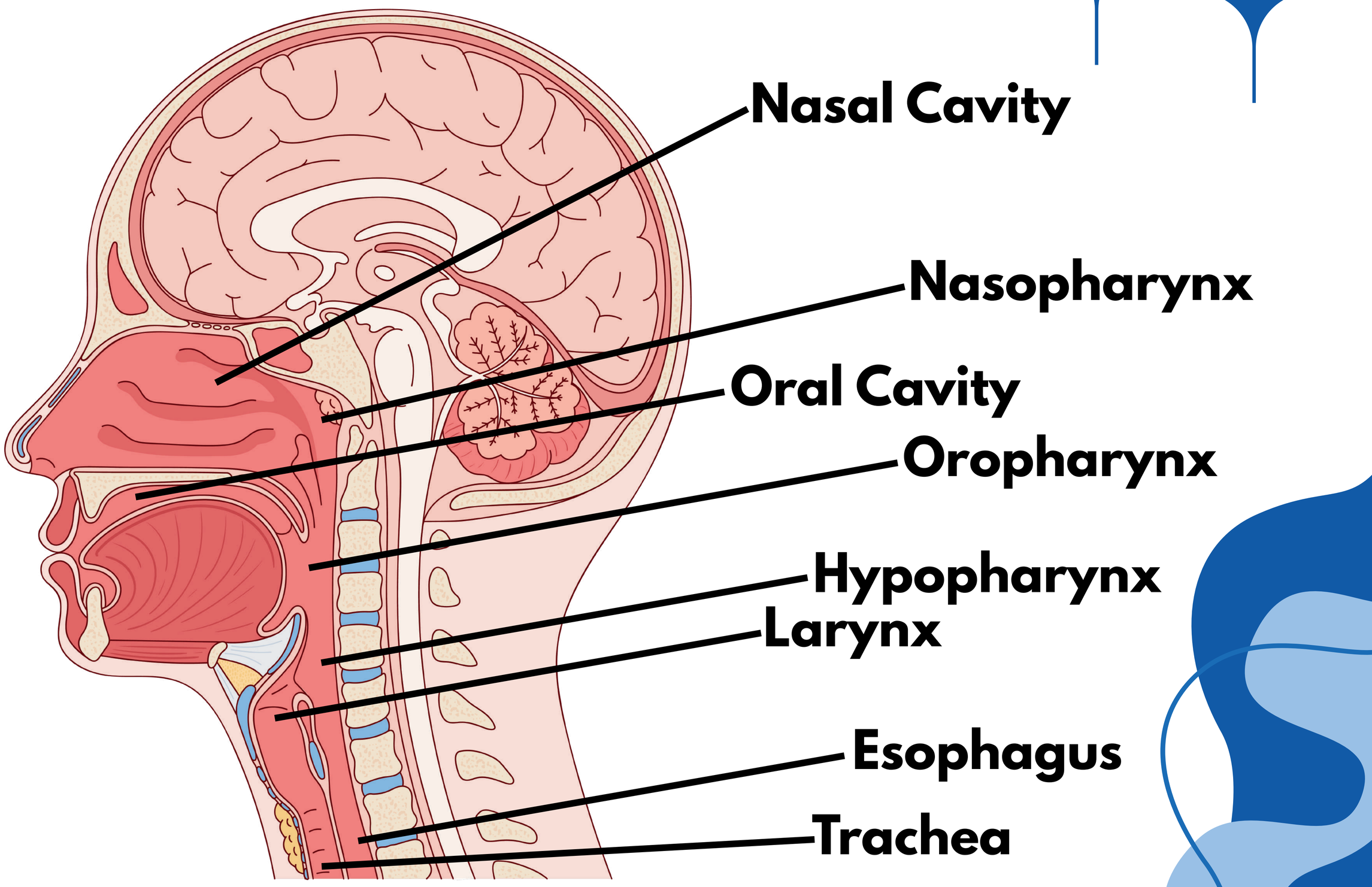
The Respiratory System

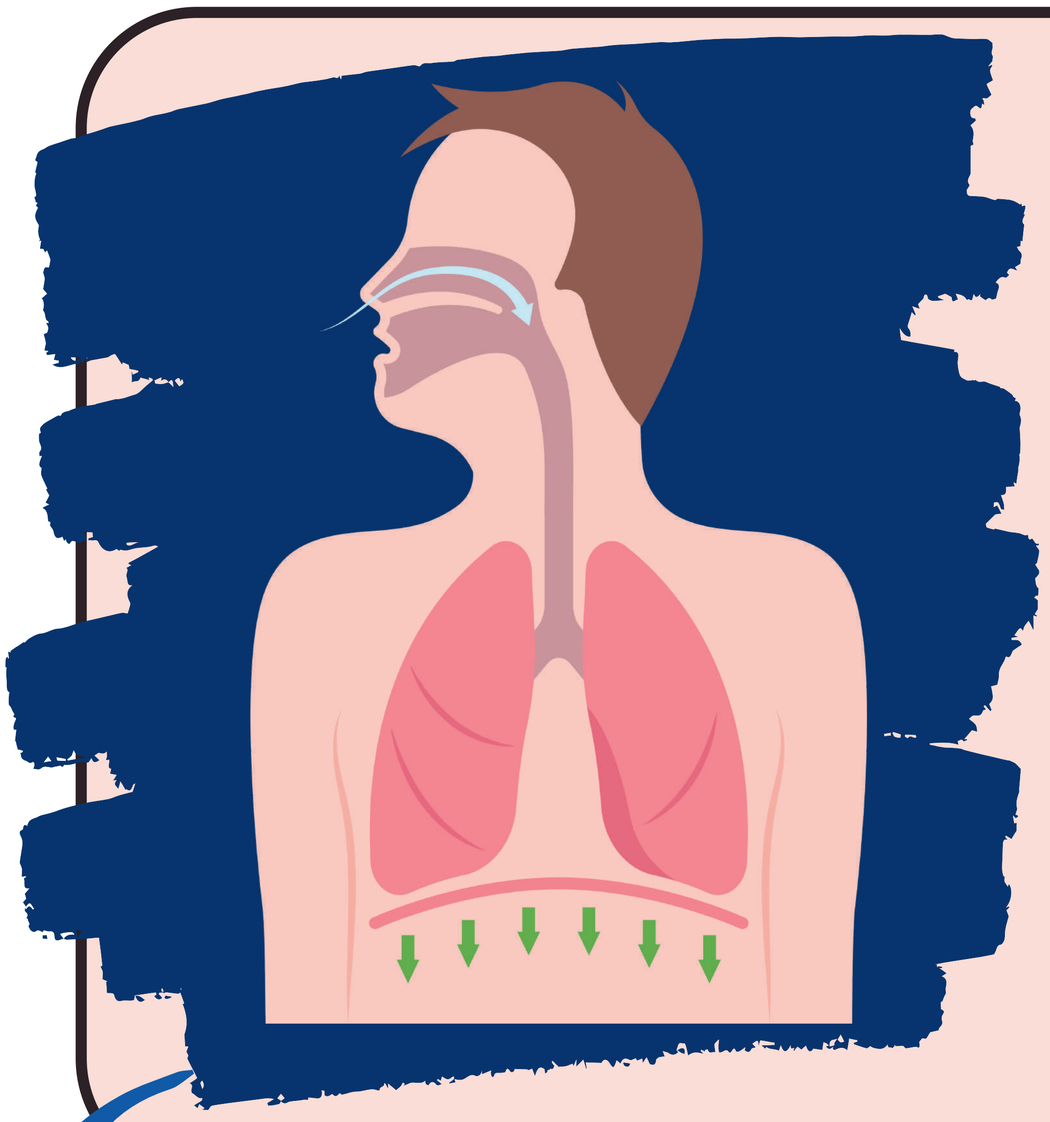
- The first part of the respiratory system is the nose and mouth.

- The nose has mucous membranes and nasal cavities that warm and filter the air, stopping bacteria and irritants from reaching the lungs.
  - The air travels through the nasopharynx, oropharynx, and hypopharynx.
  - Then, the air passes down the trachea, which is a tube with U-shaped cartilage.
    - The trachea delivers air to the lungs.



