3. INTRODUCTION TO RESPIRATION IN ORGANISMS

TEACHING TASK

I.CHOOSE THE CORRECT ANSWERS

1.The process which involves the exchange of gases is called
Answer: d) Breathing
Explanation: Breathing is the physical process of inhaling and exhaling gases, whereas respiration is a biochemical process.

2.Roots respire through
Answer: d) Air spaces
Explanation: Roots respire through air spaces in the soil, as they lack specialized respiratory organs like stomata or lenticels.

3.Which of the following animals breathe through their skin and lungs?
Answer: b) Frog
Explanation: Frogs use cutaneous (skin) respiration along with lungs, especially when in water.

4.What happens to lime water when we exhale air into it?
Answer: c) Turns Milky
Explanation: Exhaled air contains CO_2, which reacts with lime water (calcium hydroxide) to form calcium carbonate, making it milky.

5.Plants respire through
Answer: b) Stomata
Explanation: Stomata are tiny pores on leaves that allow gas exchange (O_2 and CO_2).

6.The respiratory organs in cockroach are
Answer: d) Spiracles
Explanation: Cockroaches have a network of tracheae connected to spiracles (tiny openings) for breathing.

II. FILL IN THE BLANKS

7.In earthworm, the respiratory organ are
Answer: Skin
Explanation: Earthworms breathe through their moist skin via diffusion.

8.Answer: Joseph Priestley published the book “Experiments and Observations on Different Kinds of Air”.
Explanation: He discovered oxygen and studied plant respiration.

9.Dissolved oxygen is used by Answer: Aquatic
Explanation: Fish and other aquatic animals use oxygen dissolved in water.

10. The respiratory organ of human beings is Answer: Lungs
Explanation: Humans primarily use lungs for gas exchange.

III.MATCH THE FOLLOWING
Group A Group B
Answer:
1. Gills b) Fish
2. Spiracles d) Cockroach
3. Respiration a) Taking in O2 and giving off CO2
4. Exchange of gases e) Stomata
5. Roots respire through c) Lenticels

Explanation:
Gills ? Used by fish for breathing underwater.
Spiracles ? Tiny openings in cockroaches (insects) for air entry.
Respiration ? The process of taking in O2 and releasing CO2.
Exchange of gases ? Occurs in leaves through stomata.

LEARNERS TASK

CHOOSE THE CORRECT ANSWERS

1.Exchange of gases through skin is called
Answer: c) Cutaneous respiration
Explanation: Cutaneous respiration refers to gas exchange through the skin (e.g., frogs, earthworms).

2.In cockroach, respiration takes place through
Answer: a) Spiracles
Explanation: Cockroaches have a tracheal system connected to spiracles (tiny openings) for breathing.

3.At the entrance of trachea, there is a voice box called
Answer: b) Larynx
Explanation: The larynx (voice box) is located at the top of the trachea and helps in sound production.

4.The blood of cockroach is
Answer: c) White
Explanation: Cockroaches have hemolymph (not red blood), which appears white due to the absence of hemoglobin.

5.The process in which food is oxidized and energy is released is called
Answer: b) Respiration
Explanation: Respiration involves breaking down glucose to release energy (ATP).

ADDITIONAL INFORMATION QUESTIONS

1. What is cutaneous respiration?
Answer: Gas exchange (oxygen and carbon dioxide) through the skin.

2.Who am I?
a. I live in the soil, I breathe through the skin which is thin and moist with minute holes?
Explanation: Earthworm
b. I live in water and respire through gills?
Answer: Fish

3.Write an experiment to find out moisture in our breath.
Answer:frog
Explanation: Breathe onto a clean, dry mirror. Condensation forms due to water vapor in exhaled air, proving moisture content.

4.How do you appreciate the scientists Van Helmont and Joseph Priestley?
Answer: Van Helmont: Discovered plant growth involves more than just soil (early understanding of photosynthesis).
Joseph Priestley: Discovered oxygen and showed plants release it, laying the foundation for modern respiration studies.

5.What are the problems you have faced regarding the respiratory system this year?
Answer:
i. Conceptual Confusion Between Respiration and Breathing
Breathing: Mechanical process involving inhalation (taking in oxygen) and exhalation (releasing carbon dioxide).
Respiration: Biochemical process where cells break down glucose to produce energy (ATP), involving oxygen (aerobic) or without oxygen (anaerobic).
ii. Difficulty in Associating Respiratory Structures with Organisms
Different organisms have evolved specialized respiratory structures:
Humans & mammals: Lungs with alveoli for gas exchange
Fish: Gills with filaments for aquatic respiration
Amphibians (frogs): Cutaneous (skin) + pulmonary (lungs) respiration
Insects (cockroaches): Tracheal system with spiracles
Earthworms: Moist skin for cutaneous respiration
iii. Challenges in Understanding Gas Exchange Mechanisms
Diffusion principles: Movement of O_2 from high concentration (alveoli) to low concentration (blood)
Hemoglobin's role: Oxygen transport in blood
CO_2 transport: As bicarbonate ions in plasma
Counter-current flow: In fish gills for efficient oxygen uptake

iv. Experimental Difficulties
Common practical challenges:
Lime water test: Distinguishing between inhaled (clear) vs. exhaled air (milky)
Stomata observation: Proper microscope focusing techniques
Lung capacity measurements: Using spirometers correctly
v. Application to Biological Diversity
Adaptive variations in respiration:
Amphibians: Dual mode (skin + lungs) for terrestrial/aquatic life
Insects: Tracheal system delivers air directly to tissues
Aquatic organisms: Gills extract dissolved oxygen from water
vi. Terminology and Structural Complexity
Key components often confused:
Conducting zone (nose ? bronchi) vs. Respiratory zone (alveoli)
Inspiration (active, diaphragm contracts) vs. Expiration (usually passive)
Ventilation (air movement) vs. Gas exchange (cellular level)
vii. Diagrammatic Representation Challenges
Common errors in drawings:
Incorrect branching pattern of bronchi/bronchioles
Misplacement of diaphragm
Oversimplification of alveolar structure

COMPREHENSIVE

1.The respiration in fish is called _____.
Answer: Branchial respiration
Explanation: Fish use gills (branchiae) for breathing underwater.

2.What is cutaneous respiration?
Answer: Gas exchange through the skin.
Explanation: Seen in frogs (along with lungs) and earthworms (solely skin-based).

3.In human beings, which type of respiration?
Explanation: Pulmonary respiration
Solution: Humans use lungs for oxygen-carbon dioxide exchange.

4.What is the common respiratory organ in frog & earthworm?
Answer: Skin
Explanation: Both frogs (partially) and earthworms (fully) rely on moist skin for gas exchange.