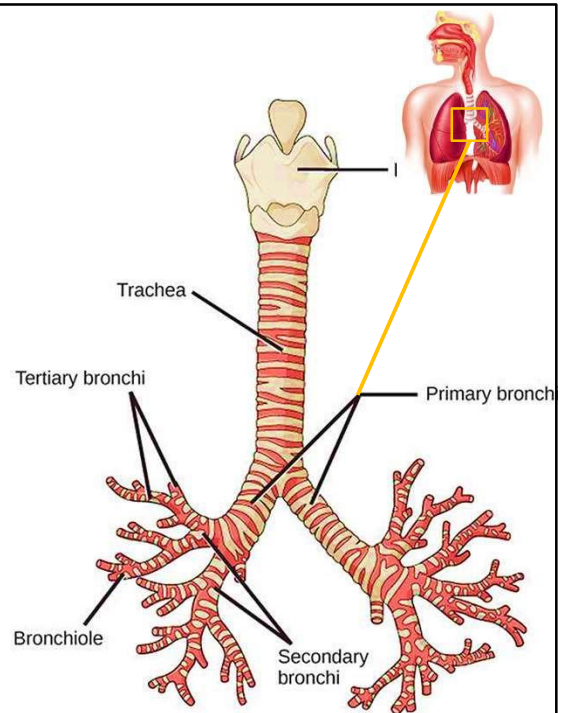
THE TRACHEA

- ◆ Lower Respiratory Tract
- ◆ the “windpipe”
 - ◆ main passageway of air to the lungs
- ◆ supported by C-shaped rings of cartilages that prevent it from collapsing during inhalation



THE BRONCHI

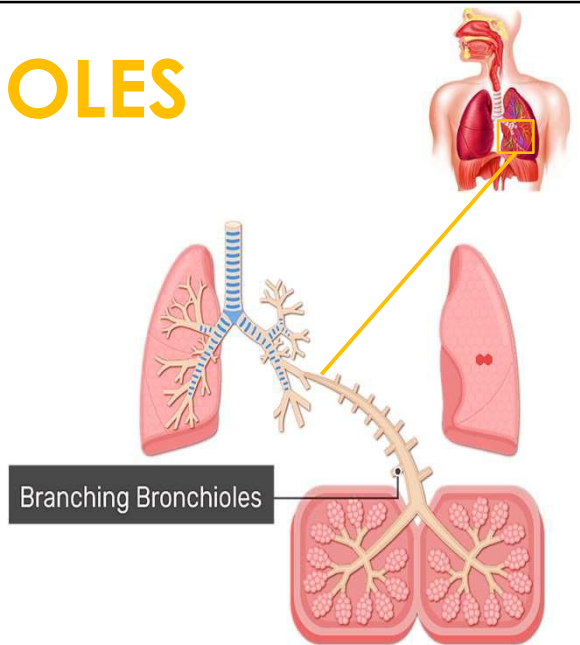
- ◆ Lower Respiratory Tract
- ◆ trachea divides into two stems, or bronchi, which lead to the lungs
- ◆ each bronchus enters the lung at a depression called the hilus or hilum.
- ◆ the bronchi further helps in cleaning, warming, and humidifying the air before it enters the “bronchioles”.





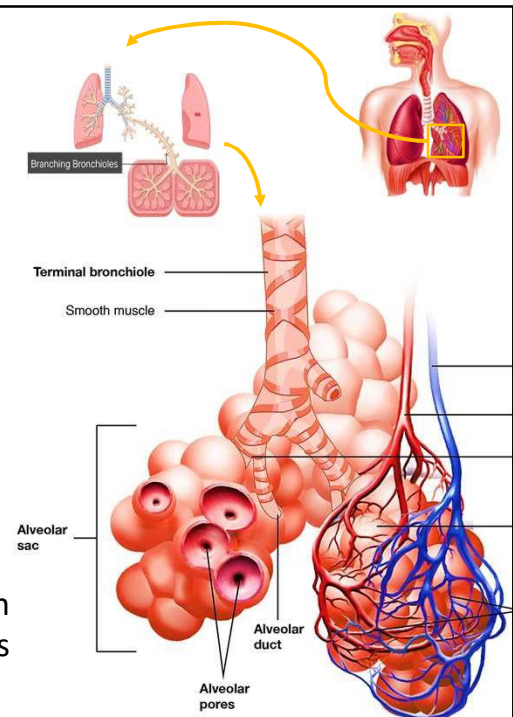
THE BRONCHIOLES

- ◆ Lower Respiratory Tract
- ◆ each bronchus branches into bronchioles which in turn branches repeatedly into smaller and smaller tubes leading to the alveoli.