The Respiratory System

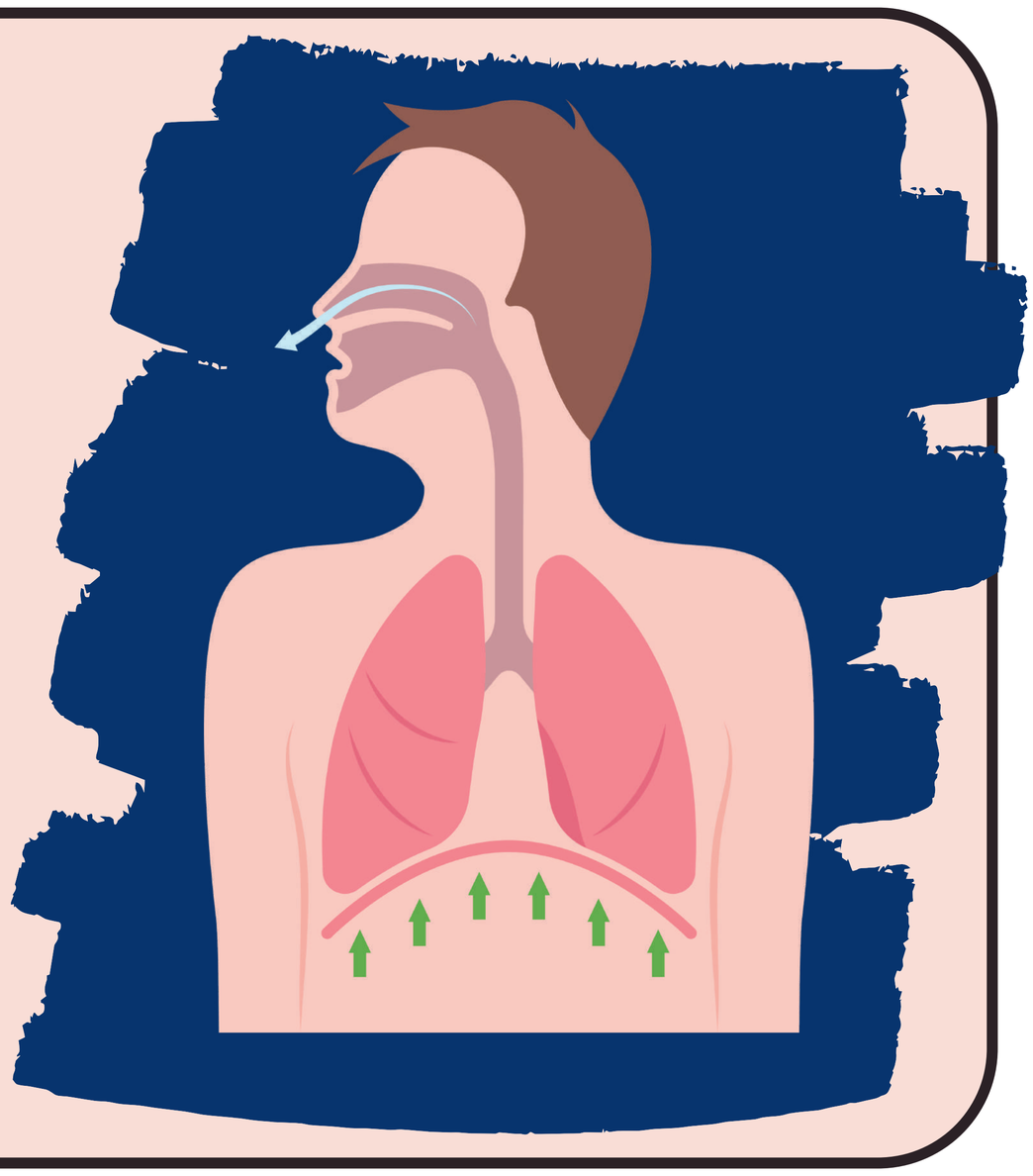
Inhalation



- Inhalation: Occurs by contraction of the diaphragm, which also causes it to move downward. The muscles between the ribs also contract, which raises the ribs and expands the chest cavity.
  - This gives the lungs extra room to expand and fill with air.

