



Class - VII Science September Month Notes

10. Respiration : The Path to Energy

Technical Words:

1. Breathing - the process by which oxygen-rich air is taken in and carbon dioxide- rich air is given out
2. Cellular respiration - The stage in which food molecules are broken down to release energy
3. Inhalation - The process by which we take in oxygen-rich air
4. Exhalation - the process by which we give out carbon dioxide-rich air from the lungs
5. Aerobic respiration - the type of respiration which uses oxygen to break down food to produce energy
6. Anaerobic respiration - the type of respiration in which energy is released from food in the absence of oxygen
7. Stomata- structure present on the leaf surfaces through which gaseous exchange takes place in green plants

**A. Short answer question**

1. Why do organisms respire?

[Answer] Organisms respire to obtain the energy required for their life processes. During cellular respiration, the food molecules are broken down to release energy.

2. Differentiate between inhalation and exhalation.

[Answer] During inhalation, the diaphragm contracts and moves down; the muscles attached to the ribs contract and pull the ribs outwards. As a result, the size of the chest cavity increases and the lungs expand. Oxygen-rich air is inhaled into the lungs at this stage. During exhalation, the diaphragm relaxes and moves up; the muscles of the ribs relax and the ribs move inwards. As a result, the size of the chest cavity decreases, the lungs contract and air rich in carbon dioxide is exhaled from the lungs.

3. Why do aquatic animals breathe faster than land animals?

[Answer] Aquatic animals breathe faster than land animals because water contains less oxygen (0.5%) compared to the air (21%). The rate of diffusion of oxygen in water is slower than that of in air.

4. What is aerobic respiration? Write the equation involved in it.

[Answer] Aerobic respiration is a type of cellular respiration that occurs in the presence of oxygen. The equation for aerobic respiration is:

$C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O + \text{Heat (energy)}$  It involves the breakdown of glucose ( $C_6H_{12}O_6$ ) molecule by the oxygen ( $O_2$ ) to produce carbon dioxide ( $CO_2$ ), water ( $H_2O$ ) and heat energy.

5. How does the exchange of gases take place in aquatic plants?

[Answer] Aquatic plants have different methods of gas exchange. In floating plants, the stomata are on the upper surface of leaves. Submerged plants do not have stomata. In these plants, gas exchange takes place directly between the leaf cells and water.

## B. Long answer question

1. What are the differences between breathing and cellular respiration?

<b>Breathing</b>	<b>Cellular Respiration</b>
It is the process of exchange of gases.	It is the process in which food is broken down using oxygen.
It is a physical process.	It is a chemical process.
It takes place outside the cell. It is an extracellular process.	It takes place inside the cell. It is an intracellular process.
It does not release energy.	It releases energy.
It does not involve enzymes.	It involves enzymes.

[Answer]

2. How does the exchange of gases take place in lungs? Explain with a diagram.

[Answer] The exchange of gases in the lungs takes place through following steps: When a person inhales, air (which contains oxygen) is drawn into the lungs through the trachea. It enters the alveoli. Oxygen in the inhaled air diffuses through the thin walls of the alveoli into the surrounding capillaries. Here, the oxygen combines with haemoglobin in the blood. The oxygen-rich blood is transported by the circulatory system to all the cells of the body. The oxygen helps to break down food (glucose) to produce energy and carbon dioxide. The blood picks up the carbon dioxide formed from the cells and brings it to the lungs. In the alveoli, carbon dioxide diffuses out of the blood into the air within the alveoli. When the person exhales, the carbon dioxide-rich air is expelled from the lungs. (Diagram: Refer to the textbook.)

3. Describe anaerobic respiration in the following.

- yeast
- muscle cells

[Answer] (a) Yeast: During anaerobic respiration, yeast cells convert glucose into ethyl alcohol and carbon dioxide. Less energy is released as glucose is not completely broken down.

(b) Muscle cells: Sometimes, when we exercise heavily, the body cannot supply enough oxygen to the muscles to completely break down glucose into carbon dioxide and water. At such times, the muscle cells respire anaerobically. Glucose is broken down into lactic acid and energy is released. The production of lactic acid causes muscle cramps.