THE ALVEOLI

- ◆ Lower Respiratory Tract
- ◆ balloon-like air sacs leading from the smallest branches of the bronchioles.
- ◆ very thin and moist – provides easy passage of gases
- ◆ millions of alveoli provide a large surface area for the exchange of a gases.
- ◆ most of the exchange of gases between the circulatory and respiratory systems takes place in the alveoli



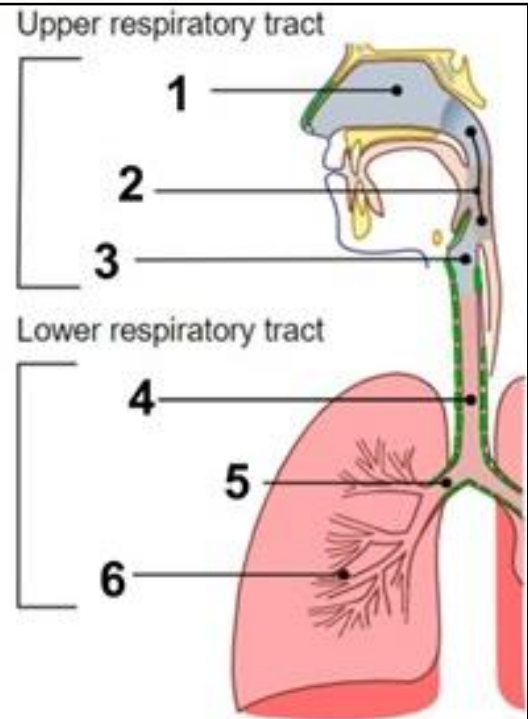


◆ Upper Respiratory Tract

- 1 Nasal Cavity
- 2 Pharynx
- 3 Larynx

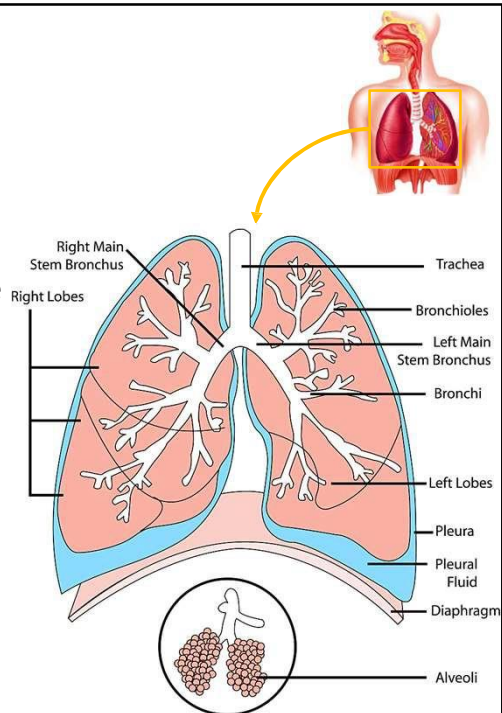
◆ Lower Respiratory Tract

- 4 Trachea
- 5 Bronchi
- 6 Lungs



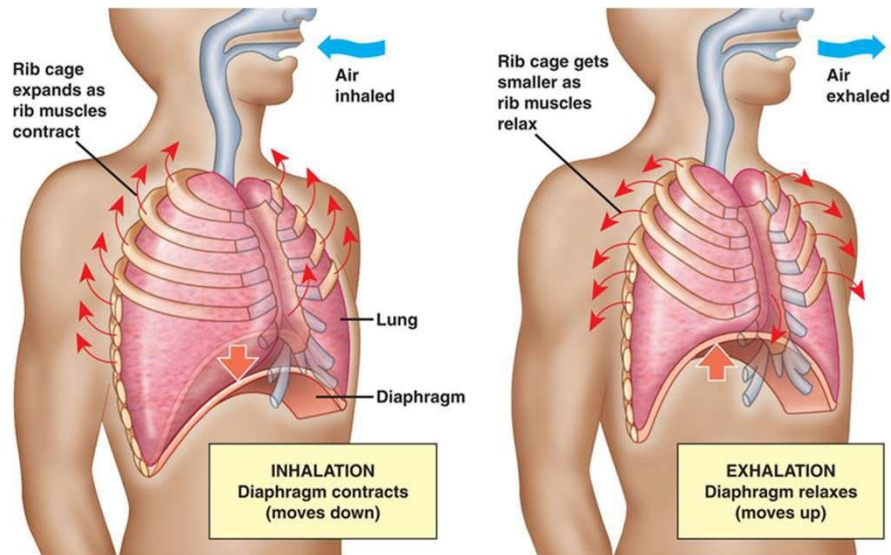
THE LUNGS

- ◆ organ where diffusion of gases takes place.
- ◆ located side by side in the thoracic cavity, separated from the abdominal cavity by the diaphragm
- ◆ covered by pleura
 - ◆ Pleura - thin tissue layer that keeps each lung moist and enables it to move with very little friction
- ◆ divided into lobes
 - ◆ right lobe- has three lobes
 - ◆ left lobe – has two lobes



