

FROM FOOD TO NUTRIENTS

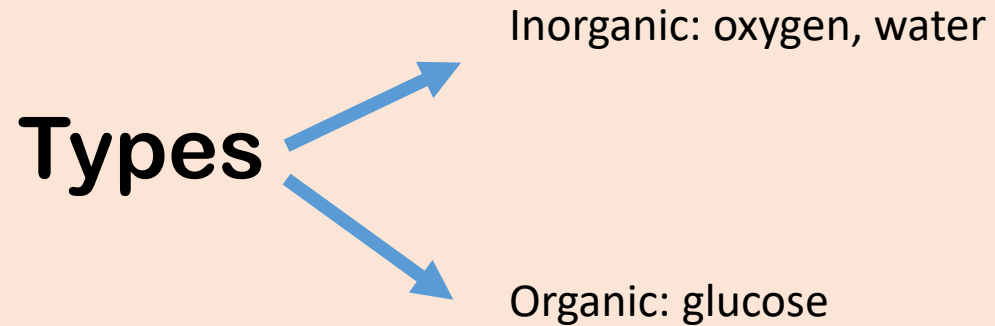


NUTRITION

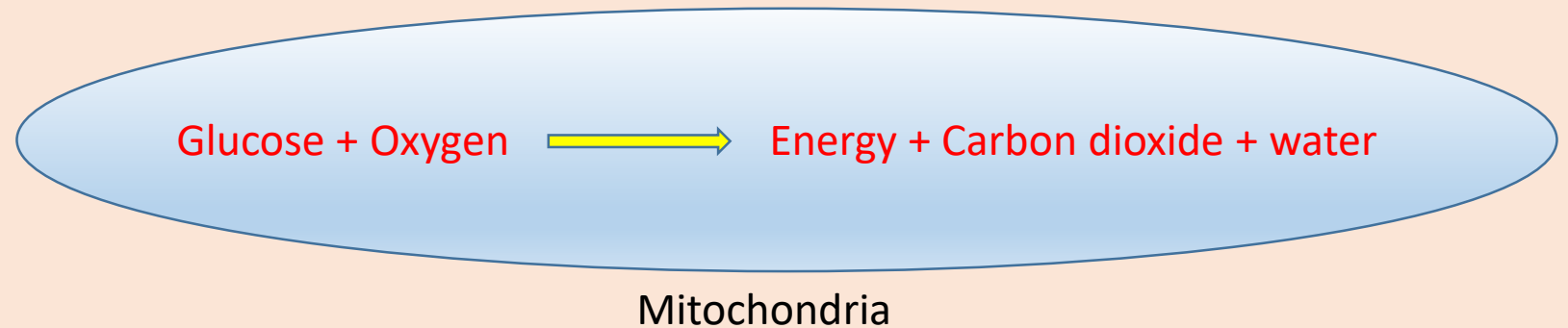
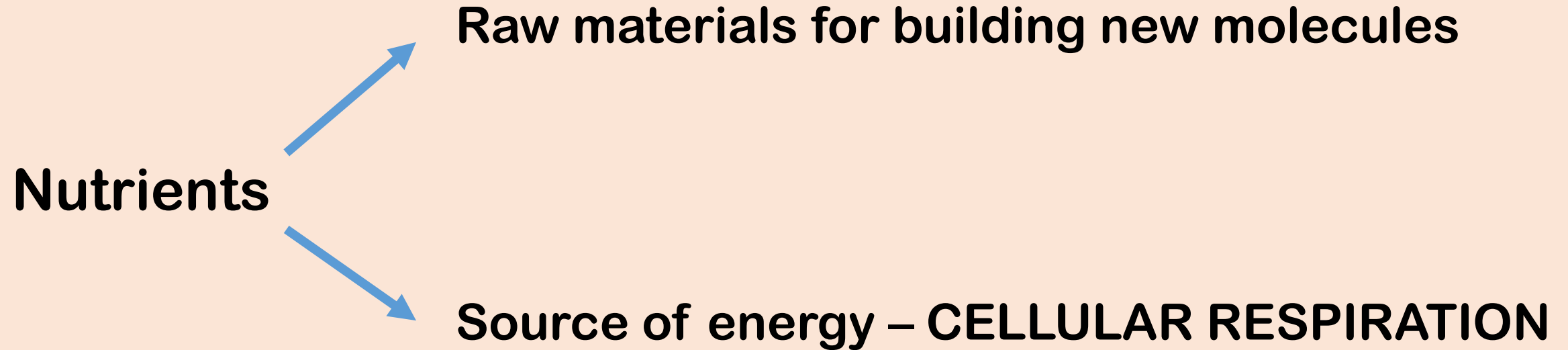
It's the incorporation and transformation of matter and energy of the medium to carry out our vital functions. Living beings obtain from food the nutrients necessary for life.