4. Explain the various organs used by plants for respiration.

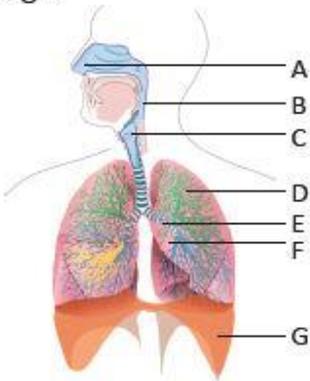
[Answer] Plants use the following organs for respiration:

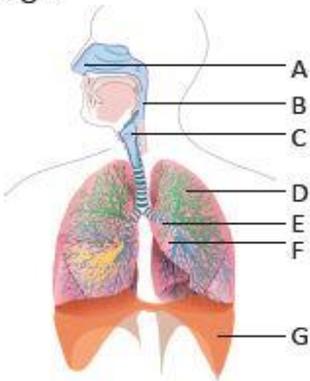
**Stomata:** In green plants, exchange of gases takes place through stomata present on the leaf surfaces. Each stoma is guarded by two guard cells, which control its opening and closing. **Lenticels:** The woody bark of large trees has openings called lenticels for exchange of gases.

**Roots:** Root hairs absorb oxygen from the air spaces present between soil particles. Mangrove trees, which grow in marshy areas, have aerial roots that help them to take in air.

**Leaf cells:** Submerged aquatic plants have a direct method of gas exchange. The exchange takes place between the leaf cells and water. Many aquatic plants have air pockets in their leaves and stems to store and transport oxygen.

## B. Picture-based question.

1. 



Label the organs of human respiratory system shown in the given image.

[Answer] A. nasal cavity

B. pharynx

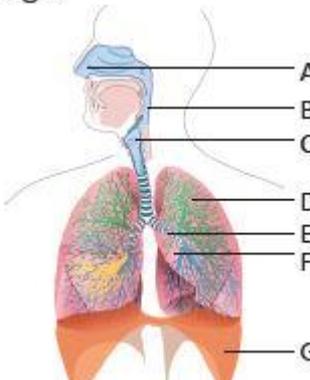
C. trachea

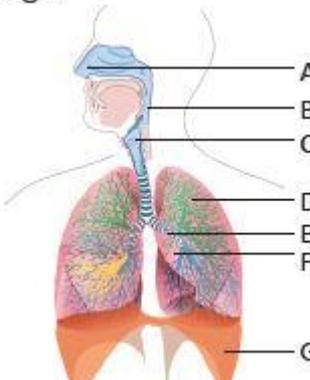
D. lungs

E. bronchus

F. bronchiole

G. diaphragm

2. 

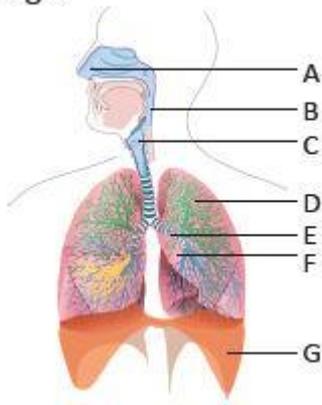


Explain how the air reaches to the lungs.

[Answer] Air enters the respiratory system through the nasal cavity. After passing through the nasal cavity, the air passes into the pharynx. From the pharynx the air enters the trachea. The trachea splits into two bronchial tubes, one for each lung.

These tubes further divide into smaller bronchi and bronchioles. The bronchioles carry the inhaled air into the alveoli, where the exchange of gases (oxygen and carbon dioxide) takes place.

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What is the function of A in the human respiratory system.

[Answer] Air is inhaled through the nostrils. The inhaled air enters the nasal cavity. The nasal cavity is lined with mucus and tiny hairs to trap the dust particles present in inhaled air so that clean air reaches the lungs.

1.Assertion (A) : Yeast is a single celled organism that can respire anaerobically.

Reason (R) : Yeast is used to produce wine and beer.

Answer: (b) Both A and R are true but R is not the correct explanation of A.

2.Assertion- When our muscle cells respire anaerobically cramps occur.

Reason - The accumulation of lactic acid causes cramps.

Ans - a - Both A and R is true and R is the correct explanation of A