

## CHAPTER 6

### RESPIRATION IN ORGANISM

#### **2-mark questions:**

**1. Why does an athlete breathe faster and deeper than usual after finishing the race?**

**Answer:**

Athletes need a lot of energy during the race, and for the release of energy, they need a lot of oxygen; hence they breathe faster than usual after finishing the race.

**2. List the similarities between aerobic and anaerobic respiration.**

**Answer:**

**Similarities:**

1. In both kinds of respiration, food particles are broken down to release energy
2. Both occur inside the cells
3. Both supply by-products

**3. List the difference between aerobic and anaerobic respiration.****Answer:****Differences**

<b>Aerobic respiration</b>	<b>Anaerobic respiration</b>
Takes place in the presence of oxygen	Takes place in the absence of oxygen
End products are CO <sub>2</sub> and H <sub>2</sub> O	End products are CO <sub>2</sub> and alcohol
Produces a large amount of energy	The energy released is less when compared to aerobic respiration
It occurs in most plants and animals	Occurs in yeast and some bacteria

**4. Why do we often sneeze when we inhale a lot of dust-laden air?****Answer:**

When we inhale dust-laden air, the dust irritates the nose; as a reflexive action, dust is thrown out through sneezing.

**5. Take three test tubes. Fill  $\frac{3}{4}$ th of each with water. Label them A, B and C. Keep a snail in test tube A, a water plant in test tube B and in C, keep both the snail and plant. Which test tube would have the highest concentration of  $\text{CO}_2$ ?**

**Answer:**

Test tube A will have the highest concentration of  $\text{CO}_2$  because test tube A has a snail which expels out  $\text{CO}_2$  into the tube. Since a plant is present in both test tubes B and C, the plant will inhale  $\text{CO}_2$  to decrease  $\text{CO}_2$  concentration. Thus, there will be less concentration of  $\text{CO}_2$  in these tubes.

**6. Why do we breathe faster and deeper after exercise?**

**Answer:**

During exercise, the demand for energy increases, requiring more oxygen. Faster and deeper breathing helps supply the body with the needed oxygen and expel carbon dioxide.

**7. What is the main difference between aerobic and anaerobic respiration?**

**Answer:**

The key difference is that aerobic respiration uses oxygen to break down glucose into energy, carbon dioxide, and water, while anaerobic respiration occurs without oxygen, resulting in the breakdown of glucose into energy and either lactic acid or alcohol.

### **8. How do insects like cockroaches breathe?**

**Answer:**

Insects, including cockroaches, breathe through small openings on the sides of their bodies called spiracles. These openings lead to a network of air tubes called tracheae, facilitating the exchange of gases.

### **9. Why do muscle cramps occur after heavy exercise?**

**Answer:**

Muscle cramps occur when muscle cells respire anaerobically during periods of intense exercise. The partial breakdown of glucose produces lactic acid, and the accumulation of lactic acid leads to muscle cramps.

### **10. How do fish breathe underwater?**

**Answer:**

Fish breathe underwater using gills. Gills are specialized organs that extract oxygen from water as it passes over them, allowing fish to extract oxygen and release carbon dioxide.

**5-mark questions:****1. Explain the process of aerobic respiration in human cells. (5 marks)****Answer:**

Aerobic respiration is a complex process that occurs in human cells to extract energy from glucose using oxygen. The process involves several steps:

**Glycolysis:**

In the cytoplasm, glucose is broken down into pyruvate molecules, producing a small amount of ATP.

**Krebs Cycle (Citric Acid Cycle):**

Pyruvate molecules enter the mitochondria and undergo further breakdown, releasing carbon dioxide and producing molecules that carry high-energy electrons.

**Electron Transport Chain:**

High-energy electrons are transferred through a series of proteins in the inner mitochondrial membrane, leading to the production of ATP.

**Oxidative Phosphorylation:**

The energy released during electron transport is used to convert ADP to ATP. Water is formed as a byproduct.

Overall, aerobic respiration results in the efficient production of ATP, providing energy for various cellular activities.

## **2. How do plants respire, and how is it different from animal respiration?**

### **Answer:**

Plants respire through a process similar to animals but with some notable differences:

### **Stomata:**

Plants have tiny pores called stomata on their leaves and stems, allowing the exchange of gases. Oxygen is taken in, and carbon dioxide is released.

