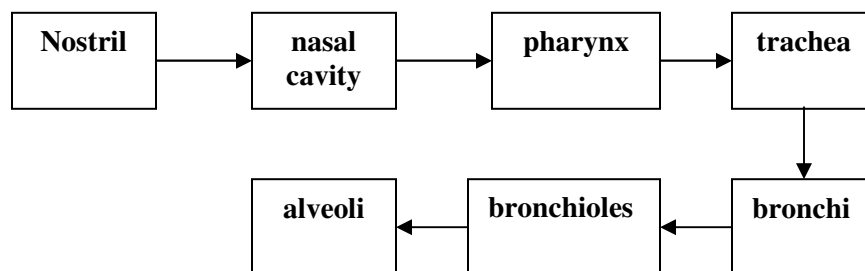


# CHAPTER 1: RESPIRATION

## 1.1 Human Breathing Mechanism

- Breathing is a physical process in which air is inhaled or taken in and exhaled or given out by a living body.
- Air enters the nose through both nostrils. The walls of the nostrils are lined with hairs to trap dust particles in the air.
- From the nostrils, air enters the nasal cavity. The nasal cavity secretes mucus to trap bacteria and other foreign particles in the inhaled air.
- From the nasal cavity, air enters the trachea.
- The trachea does not collapse because it is kept open by rings of cartilage. These cartilage rings are C-shaped.
- The trachea branches into a left bronchus and a right bronchus. Each bronchus goes into a lung.
- Each bronchus then branches into smaller tubes called **bronchioles**.
- These tubes end in many tiny air sacs called alveoli.
- The alveoli are surrounded by blood capillaries.
- Gaseous exchange takes place in the lungs by **diffusion**.
- The pathway of air flowing into our lungs is as follows:



- Comparison between inhalation and exhalation mechanisms

<b>Inhalation</b>	<b>Part Involved</b>	<b>Exhalation</b>
Contracts	<b>External intercostal muscle</b>	Relaxes
Relaxes	<b>Internal intercostal muscle</b>	Contracts
Moves upwards and outwards	<b>Movement of ribs</b>	Moves downwards and inwards
Contracts, moves downwards and flattens	<b>Diaphragm</b>	Relaxes and curves upwards
Increases	<b>Volume of thoracic cavity</b>	Decreases
Decreases	<b>Air pressure in the thoracic cavity</b>	Increases
Air is inhaled into the lungs	<b>Air movement</b>	Air in the lungs is forced out

## 1.2 Transport of Oxygen In The Human Body

- The air that enters the lungs fills up the alveoli.
- Oxygen from the air then diffuses into the blood capillaries.
- It combines with the haemoglobin in the red blood cells to form oxyhaemoglobin.
- Oxygen + haemoglobin → oxyhaemoglobin
- The blood carries the oxygen in the form of oxyhaemoglobin to all parts of the body.
- When the oxygenated blood reaches tissues or cells that do not have enough oxygen, the oxyhaemoglobin breaks down and releases the oxygen.
- The oxygen diffuses through the capillaries into the cells.
- Adaptation of the alveoli for efficient gas exchange
  1. Large surface area
  2. Very thin walls
  3. Moist inner surface
  4. Surrounded by a network of blood capillaries

### 1.3 The Important of A Healthy Respiratory System

- Substances harmful to the respiratory system

<b>Chemical Substances</b>	<b>Harmful effect on the respiratory system</b>
a. Nicotine	<ul style="list-style-type: none"><li>● Causes illnesses like bronchitis, throat cancer and lung cancer</li></ul>
b. Tobacco tar	<ul style="list-style-type: none"><li>● Blackens the lungs</li><li>● Lung cancer</li><li>● kills cells in the air passages and the lungs</li><li>● increases production of mucus and phlegm in the lungs</li></ul>
c. Carcinogen	<ul style="list-style-type: none"><li>● Stimulates the growth of cancer cells, causing lung cancer and throat cancer</li></ul>
d. Sulphur dioxide and nitrogen dioxide	<ul style="list-style-type: none"><li>● Damages the breathing channel and lungs</li></ul>
e. Carbon monoxide	<ul style="list-style-type: none"><li>● prevents haemoglobin from transporting oxygen around the body</li><li>● causes a lack of oxygen in our body which may lead to headaches, brain damage or even death</li></ul>
f. Forest fire and open burning (Haze)	<ul style="list-style-type: none"><li>● Irritates the respiratory system, causing respiratory disorders such as asthma</li></ul>
g. Burning plastic material (Hydrogen chloride, ammonia and hydrogen cyanide)	<ul style="list-style-type: none"><li>● Corrodes the breathing channel</li></ul>

- Diseases of the respiratory system

Diseases	Symptoms
<p><b>a. Lung emphysema</b></p> <ul style="list-style-type: none"> <li>•the abnormal growth of the cells lining the fine air vessels in the lungs which block the air vessels.</li> <li>•the alveoli swell and burst</li> </ul>	<ul style="list-style-type: none"> <li>•shortness of breath</li> <li>•the feeling of pain while breathing</li> <li>•tiredness</li> </ul>
<p><b>b. Bronchitis</b></p> <ul style="list-style-type: none"> <li>•is the inflammation of the bronchi caused by tar and the irritants in cigarette smoke</li> </ul>	<ul style="list-style-type: none"> <li>•continuous coughing(smoker's cough)</li> <li>•constant breathlessness</li> <li>•sleeplessness</li> </ul>
<p><b>c. Lung cancer</b></p> <ul style="list-style-type: none"> <li>•unusual cell growths in the lungs</li> <li>•carcinogen is the cause of cancer</li> </ul>	<ul style="list-style-type: none"> <li>•regular coughing</li> <li>•blood in the sputum</li> <li>•feeling of pain while breathing</li> </ul>
<p><b>d. Asthma</b></p> <ul style="list-style-type: none"> <li>•is caused by the inflammation of the breathing channel</li> <li>•breathing channel suddenly becomes narrow causing difficulty in breathing</li> <li>•very sensitive to certain allergens</li> </ul>	<ul style="list-style-type: none"> <li>•shortness of breath</li> <li>•wheezing</li> <li>•excessive coughing</li> </ul>
<p><b>e. Influenza</b></p> <ul style="list-style-type: none"> <li>•is caused by viruses which attack the mucus membranes in the respiratory system</li> </ul>	<ul style="list-style-type: none"> <li>•blocked noses, teary eyes, giddiness</li> <li>•headaches, aches in the limbs</li> <li>•coughs and fever</li> </ul>
<p><b>f. Pneumonia</b></p> <ul style="list-style-type: none"> <li>•is caused by bacteria, viruses and chemical substances</li> <li>•trachea and alveolus are attacked by bacteria and viruses</li> <li>•lungs are filled with pus and fluid</li> </ul>	<ul style="list-style-type: none"> <li>•chest pains</li> <li>•coughs and fever</li> </ul>
<p><b>g. Tuberculosis</b></p> <ul style="list-style-type: none"> <li>•is caused by bacterial infection (<i>Mycobacterium tuberculosis</i>)</li> </ul>	<ul style="list-style-type: none"> <li>•prolonged coughs and spits out blood in the end stages</li> </ul>