NUTRIENTS

Simple molecules, obtained from food, that our cells absorb and use for their nutrition



What do we need nutrients for?



In the nutrition function, the following systems are involved:

- **Respiratory system:** Exchange gases
- **Digestive system:** Obtain nutrients from food.
- **Circulatory system:** Transport nutrients and waste from cells.
- **Urinary system:** Eliminate waste from the blood

RESPIRATORY SYSTEM



The respiratory system consists of the set of organs involved in the uptake of oxygen from the atmosphere and the release of carbon dioxide generated during cellular respiration.



ANATOMY

Upper respiratory system: Nose + pharynx + larynx

Lower respiratory system: Trachea + bronchi + bronchioles + alveoli



ANATOMY

Nose and mouth

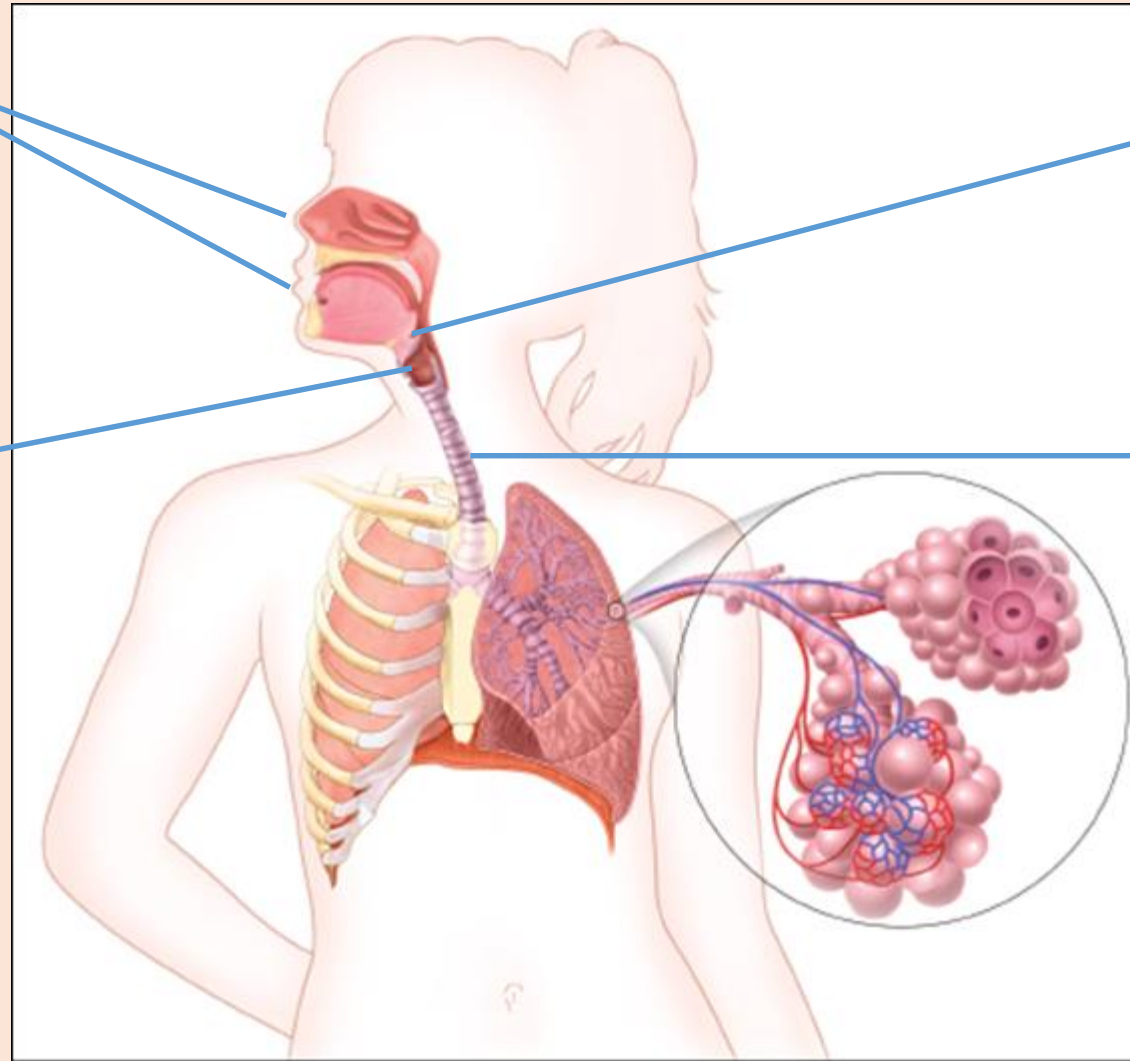
They are the entryways for air. From here, air passes the pharynx

