MINISTRY OF EDUCATION

SECONDARY ENGAGEMENT PROGRAMME

GRADE 8

INTEGRATED SCIENCE

Week 8 **Lesson 2**

Topic: **Respiration**

Sub-topic: **Breathing and Gaseous Exchange surfaces**

Objectives: After observing pictures of respiratory structures, students will describe how gaseous exchange occurs in man and fish correctly.

Content

Breathing

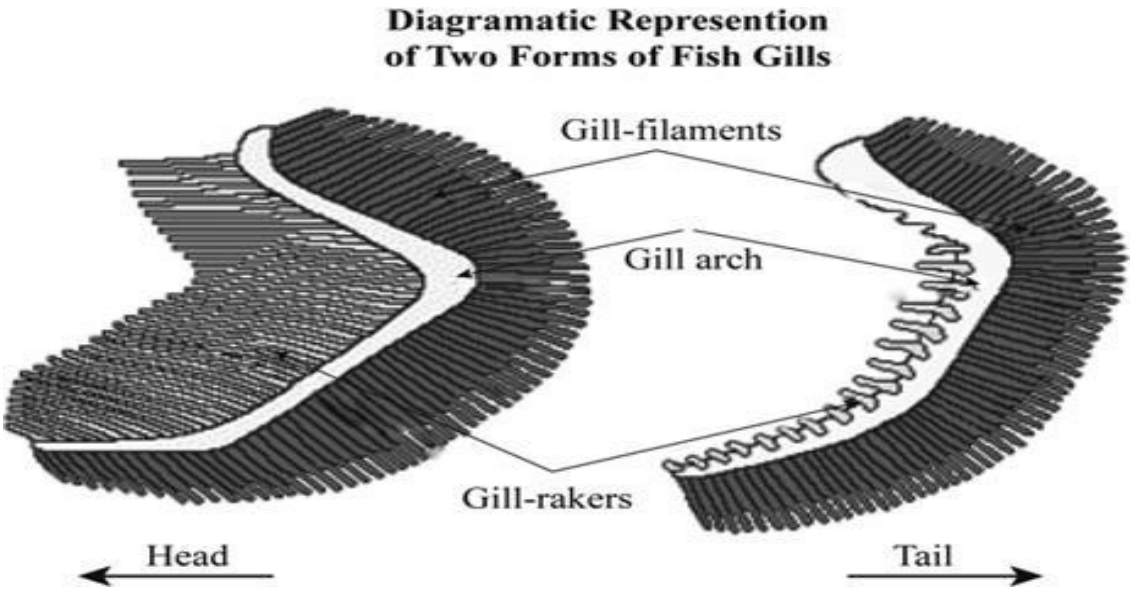
Breathing describes the combined action of inhaling (taking in) and exhaling (giving out) air. The purpose of breathing is to bring air close to the respiratory surface, be it the surface of the trachea in insects, or of gills as in fishes, or of lungs as in mammals. Breathing is external respiration and it involves movement of respiratory structures, yet plants do not breathe, they respire.

Breathing in a Fish

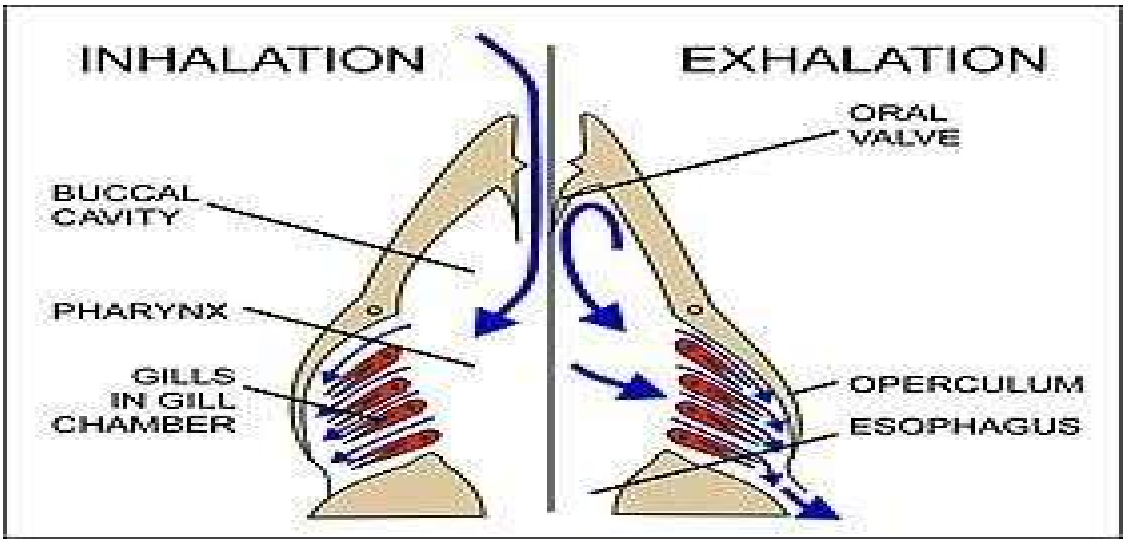
The movement in a fish, aimed at getting air, which is dissolved in the water, close to the gills are: -