### **Cellular Respiration:**

Plant cells undergo cellular respiration, breaking down glucose with the help of oxygen to release energy, carbon dioxide, and water.

### **Root Respiration:**

Roots absorb oxygen from air spaces between soil particles for energy production.

Unlike animals, plants can carry out both photosynthesis (in the presence of sunlight) and respiration throughout their lifetime. Additionally, plants release oxygen during photosynthesis, contributing to the oxygen content in the atmosphere.

**FILL IN THE BLANKS:**

1. During \_\_\_\_\_, the breakdown of food in the cell with the use of oxygen is called aerobic respiration.
2. Yeasts, single-celled organisms, can survive in the absence of air and get energy through \_\_\_\_\_ respiration.
3. In the absence of oxygen, glucose breaks down into alcohol and carbon dioxide through \_\_\_\_\_ respiration.
4. The process of breathing involves taking in air rich in \_\_\_\_\_ and giving out air rich in \_\_\_\_\_.
5. The muscular sheet forming the floor of the chest cavity is called the \_\_\_\_\_.

**Answer:**

1. During **aerobic respiration**, the breakdown of food in the cell with the use of oxygen is called aerobic respiration.
2. Yeasts, single-celled organisms, can survive in the absence of air and get energy through **anaerobic** respiration.
3. In the absence of oxygen, glucose breaks down into alcohol and carbon dioxide through **anaerobic** respiration.
4. The process of breathing involves taking in air rich in **oxygen** and giving out air rich in **carbon dioxide**.
5. The muscular sheet forming the floor of the chest cavity is called the **diaphragm**.

**5. Tick the correct answer:**

**(a) In cockroaches, air enters the body through**

**(i) lungs (ii) gills (iii) spiracles (iv) skin**

**(b) During heavy exercise, we get cramps in the legs due to the accumulation of**

**(i) carbon dioxide (ii) lactic acid (iii) alcohol (iv) water**

**(c) Normal range of breathing rate per minute in an average adult person at rest is**

**(i) 9–12 (ii) 15–18 (iii) 21–24 (iv) 30–33**

**(d) During exhalation, the ribs**

**(i) move outwards (ii) move downwards (iii) move upwards (iv) do not move at all**

**Answer:**

a) (iii) spiracles

b) (ii) lactic acid

c) (ii) 15–18

d) (ii) move downwards



**6. Match the items in Column I with those in Column II:**

<b>Column I</b>	<b>Column II</b>
<b>(a) Yeast</b>	<b>(i) Earthworm</b>
<b>(b) Diaphragm</b>	<b>(ii) Gills</b>
<b>(c) Skin</b>	<b>(iii) Alcohol</b>
<b>(d) Leaves</b>	<b>(iv) Chest cavity</b>
<b>(e) Fish</b>	<b>(v) Stomata</b>
<b>(f) Frog</b>	<b>(vi) Lungs and skin</b>
	<b>(vii) Trachea</b>

**Answer:**

Column I	Column II
(a) Yeast	(iii) Alcohol
(b) Diaphragm	(iv) Chest cavity
(c) Skin	(i) Earthworm
(d) Leaves	(v) Stomata
(e) Fish	(ii) Gills
(f) Frog	(vi) Lungs and skin

**7. Mark 'T' if the statement is true and 'F' if it is false:**

**(i) During heavy exercise, the breathing rate of a person slows down. (T/F)**

**(ii) Plants carry out photosynthesis only during the day and respiration only at night. (T/F)**

**(iii) Frogs breathe through their skins as well as their lungs. (T/F)**

**(iv) Fishes have lungs for respiration. (T/F)**

**(v) The size of the chest cavity increases during inhalation. (T/F)**

**Answer:**

i) False

ii) False

iii) True

iv) False

v) True

**8. Given below is a square of letters in which are hidden different words related to respiration in organisms. These words may be present in any direction — upwards, downwards, or along the diagonals. Find the words for your respiratory system. Clues about those words are given below the square.**

S	V	M	P	L	U	N	G	S
C	Z	G	Q	W	X	N	T	L
R	M	A	T	I	D	O	T	C
I	Y	R	X	Y	M	S	R	A
B	R	H	I	A	N	T	A	Y
S	T	P	T	B	Z	R	C	E
M	I	A	M	T	S	I	H	A
S	P	I	R	A	C	L	E	S
N	E	D	K	J	N	S	A	T