Larynx (Laringe)

This is a funnel-shaped structure. Its hard walls of cartilage can be felt in the front of the neck.

The **vocal cords** are located here.

When swallowing food, a cartilaginous structure called **epiglottis** stops it from entering the larynx.



Pharynx (Faringe)

The pharynx serves both the digestive and respiratory systems

Trachea (Tráquea)

It's a flexible tube that always remains open to the air passage thanks to the rings of cartilage inside the walls



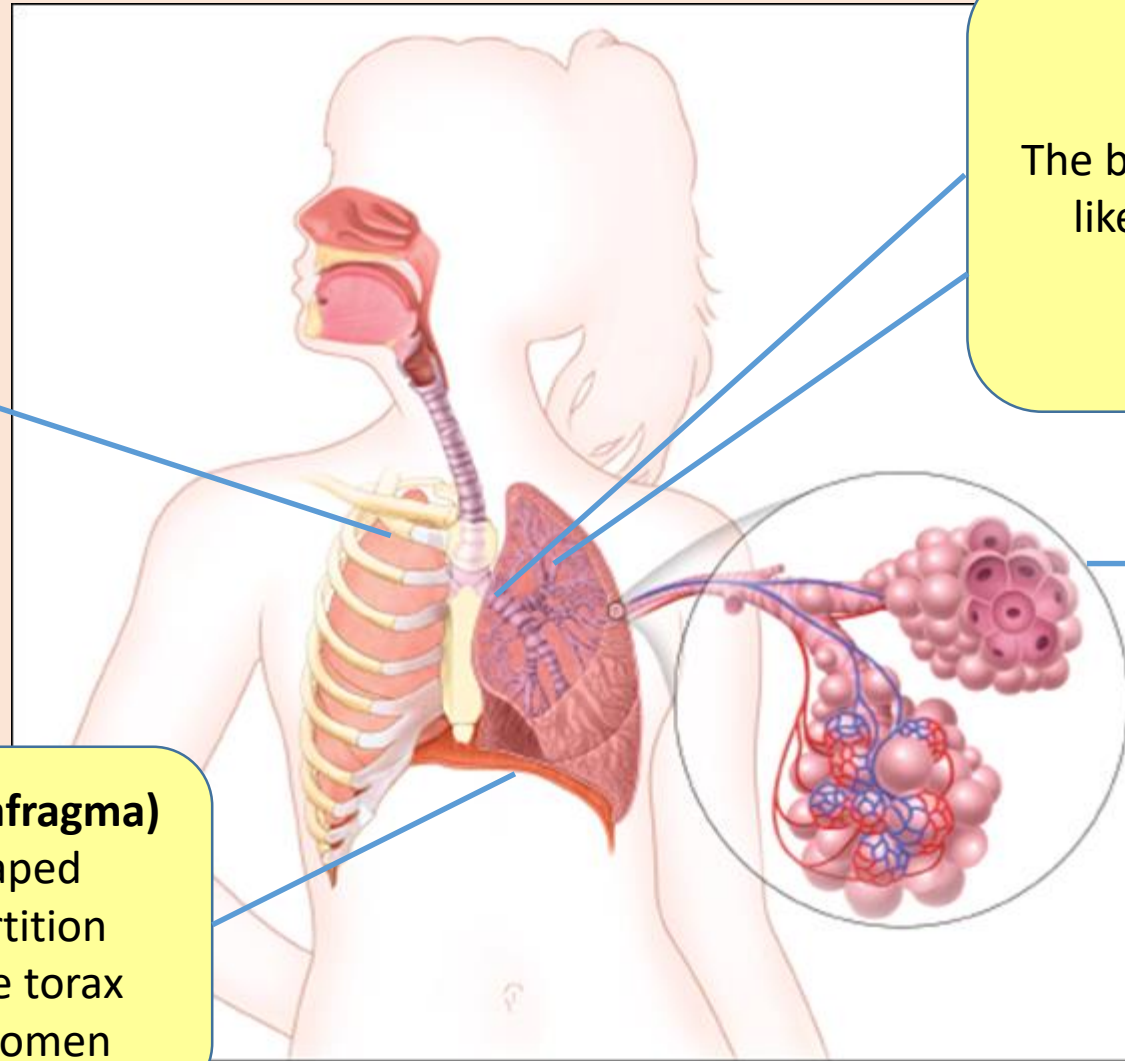
ANATOMY

Lungs (Pulmones)
They are two organs located in the thoracic cavity and are protected by the ribs

Diaphragm (Diafragma)
A dome-shaped muscular partition separating the torax from the abdomen

