	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	**DEPARTMENT OF SCIENCE 2025– 2026** **SUBJECT: BIOLOGY**	**Date: 19/05/2025**
Worksheet: 04	**UNIT- V- Human Physiology** **CHAPTER:14- Breathing and Exchange of gases**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC:**	**ROLL NO.**

I. MULTIPLE CHOICE QUESTIONS (1M)

1. Dorsally the thoracic chamber is protected by:
   A. Ribs
   B. Vertebral column
   C. Sternum
   D. Diaphragm

2. Pneumotaxic centre which regulates the process of respiration is located in:
   A. Medulla
   B. Cerebellum
   C. Pons
   D. Hypothalamus
3. Which of the following part(s) of respiratory system is affected in asthma?
   A. Lungs
   B. Trachea
   C. Bronchi and bronchioles
   D. Alveoli

4. Which statement is incorrect about haemoglobin?
   A. It is a protein
   B. It helps in oxygen transport
   C. It helps in CO_2 transport
   D. It is a triglyceride

5. Emphysema is characterised by:
   A. Permanent enlargement and destruction of alveolar area leading to reduction in respiratory surface
   B. Inhibition of respiratory centre
   C. Accumulation of fluid in lungs
   D. Spasm of muscles of trachea

Two statements are given - one labelled as **Assertion (A)** and the other labelled as **Reason (R)**.
Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
B. Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).
C. Assertion (A) is true, Reason (R) is false.
D. Assertion (A) is false, Reason (R) is true.

6. Assertion(A): Trachea is not collapsed even when there is no air in it.
   Reason(R): Trachea is supported by the cartilaginous ring.

7. Assertion (A): Breathing is different from respiration.
   Reason (R): Breathing is physical and respiration is biochemical.

8. Assertion(A): Gas exchange with water as respiratory medium is much more demanding than breathing air.
   Reason (R): Air contains much more oxygen than water at the same time than PO_2.

II. VERY SHORT ANSWER TYPE QUESTIONS(2M)

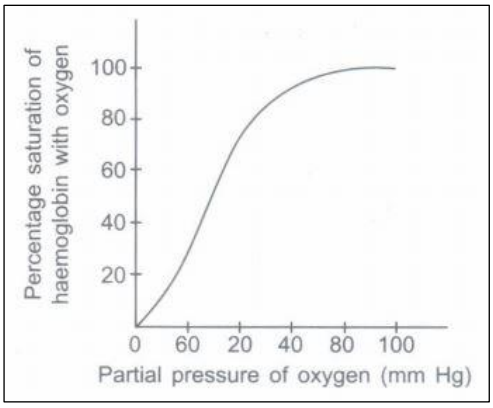
9. Name the muscles associated with inspiration and expiration.
10. Define the partial pressure of a gas.
11. Distinguish between carbamino - haemoglobin and carboxy - haemoglobin.
12. Write the appropriate volumes of the following.
    i) Inspiratory Reserve Volume (IRV)
    ii) Expiratory Reserve Volume (ERV)
13. Name the membrane that surrounds the lungs. Also, mention the role performed by that membrane.
14. List the factors on which diffusion is based during exchange of gases.

III. SHORT ANSWER TYPE QUESTIONS (3M)

15. Give a brief description of transport of carbon dioxide.
16. The diffusion membrane is made up of three major layers. Name the membranes and write how the thickness of these membranes help in diffusion.
17. What is the role of the carbonic anhydrase enzyme in the transport of gases during respiration?

IV. CASE STUDY BASED QUESTIONS (4M)

18. Study the graph given below and answer the questions that follow:



A. Name and define the curve.
B. What is the significance of plotting this curve?
C. How much of oxygen is transported by every 100 ml of blood under normal physiological conditions?