- The opening and closing of the mouth,
- The raising and lowering of the gill cover or operculum

Structure of a Fish's Gill



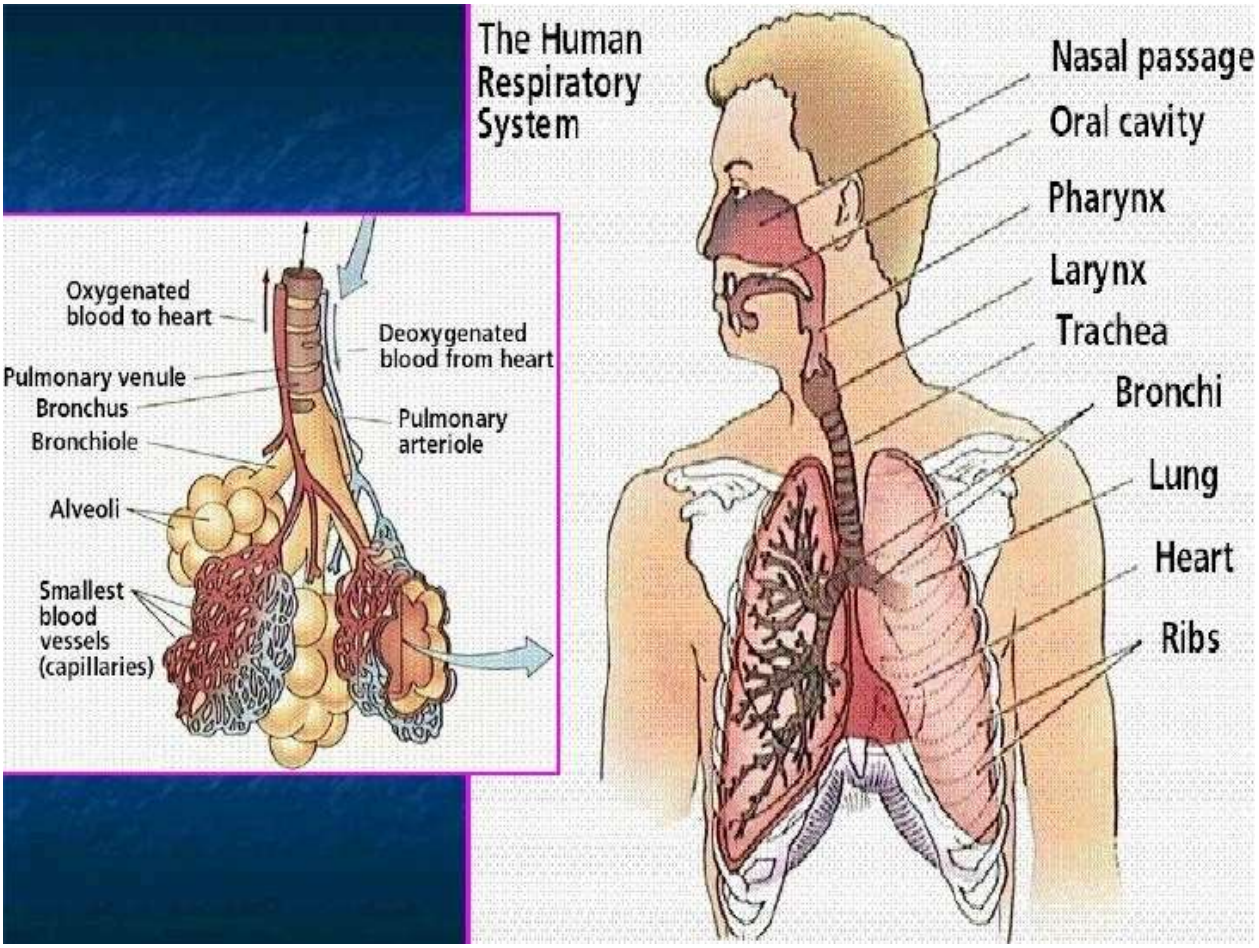
Breathing Mechanisms of a Fish



The water which enters in when the mouth is opened flows out over the gills when the operculum is raised and the mouth closed. The esophagus is closed before the mouth is closed and the floor of the mouth is raised so that the water does not enter the digestive system. The water flows in one direction only. As it passes over the gills, oxygen diffuses into the blood in the gills. Carbon dioxide in the blood in the gills diffuses into the water before the water passes out of the operculum.