DIAPHRAGM

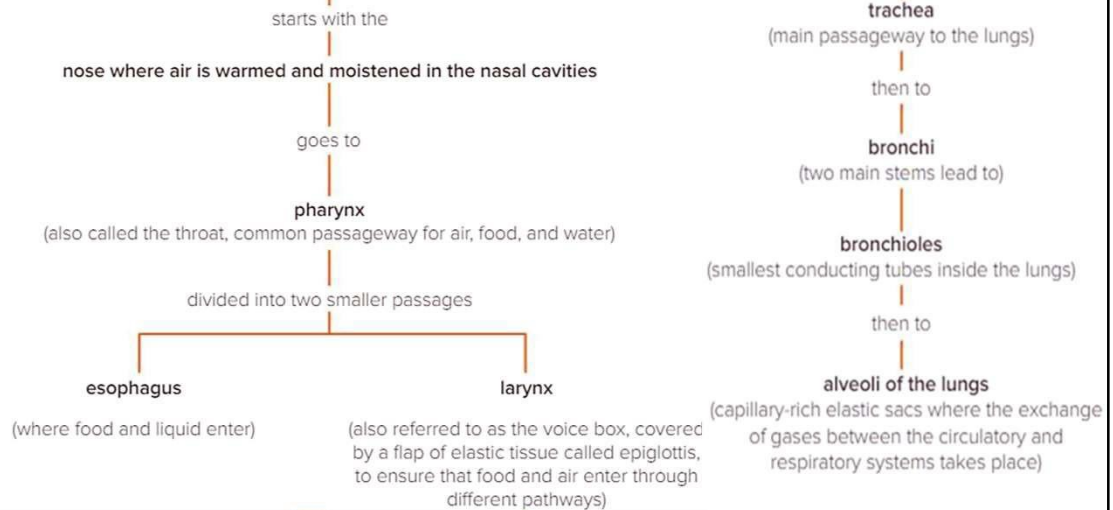
a muscle that helps you inhale and exhale

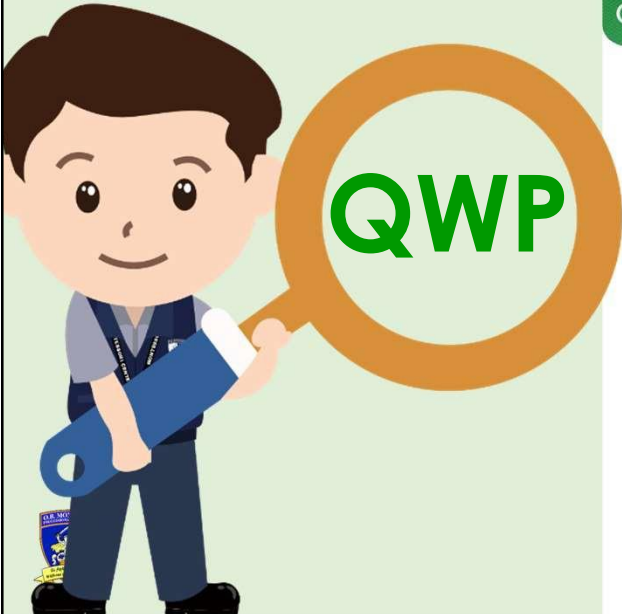


SUMMARY




Human Respiratory System





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- ☐ A. Free Fall
- ☐ B. Projectile Motion

II. **CONSERVATION OF MECHANICAL ENERGY**

- ☐ A. Mechanical Energy
- ☐ B. Law of Conservation of Mechanical Energy


LIVING THINGS AND THEIR ENVIRONMENT

I. **CIRCULATION AND GAS EXCHANGE**

- ☐ A. The Circulatory System
- ☐ B. The Respiratory System
- ☐ C. Coordinated Functioning of the Organ Systems
- ☐ D. Proper Care of the Organ Systems


II. **HEREDITY AND VARIATION**

- ☐ A. Genes and Chromosomes
- ☐ B. Mendelian Patterns of Inheritance
- ☐ C. Non-Mendelian Patterns of Inheritance



CHAPTER 1

CIRCULATION AND GAS EXCHANGE



TOPIC 3

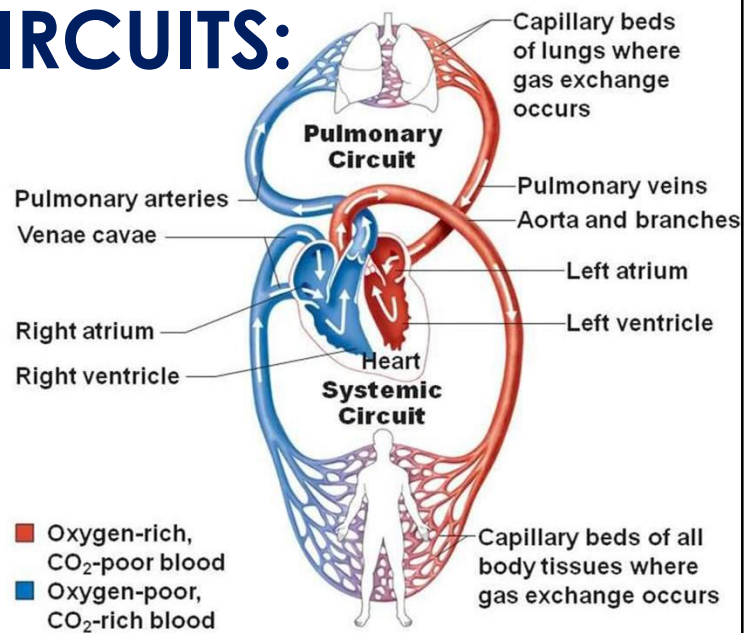
COORDINATED FUNCTIONING OF THE ORGAN SYSTEMS