OR

D. Name the type of graph obtained.

V. LONG ANSWER TYPE QUESTIONS (5M)

19. With the help of a neat labelled diagram explain the structure of human respiratory structure.

20. Describe the process of breathing in human.

Answer Key

Q. No.	Answer
I.	**MULTIPLE CHOICE QUESTIONS (1M)**
1	B. Vertebral column
2	C. Pons
3	C. Bronchi and bronchioles
4	D. It is a triglyceride
5	A. Permanent enlargement and destruction of alveolar area leading to reduction in respiratory surface
	ASSERTION & REASONING
6	A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
7	A. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
8	A.Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
II	**VERY SHORT ANSWER TYPE QUESTIONS(2M)**
9	Diaphragm, external and internal intercostal muscles
10	It is the pressure exerted in a mixture of gases and is equal to the total pressure of the mixture of gases divided by the percentage of that gas in a mixture.
11	Haemoglobin carrying carbon dioxide is called carbaminohemoglobin and haemoglobin bound to carbon monoxide is called carboxyhemoglobin.
12	i) IRV (2500 mL to 3000 Ml) ii) ERV (1000 mL to 1100 Ml).
13	The name of the membrane is the pleura membrane. It reduces friction or resistance in the lungs.
14	Pressure/concentration gradient, the solubility of the gases, membrane thickness and partial pressure (pO_2 / pCO_2)
III	**SHORT ANSWER TYPE QUESTIONS (3M)**
15	**Dissolved in Plasma (7-10%)** – A small amount of CO_2 dissolves directly in the blood plasma. **As Bicarbonate Ions (70%)** – The majority of CO_2 reacts with water in red blood cells to form carbonic acid (H_2CO_3), which then dissociates into bicarbonate (HCO_3^-) and hydrogen ions (H^+). This reaction is catalyzed by the enzyme **carbonic anhydrase**. **As Carbaminohemoglobin (20-23%)** – CO_2 binds directly to hemoglobin in red blood cells to form **carbaminohemoglobin ($HbCO_2$)**, which is transported to the lungs.
16	Exchange surface- 3 layers, epithelium of alveoli, Endothelium of alveolar capillaries and basement membrane in between them. The thin nature of the membrane ensures **efficient exchange of oxygen (O_2) and carbon dioxide (CO_2)** between alveolar air and blood.
17	Carbon dioxide produced by the tissues diffuses into the bloodstream and passes into the red

	blood corpuscles where it reacts with water to form carbonic acid (H_2CO_3) catalysed by carbonic anhydrase found in the erythrocytes and plasma. Carbonic acid dissociates into hydrogen (H+) and bicarbonate (HCO_3) ions. Thus, CO_2 is transported in blood as bicarbonate ions and it also acts as a source of H+ ions which affects the transport of oxygen in blood.
IV	**CASE STUDY BASED QUESTIONS (4M)**
18	A. The oxygen dissociation curve is a graph showing the percentage saturation of oxyhaemoglobin at various partial pressures of oxygen. B. The **oxygen dissociation curve** illustrates the relationship between oxygen pressure and hemoglobin's affinity for oxygen, showing how readily hemoglobin binds to or releases oxygen. It is significant because it helps explain how oxygen is efficiently loaded in the lungs and unloaded in tissues based on varying oxygen concentrations. C. Every 100 mL of oxygenated blood can deliver around 5ml of O2 to the tissues under normal physiological conditions. OR D. Sigmoid
V	**LONG ANSWER TYPE QUESTIONS (5M)**
19	**Nose/Nasal Cavity**: Filters, moistens, and warms air. **Pharynx**: Passage for air from the nasal cavity to the larynx. **Larynx**: Contains vocal cords; involved in sound production. **Trachea**: A tube that carries air to the bronchi; lined with cilia. **Bronchi**: Two tubes branching from the trachea leading to the lungs. **Bronchioles**: Smaller airways within the lungs. **Alveoli**: Tiny air sacs where gas exchange (O_2 and CO_2) occurs. **Lungs**: Main organs for respiration; responsible for gas exchange. **Diaphragm**: Muscle that aids in breathing by expanding and contracting the lungs. FIG 14.1 FROM NCERT
20	INSPIRATION: It is initiated by the contraction of the diaphragm muscles and external intercostal muscles. The muscles pull the ribs and sternum upwards and outwards and increase the thoracic volume forcing the lungs to expand the pulmonary volume. The increase in pulmonary volume and decrease in intrapulmonary pressure forces the air from outside to enter the air passages into the lungs. EXPIRATION: Relaxation of the diaphragm allows the diaphragm and sternum to return to their original shape and the internal intercostal muscles contract, pulling the ribs downward and reducing the thoracic volume and pulmonary volume. This results in an increase in the intrapulmonary pressure slightly above the atmospheric pressure causing the expulsion of air from the lungs.

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