Bronchi and bronchioles (Bronquios y bronquiolos)
The bronchi are two tubes that branch like a tree. As the subdivide, they become finer and are called bronchioles.

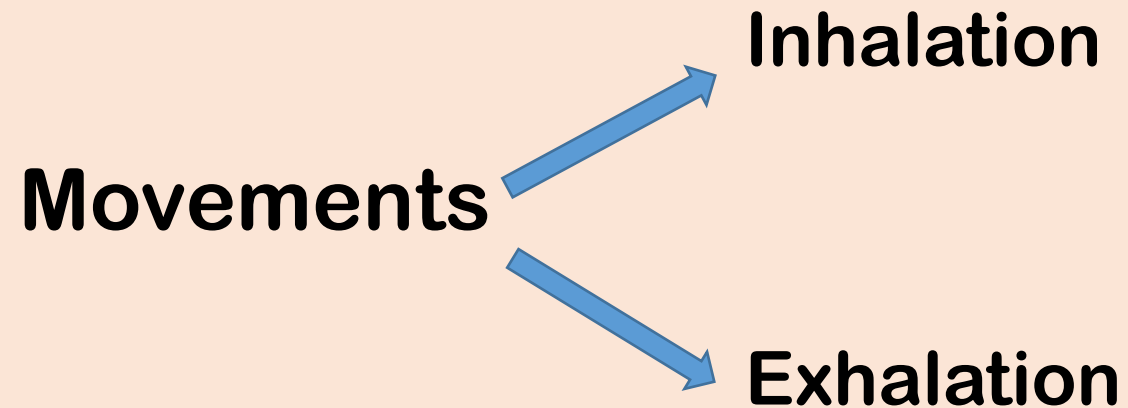
Alveoli (Alveolos)
They are small, thin-walled air sacs found at the end of each of the smallest bronchioles. Each one is surrounded by many capillaries





PULMONARY VENTILATION

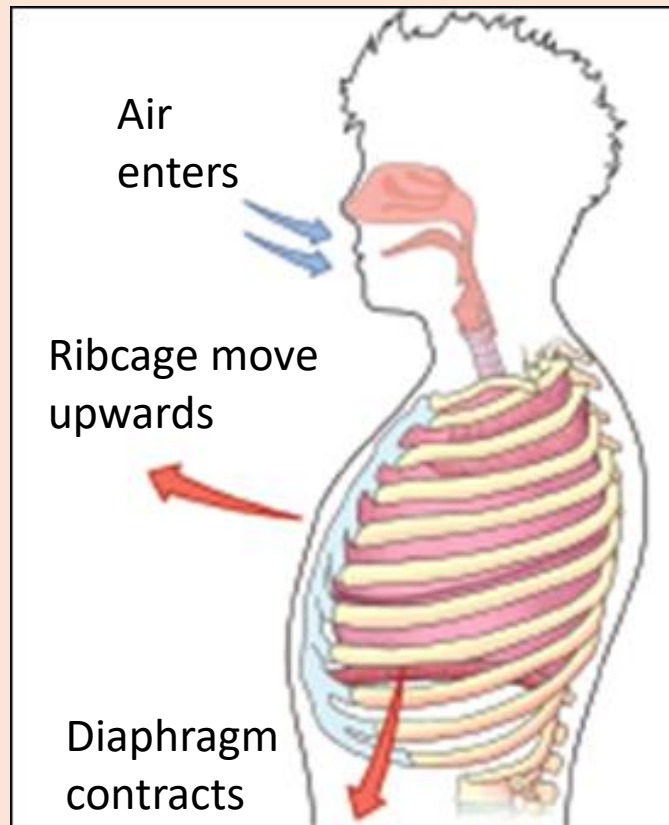
The lungs don't have any muscle tissue, which means they are unable to control the movement of air themselves. The lungs are very elastic and their most external layer is strongly united to the inner wall of the thoracic cavity.