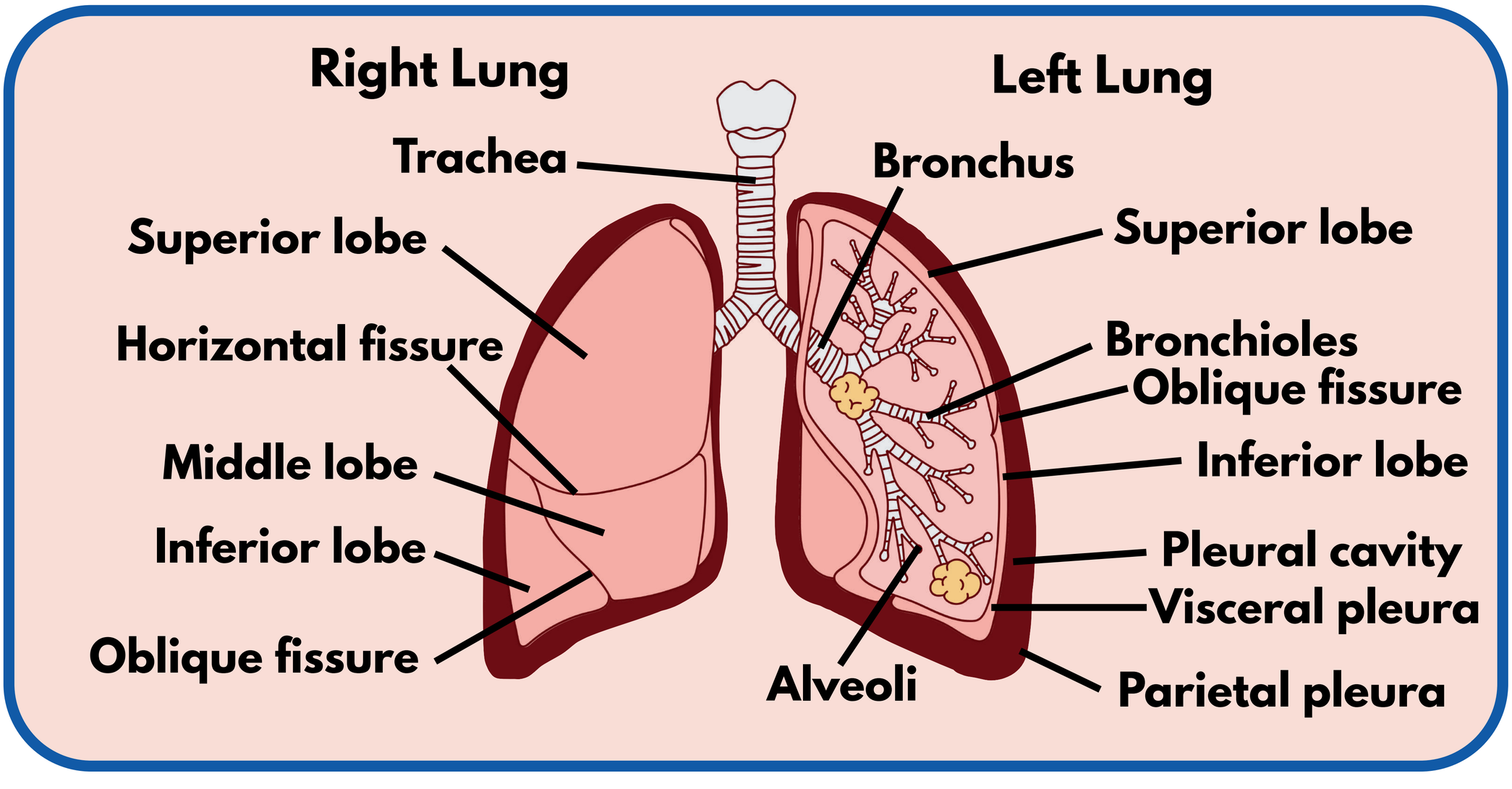
Exhalation

- Exhalation: Occurs by relaxation of the diaphragm, which also causes it to move upward.
  - Since the cavity gets smaller, there is a higher pressure, and the lungs compress to force the air out.



