ASPIRE
INTERNATIONAL SCHOOL

Science Department

2023/2024

Year 7 -Term 3

Revision Pack of Unit 1 (Stage 8)

Name: …….

Class: ……

1.1 Respiration

It is one of the seven life processes that characterize living things.

Movement
Respiration
Sensitivity
Growth
Reproduction
Excretion
Nutrition

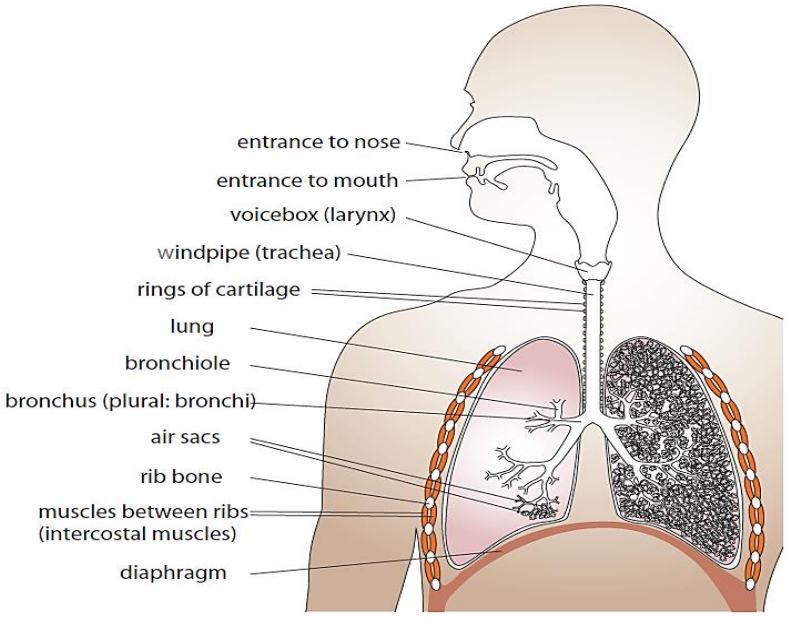
Respiration is a series of chemical reactions that happens inside every cell.

Respiration using oxygen to break down food molecules is called aerobic respiration

- The air around you contains oxygen. When you breathe, you take air into your lungs.
- Some of the oxygen from the air goes into your blood. The blood delivers oxygen to every cell in the body so that the cells can use it.
- The blood collects the waste carbon dioxide from the cells and takes it back to the lungs.

The Respiratory System:

It contains the organs that help you to take oxygen out of the air,
and get rid of carbon dioxide.



Air (oxygen) travels from the nose to your blood through:

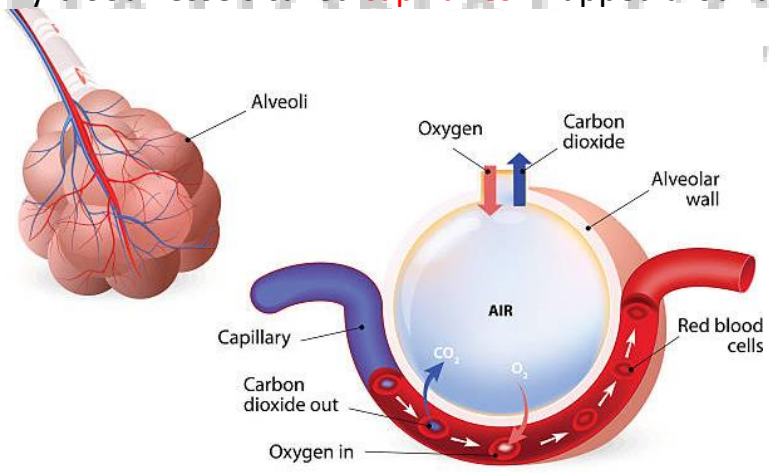
Nose → Lyrnex → Trachea → Bronchus → Bronchiole → Air sac(Alveoli)