BLOOD CIRCUITS:

◆ PULMONARY CIRCUIT

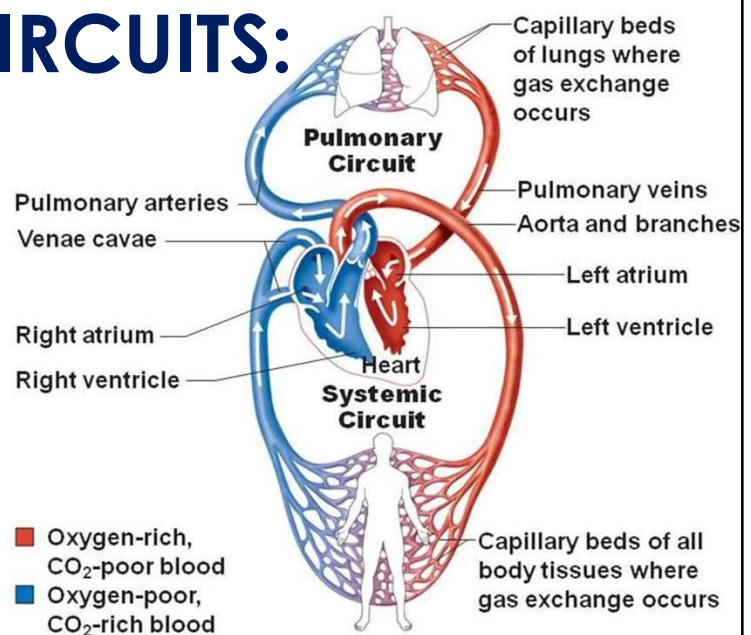
- ◆ heart to lungs (vice versa)
- ◆ removes carbon dioxide from the blood and replenishes its supply of oxygen.