PULMONARY VENTILATION

Inhalation



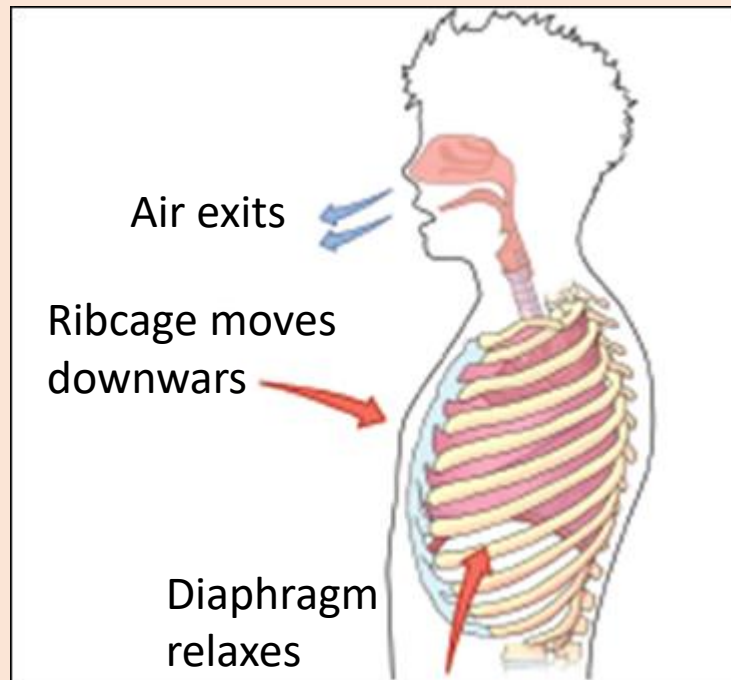
When the diaphragm and intercostal muscles contract, the ribcage expands and thoracic volume increases.

As the lungs are attached to the walls of the thoracic cavity, they increase their volume and inflate as air is pulled in.



PULMONARY VENTILATION

Exhalation



When the diaphragm relaxes, it moves back upwards. Simultaneously, the intercostal muscles relax which moves the ribcage downwards.