- Lungs are surrounded by ribs which have intercostal muscles in between them.
- The trachea (windpipe) has strong rings of cartilage around it which keep the trachea open and prevent it from collapsing so that air can be kept moving in and out of your body.
- The trachea branches into two bronchi (singular: bronchus). The bronchi also have cartilage to support them. One bronchus goes to each lung.
- Each bronchus divides into several smaller tubes called bronchioles. The structure of these branches allows the air to reach deeper into the lungs.
- The bronchioles end by tiny structures called air sacs. This is where the oxygen goes into the blood, and the carbon dioxide comes out.

- Can you feel the larynx vibrating?
- Your larynx (the voice box) contains your vocal cords. These are bands of muscle that stretch across your larynx. You can think of them as being rather like guitar strings. When these cords vibrate, they make a sound.

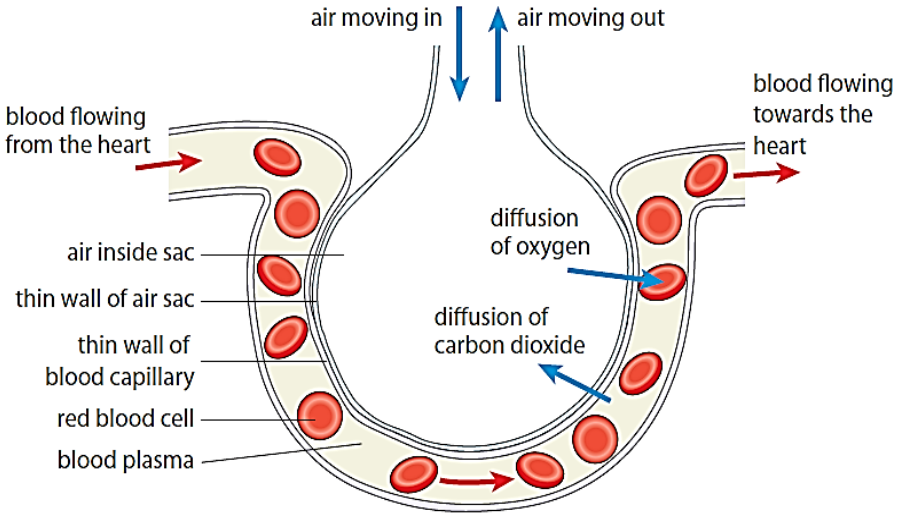
1.2 Gas exchange

Air sacs are also called (alveoli).
There are lots of very tiny blood vessels called capillaries wrapped around the air sacs.



The structure of an air sac

- The air sac has a wall made of one layer of cells. These cells are very thin.
- There is a blood capillary around the outside of the alveolus. The capillary is pressed tightly against the alveolus. The wall of the capillary is also made of a single layer of very thin cells.



the blood in the capillary -on the left of the diagram, comes from the heart. Before reaching the heart, it comes from the organs in the body. These organs contain cells that respire, using up oxygen and making carbon dioxide. So, the blood in this capillary contains only a small amount of oxygen and a lot of carbon dioxide.

The air inside the air sac comes from outside the body, where the air contains a lot of oxygen and only a small amount of carbon dioxide.

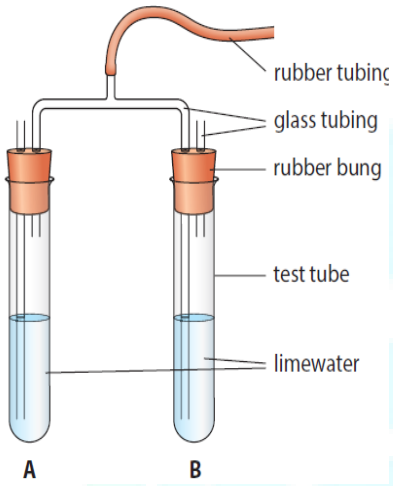
Inside the alveolus, this air is very close to the blood. There are only two very thin cells between the air and the blood, so:

- The oxygen particles in the air are gas, so they are moving freely. They can easily move from the air, through these thin-walled cells and into the blood. This is called diffusion. The oxygen molecules move from where there are a lot of them (in the air) to where there are fewer of them (in the blood).