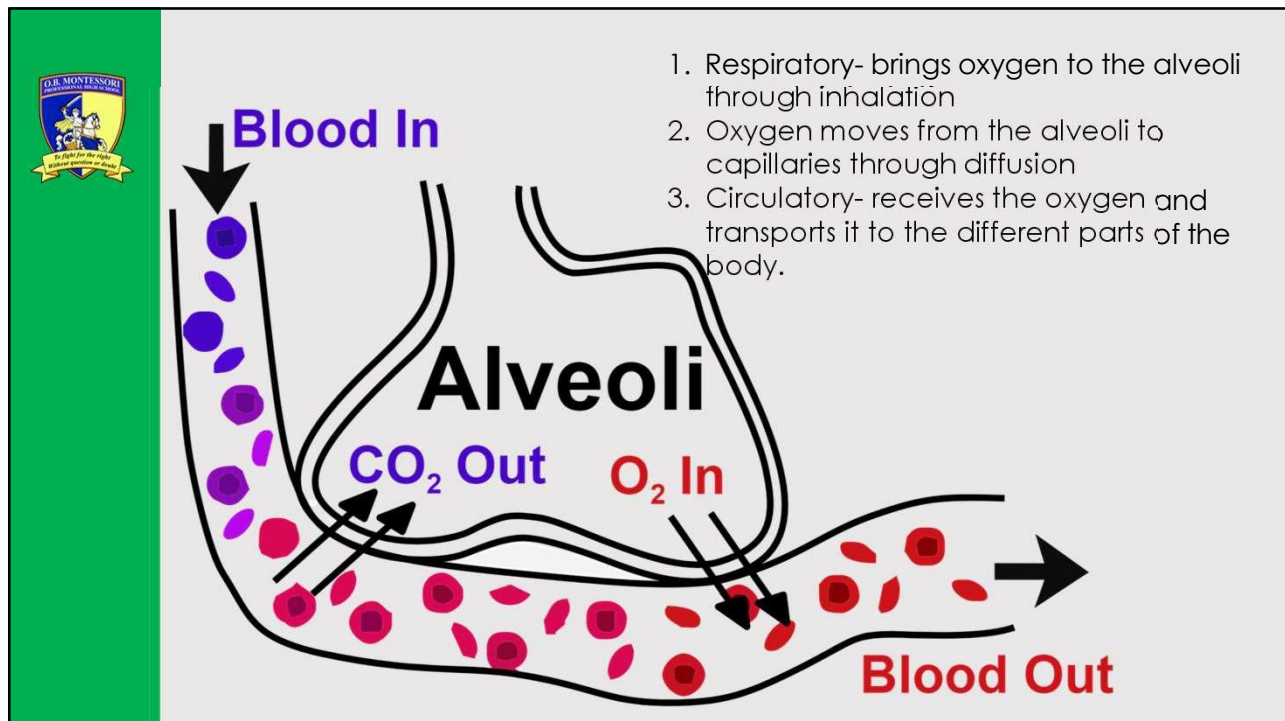
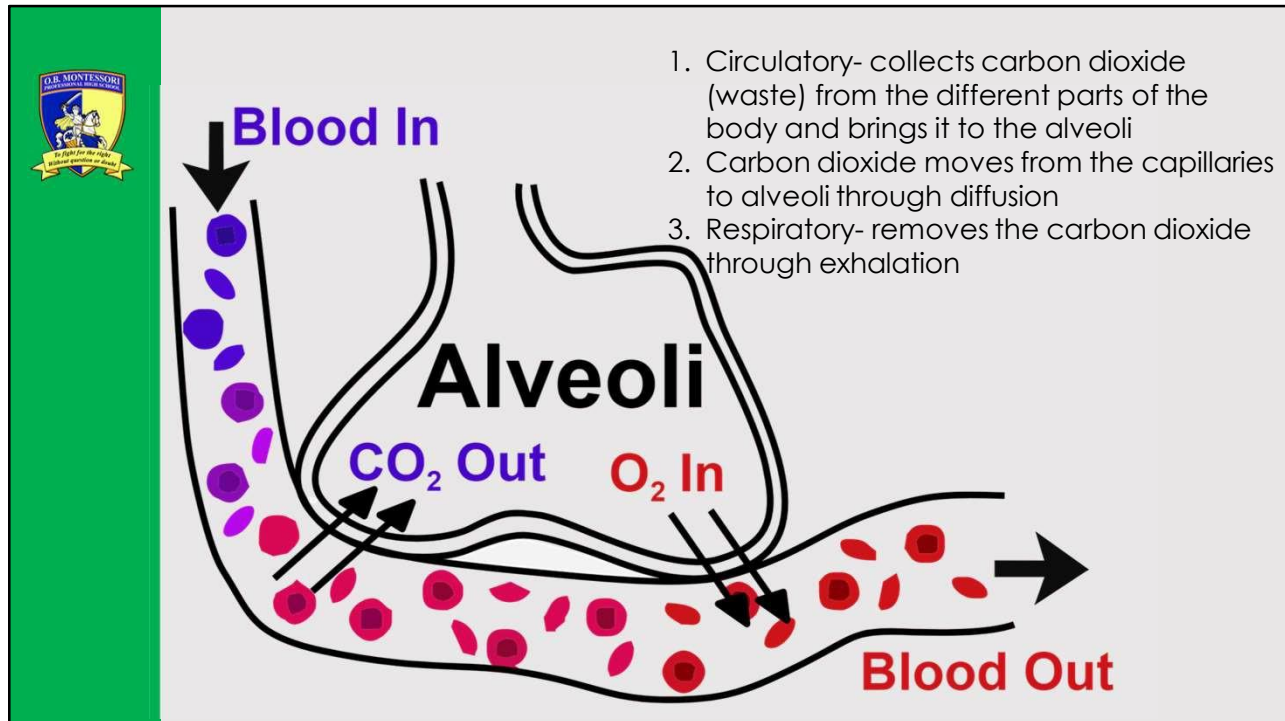


BLOOD CIRCUITS:

◆ SYSTEMIC CIRCUIT

- ◆ heart to the parts of the body (vice versa)
- ◆ collects waste materials (CO₂) from the cells of the body
- ◆ delivers nutrients (like O₂) to the cells of the body







SUMMARY

Types of Blood Circuits

pulmonary circuit

removes carbon dioxide from the blood and replenishes its supply of oxygen

systemic circuit

supplies nutrients and oxygen to all the tissues and collects waste materials away from the tissues for elimination

QWP

Professional High School
THIRD QUARTER
SCIENCE 9
QUARTERLY WORK PLAN

FORCE, MOTION, AND ENERGY (CONTINUATION)

I. MOTION IN TWO DIMENSIONS

- ☐ A. Free Fall
- ☐ B. Projectile Motion

II. CONSERVATION OF MECHANICAL ENERGY

- ☐ A. Mechanical Energy
- ☐ B. Law of Conservation of Mechanical Energy

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CHAPTER 1 CIRCULATION AND GAS EXCHANGE