Breathing in Mammals

Structure of the lungs of man



Inhalation	Exhalation
•Diaphragm muscles contract. •Diaphragm flattens out	•Diaphragm muscles relax. •Diaphragm arches upwards
•Intercostal muscles contract.	•Intercostal muscles relax.
•Ribcage moves upwards and outwards.	•Ribcage moves downwards and inwards.
•Volume of thoracic cavity increases	•Volume of thoracic cavity decreases.
•Air pressure surrounding the lungs decreases.	•Air pressure surrounding the lungs increases.
•Air flows into the lungs	•Air is forced out of the lungs.

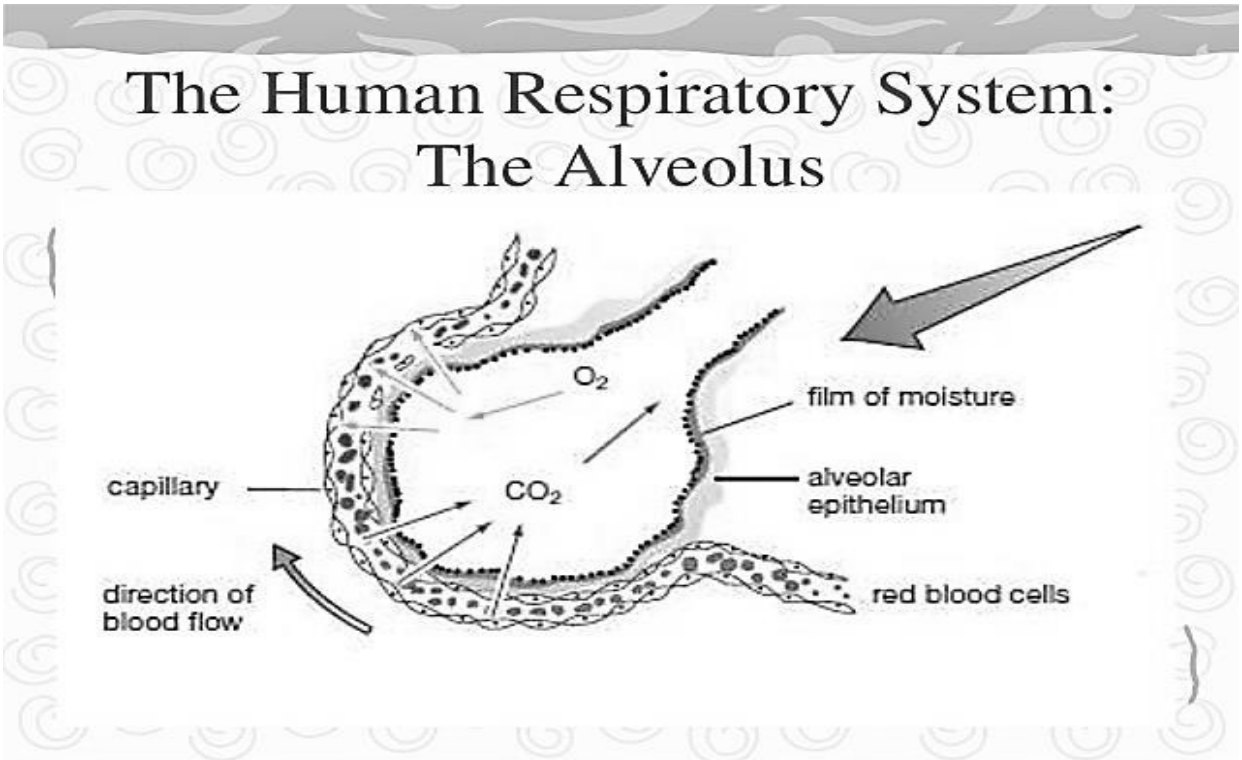
Comparing inhaled and exhaled air

What are the differences between inhaled and exhaled air?