- When the oxygen gets into the blood, it dissolves and goes into the red blood cells where it combines with haemoglobin.

- There is a lot of carbon dioxide in the blood inside the capillary and only a small quantity in the air inside the air sac. So, the carbon dioxide diffuses into the air in the air sac.

<u>To test the difference between inspired (inhaled) and expired (exhaled) air:</u>



Notes:

1- Limewater is used to compare how much carbon dioxide there is in the air that you breathe in and the air that you breathe out.
2- The limewater went cloudy first in tube **B**.
This is the limewater that **expired** air bubbles through.
3- Our results show that expired air contains **more** carbon dioxide than inspired air.

Safety

- It is very important that the rubber tubing is perfectly clean before you use it.
- Do not share the mouthpiece with anyone else or put it on the work surface when you have finished.
- Be careful – don't suck too hard! Limewater is not poisonous, but it may irritate your body.

1.3 Breathing

	Inhalation	Exhalation
Direction of air	Air gets in	Air gets out
Chest	Bigger	Smaller
Intercoastal muscles	contract (get shorter).	Relax (return to the normal size)
Ribs	Move out & upward	Move in & downward
Diaphragm	Contracts & moves downward	Relaxes & moves upward
The relation between the volume of the chest and the pressure of the air	volume increases, the pressure inside the chest cavity/lungs decreases	volume decreases, the pressure increases, so the air is squeezed out of the lungs

When we breathe in, the muscles in the diaphragm and between the ribs **increase** the volume of the chest. This makes air move **into** the lungs.

When we breathe out, the muscles in the diaphragm and between the ribs **decrease** the volume of the chest. This makes air move **out of** the lungs.

1.4 Respiration

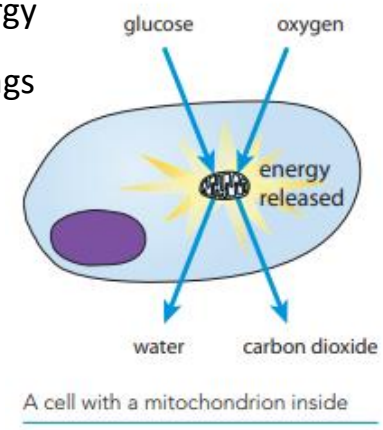
is a series of chemical reactions occurring in all living organisms.

It occurs in the mitochondria,

Transform chemical energy stored in glucose into thermal (heat) energy

That's why respiring cells get a little bit warmer than their surroundings

This is called **Aerobic respiration**: (VIP)



A cell with a mitochondrion inside

$$\text{glucose} + \text{oxygen} \longrightarrow \text{carbon dioxide} + \text{water}$$

Questions:

- **Neurones contain more mitochondria than cheek cells. Suggest why.**
  Neurones need a lot of energy to transfer electrical signals around the body. Cheek cells do not need much energy, as they just stay in place. Mitochondria are where energy is released from glucose, through aerobic respiration, so neurones need a lot of them.
- **Look at the word equation for aerobic respiration.**
  a- What are the reactants in this reaction?
  Oxygen & Glucose
  b- What are the products of this reaction?
  Carbon Dioxide and Water

Summary

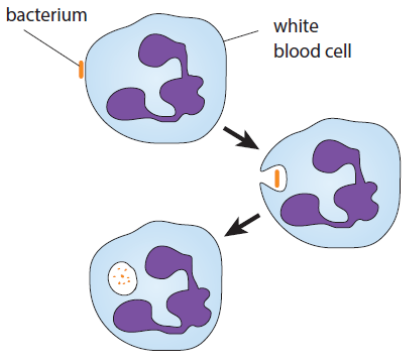
	Gas exchange	Breathing	Respiration
Location	**1- Air sac** **2- All body cells**	**Respiratory system**	**Mitochondria of all body cells**
Function	**Take oxygen in and give out CO_2**	**Inhale and exhale**	**Producing energy using glucose and oxygen**