TOPIC 4 PROPER CARE OF ORGAN SYSTEMS

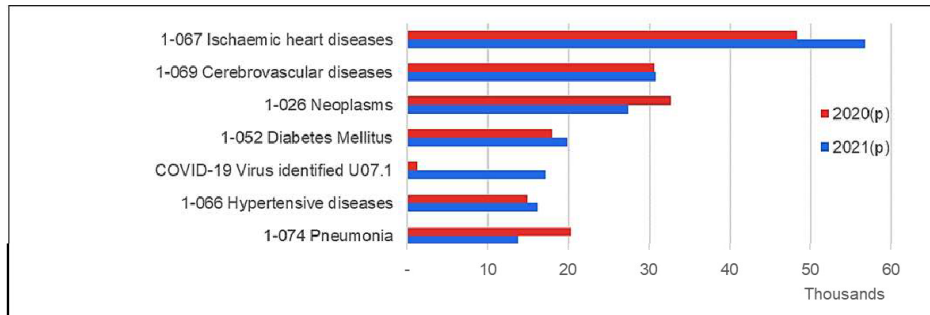
CIRCULATORY AND RESPIRATORY DISEASES: PREVENTION AND TREATMENT





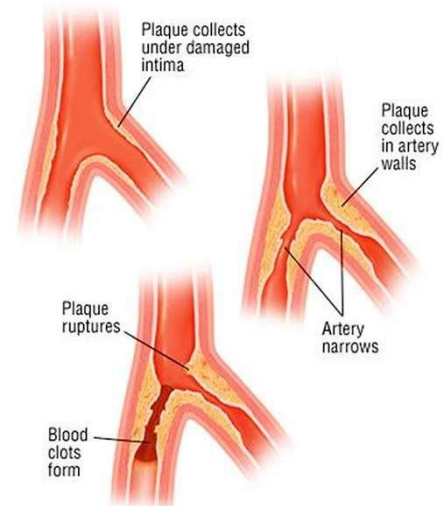
CARDIOVASCULAR SYSTEM DISEASES


- ◆ 8.9 million people worldwide die annually due to Cardiovascular Diseases.
- ◆ According to Philippine Statistics Authority
 - ◆ 18.7% of Deaths (56,760) are due to Ischaemic Heart Diseases.
 - ◆ 8.8% of Deaths (26,750) are due to COVID 19.



CARDIOVASCULAR SYSTEM DISEASES: ATHEROSCLEROSIS

- ◆ Occurs when the wall of an artery becomes thicker and less elastic due to build-up of fatty substances (*plaques*) under the inner lining of the arterial wall
 - ◆ Plaques- fatty substances, primarily cholesterol (low density lipoprotein LDL)
 - ◆ Restricts the blood flow and damages the heart muscles, causing heart attack
 - ◆ Risk Factors: include high cholesterol and triglyceride levels, high blood pressure, smoking, diabetes, obesity, physical inactivity, and eating saturated fats







CARDIOVASCULAR SYSTEM DISEASES:

HYPERTENSION

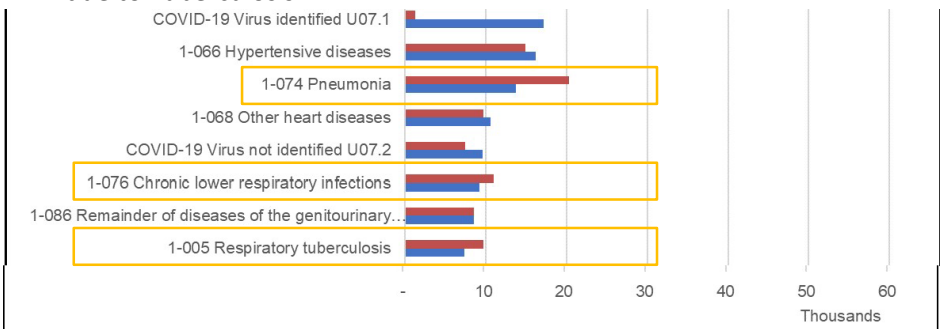
- ◆ Hypertension – chronic elevation of blood pressure
 - ◆ Affects 11 out of 100% Filipinos
 - ◆ Can cause complications such as heart attack or stroke
 - ◆ Silent killer - because it may show no symptoms
- ◆ Risk Factors: Elevated Blood Pressure, Diabetes, Unhealthy Diet, Physical Inactivity, Obesity, Too Much Alcohol, Tobacco Use, Genetics and Family History, Age, Sex, etc..





RESPIRATORY SYSTEM DISEASES

- ◆ 7.7 million people worldwide die annually due to Respiratory System related diseases.
- ◆ According to Philippine Statistics Authority
 - ◆ 4.5% of Deaths (22,158) are due to Pneumonia, 2.36% of Deaths (11,610) are due to Tuberculosis.