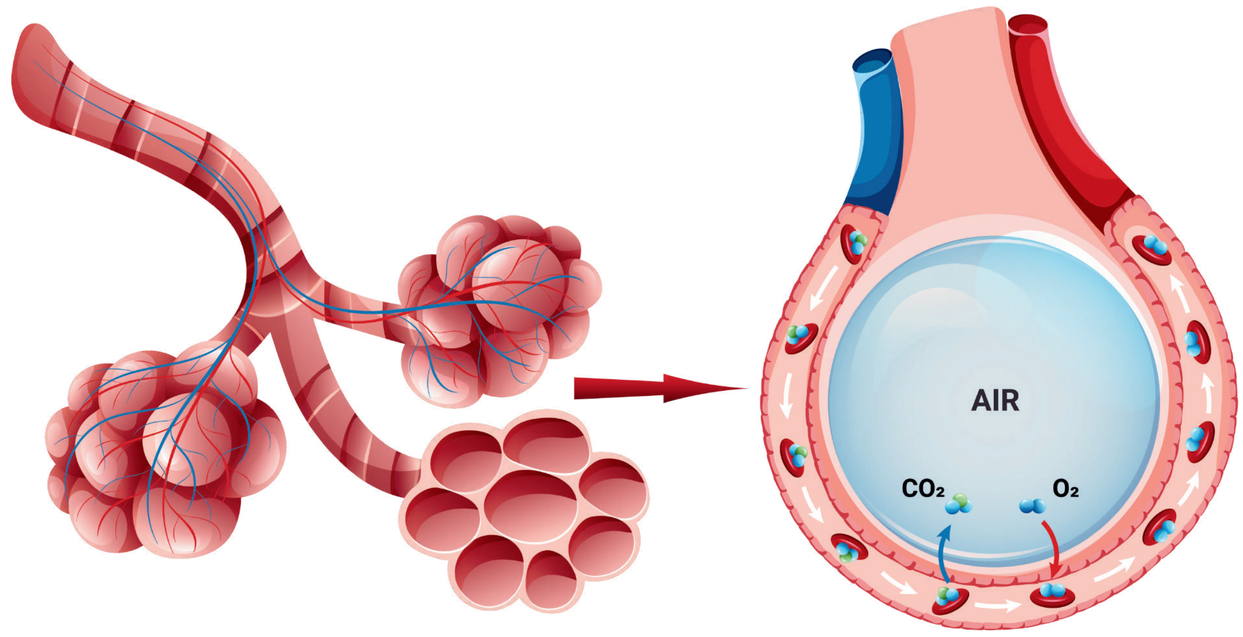
The Respiratory System

- The lungs are split into two: the right and left lungs.
  - The right lung has three lobes, and the left has two
    - Lobes are separated by fissures.
  - There are two types of pleura that cover and protect the lungs.
    - Visceral pleura: covers the lungs
    - Parietal pleura: lines the chest wall
- There are two large bronchial tubes that have C-shaped cartilage that helps maintain the airway's structure and prevents collapse while breathing.
  - The trachea splits into two branches called the bronchi (plural for bronchus), one going to each lung.
    - The bronchi then split into smaller branches called bronchioles, which are the smallest airway.
  - At the end of each bronchiole are alveoli.
  - Alveoli are sac-like structures that allow the exchange of oxygen and carbon dioxide.
- Trachea → Bronchi → Bronchioles → Alveoli



The Respiratory System

- The alveoli are covered with capillary beds.
- Capillaries help with the exchange of materials between the blood and surrounding tissues because they have very thin walls.
    - These capillaries are attached to the pulmonary circuit, so the blood coming through is deoxygenated and has the waste from the internal respiration of the tissues.



    - Carbon dioxide diffuses into the alveoli.
    - Oxygen diffuses into the pulmonary circuit
        - The blood returns to the heart fully oxygenated.
- Once the CO_2 diffuses into the alveoli and the exchange happens, the process of exhaling begins.
- Diffusion happens because of an imbalance in the pressure gradient and a difference in the concentration.
    - A higher concentration will always diffuse to a lower concentration.
- The main carrier of oxygen in the blood is hemoglobin.
    - Hemoglobin is a protein found in red blood cells.
    - Hemoglobin contains iron. The iron atoms within the hemoglobin molecules bind to oxygen.
    - Then, when the blood reaches the capillaries, it diffuses through the thin tunica intima and is able to diffuse through the tissues.