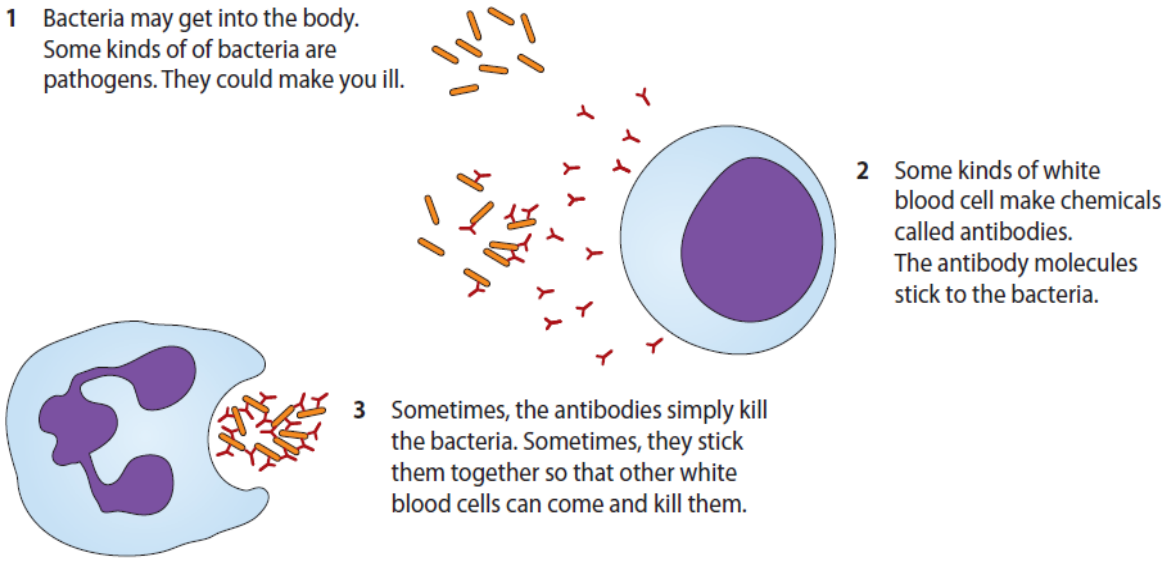
1.5 Blood

	Plasma	Red blood cells	White blood cell
Description	Pale yellow liquid (Mostly water)	Red cells	White cells
Nucleus	_____	Doesn't have a nucleus	Have nucleus
Size	_____	Tiny	Bigger than RPCs
Function	Contains many dissolved substances (glucose, nutrients, CO_2, …..)	Transport Oxygen to all body cells	Kill pathogens

Note:

- **Red blood cells don't have mitochondria** to stop the red blood cells from using up all the oxygen for themselves, instead of delivering it to the body cells.
- Some kinds of white blood cells can change their shape, and push their cytoplasm out to make 'fingers' that can capture a bacterium.
- The white blood cell then produces chemicals that kill and digest the bacterium. This is called **phagocytosis**.
- Other types of white blood cells produce chemicals that kill pathogens. These chemicals are called **antibodies**. They are shown as little Y-shapes on the diagram below. Different kinds of antibodies are needed for each different kind of pathogen.
- The antibodies stick onto the pathogen. Sometimes, they kill the pathogen directly. Sometimes, they glue lots of the pathogens together so that they cannot move. This makes it easy for other white blood cells to capture and kill the pathogens.





Remember:

- Diffusion when molecules move from where there are a lot of them (high concentration) to where there are fewer of them (low concentration).

- The air that you breathe out is called expired air.
- The air that you breathe in is called inspired air.