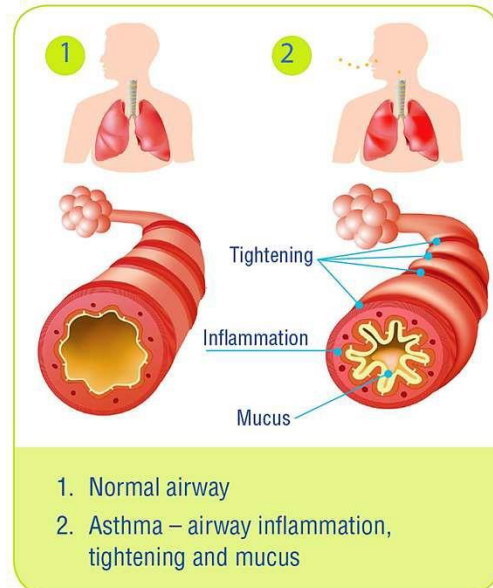


Disease Category	Thousands of Deaths (Approx.)
COVID-19 Virus identified U07.1	18
1-066 Hypertensive diseases	15
1-074 Pneumonia	22
1-068 Other heart diseases	12
COVID-19 Virus not identified U07.2	10
1-076 Chronic lower respiratory infections	11
1-086 Remainder of diseases of the genitourinary...	10
1-005 Respiratory tuberculosis	10



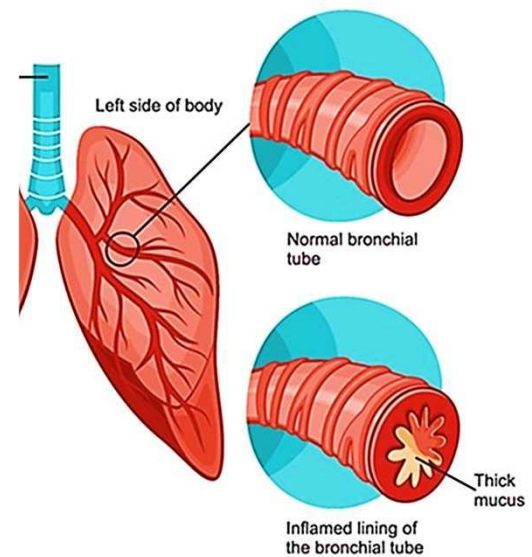
RESPIRATORY SYSTEM DISEASES: ASTHMA

- ◆ Restriction in the movement of air due to recurring episodes of contraction of the bronchial smooth muscle
- ◆ Most result from allergic responses
- ◆ Risk Factors: Family history. If you have a parent with asthma, you are three to six times more likely to develop asthma than someone who does not have a parent with asthma



RESPIRATORY SYSTEM DISEASES: BRONCHITIS

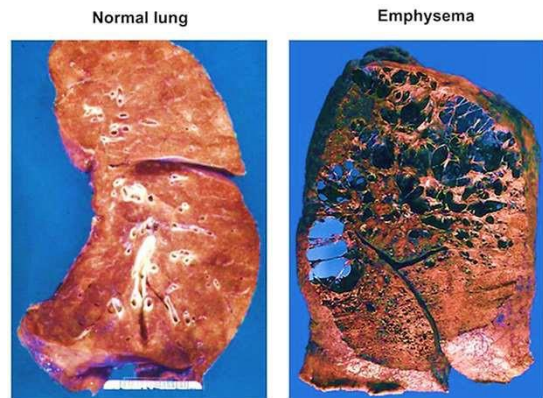
- ◆ Inflammation of the bronchi
- ◆ Swelling of the bronchial lining causes narrowing of the air passages
- ◆ Caused by air pollution or infections.
- ◆ Risk Factors: smoking; childhood respiratory disease, family history of lung disease. exposure to pollutants. asthma. allergies. gastroesophageal reflux disease (GERD), those who are older





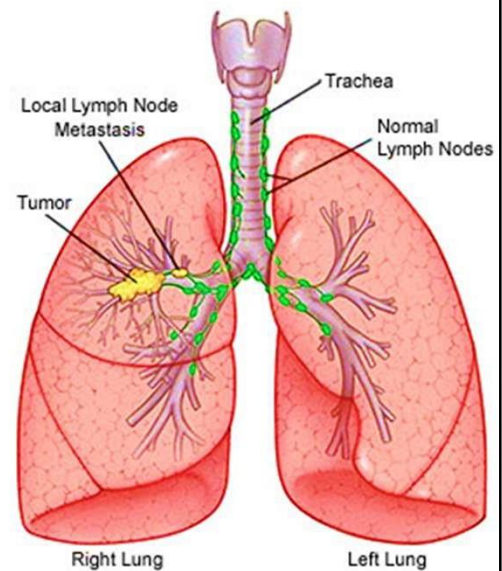
RESPIRATORY SYSTEM DISEASES: EMPHYSEMA

- ◆ Chronic Obstructive Pulmonary Disease (COPD)
- ◆ Gradual destruction of the walls of the alveoli or air sacs
- ◆ Gas exchange is decreased and air is retained in the lungs in most cases
- ◆ Irreversible
- ◆ Risk Factors: Long-term exposure to airborne irritants, including: Tobacco smoke. Marijuana smoke. Air pollution.