The resulting decrease in thoracic volume causes air to move out of the lungs



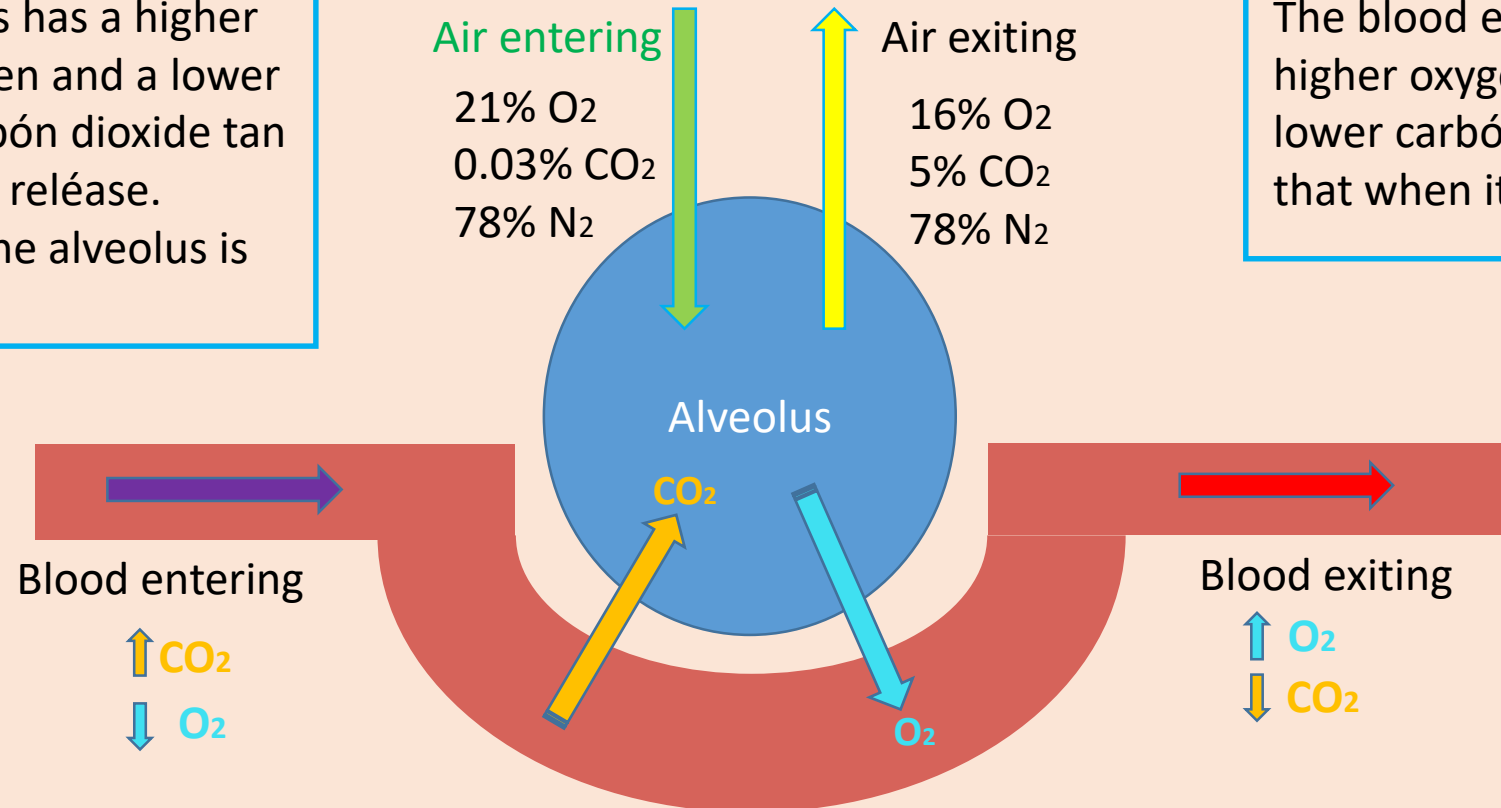
GAS EXCHANGE

Air entering the lungs has a higher concentration of oxygen and a lower concentration of carbon dioxide than the air that the lungs release. The blood entering the alveolus is poor in oxygen.

Air entering
 21% O₂
 0.03% CO₂
 78% N₂

Air exiting
 16% O₂
 5% CO₂
 78% N₂

The blood exiting the lungs has a higher oxygen concentration and a lower carbon dioxide concentration than when it enters.



These gases traverse the membranes of the cells by **DIFFUSION**, from their respective areas of higher concentration to that of lower concentration



CHARACTERISTICS OF THE ALVEOLUS

The following adaptations enable the alveoli to perform gas exchange:

- ❖ The total surface area of lungs' alveoli is enormous (two hundred square meters).
- ❖ Each alveolus is surrounded by many capillaries that move approximately eight thousand litres of blood each day.
- ❖ The wall of each alveolus is extremely thin, less than one micrometre



THE RESPIRATORY SYSTEM AND OUR HEALTH

The air often contains microorganisms and harmful particulates that can damage our respiratory system

Microorganism

Upper respiratory illnesses: Mild illnesses like the common cold and others more serious like influenza

Lower respiratory infections:
Bronchitis and pneumonia

Tobacco

Chronic bronchitis: Tobacco causes the secretion of excess mucus which can obstruct the respiratory passageways

Lung cancer: 90% of all cases of lung cancer are caused by tobacco