Inhaled Air	
Oxygen:	21%
Carbon dioxide:	0.04%
Water vapor:	small amount

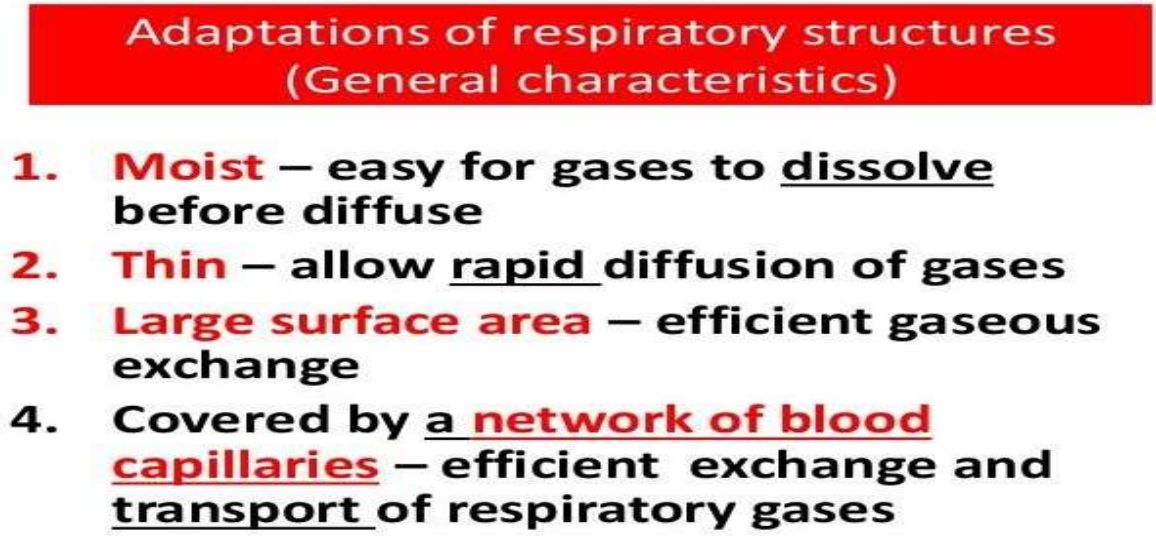
Exhaled Air	
Oxygen:	16%
Carbon dioxide:	4%
Water vapor:	large amount

Respiratory surface of the lungs- The ALVEOLI



Features of Respiratory Surfaces

Fish's Gill	Mammal's lung	Common feature
The gill lamellae or filaments are delicate structures	The walls of the hollow alveoli are thin, just one cell thick	THIN
Gills are continuously bathed with water. They are wet.	Certain cells in the alveolar walls secrete mucus.	MOIST
The numerous lamellae greatly increase the surface area of gills.	The numerous alveoli greatly increase the surface area of the lungs. It is said that if the lungs of an adult man were spread out, the tissues would cover an area of about $90m^2$	EXTENSIVE
The gills of a freshly caught fish are bright red. Each lamella has a network of blood vessel.	The are many capillaries around each alveolus	VASCULAR



Home work

1. Draw and label three (3) parts of a fish's gill.
2. List two (2) features of a respiratory surface.
3. Which part of the lungs is responsible for gaseous exchange.
4. Write the equation for aerobic respiration.

References

1. https://www.google.com/search?q=structure+of+a+fish+gill&tbm=isch&ved=2ahUKEwiEoPX5quzrAhVKJN8KHXihDAUQ2-cCegQIABAA&oq=structure+of+a+fish+gill&gs_lcp=CgNpbWcQAzICCAA6BAgjECc6BAgAEBg6BggAEAoQGDoHCCMQ6gIQJzoFCAAQsQM6BAgAEEM6BwgAELEDEEM6CAgAELEDEIMBOgoIABCxAxCDARBDUKOLHVi_gx5g7IkeaBRwAHgEgAGfCYgB60aSAQ0yLTYuMy4xLjIuMy4ymAEAoAEBqgELZ3dzLXdpei1pbWewAQrAAQE&sclient=img&ei=EVFhX8TTDsrI_Ab4wrIo&bih=789&biw=1600&hl=en
2. https://www.google.com/search?q=differences+between+inhalation+and+exhalation&hl=en&sxsrf=ALeKk02aq_TAzrtsF01_9LpNz2RWWc26KQ:1600214499886&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjJz9HGr-zrAhVrlXIEHdr5A1wQ_AUoAXoECA0QAw&biw=1600&bih=789#imgrc=5IGNhInt4s8DJM
3. Blackman, S., Bernard, M.,Dalgety, F., &Sadoo, d.s (2000) Science in Daily Life Bk.2. Georgetown, Guyana. Ministry of Education, Guyana