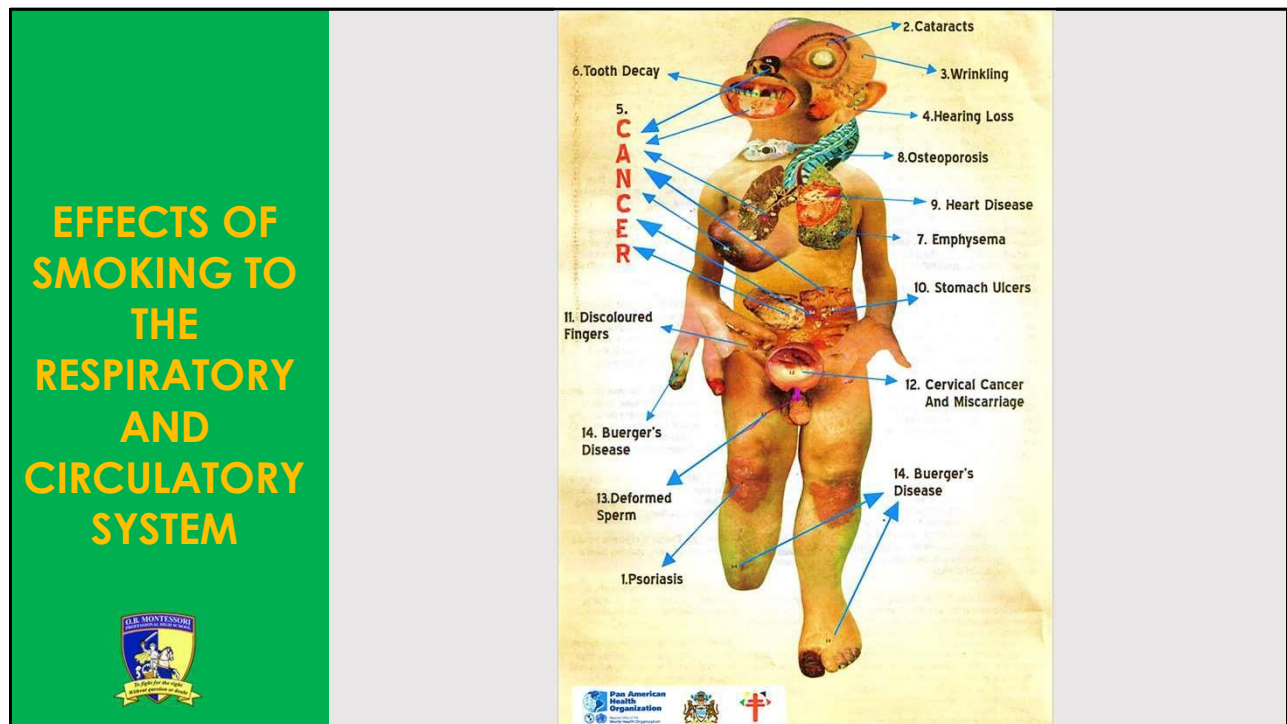


RESPIRATORY SYSTEM DISEASES: LUNG CANCER

- ◆ Uncontrolled division of cells lining the respiratory tract.
- ◆ Forms tumor than can produce cancer cells can spread when they reach the blood supply and the lymph.
- ◆ Most occur in smokers.
- ◆ Risk Factors: Cigarette smoking is linked to about 80% to 90% of lung cancer deaths, breathing secondhand smoke, being exposed to substances such as asbestos or radon at home or work, and having a family history of lung cancer



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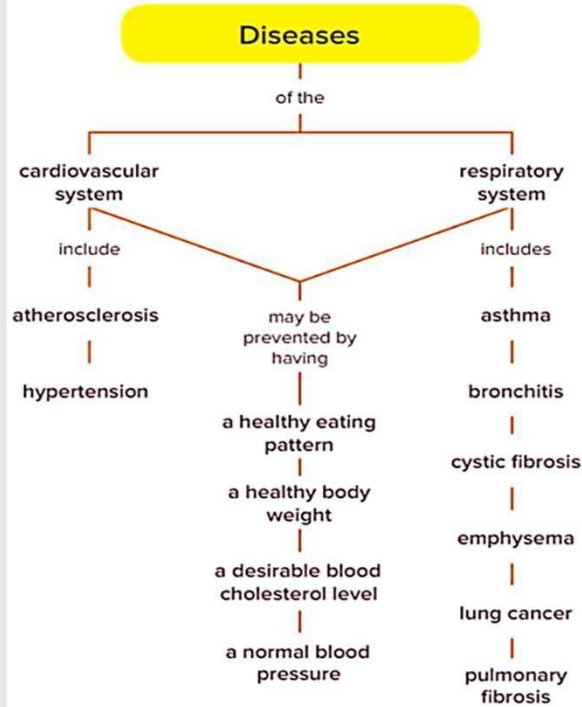


PREVENTION AND TREATMENT OF CIRCULATORY AND RESPIRATORY DISEASES

- ◆ Diet strategies, physical activity, and avoidance of exposure to tobacco smoke,
- ◆ A heart-healthy diet aims for :
 - ◆ A healthy eating pattern
 - ◆ A healthy body weight
 - ◆ A desirable blood cholesterol level
 - ◆ A normal blood pressure



SUMMARY



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