- (I) The air tubes of insects**
- (ii) Skeletal structures surrounding the chest cavity**
- (iii) Muscular floor of the chest cavity**
- (iv) Tiny pores on the surface of a leaf**
- (v) Small openings on the sides of the body of an insect**
- (vi) The respiratory organs of human beings**
- (vii) The openings through which we inhale**
- (viii) An anaerobic organism**
- (ix) An organism with a tracheal system**

**Answer:**

- (I) Trachea
- (ii) Ribs

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(iii) Diaphragm

(iv) Stomata

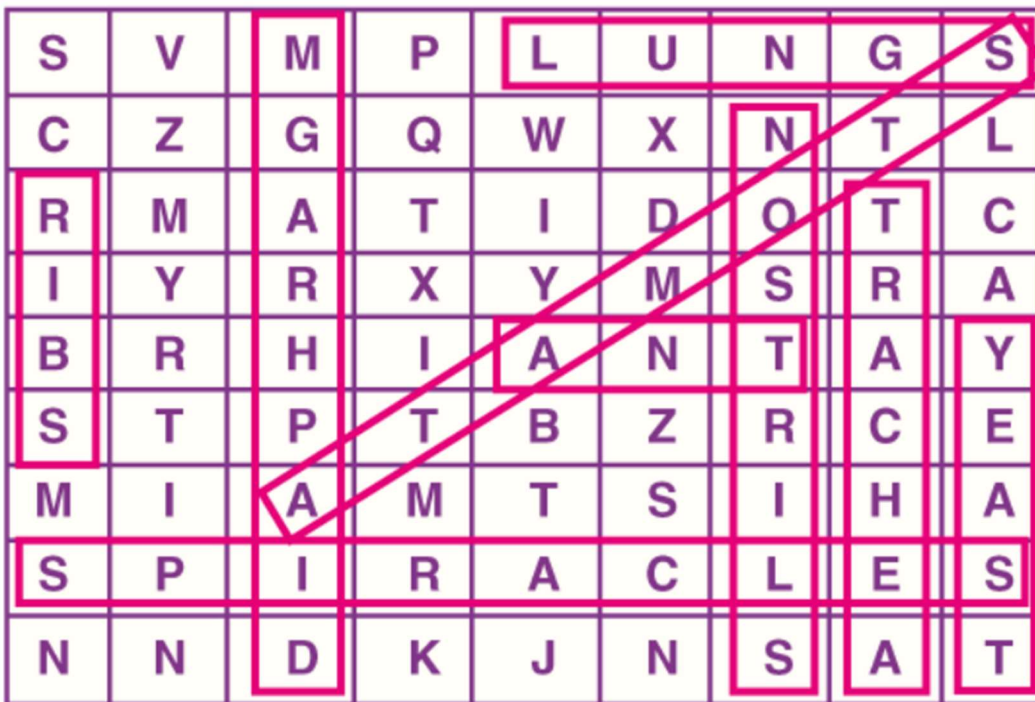
(v) Spiracles

(vi) Lungs

(vii) Nostrils

(viii) Yeast

(ix) Ant



**9. The mountaineers carry oxygen with them because:**

- (a) At an altitude of more than 5 km, there is no air.**
- (b) The amount of air available to a person is less than that available on the ground.**
- (c) The temperature of air is higher than that on the ground.**
- (d) The pressure of air is higher than that on the ground.**

**Answer:**

The answer is (b). The amount of air available to a person is less than that available on the ground.

**Summary:**

Boojho, excited to meet his grandparents, reflects on the connection between running and rapid breathing. This curiosity leads to an exploration of respiration in organisms. The text explains the importance of respiration in obtaining energy from food, with a focus on aerobic and anaerobic processes. It details how oxygen from the air aids in the breakdown of glucose, highlighting cellular respiration in all organisms.

The narrative delves into breathing as a crucial part of the respiration process, emphasizing the mechanism in humans. It touches upon aerobic respiration during exercise, the occurrence of anaerobic respiration in muscle cells, and the consequences like muscle cramps. Various organisms, including insects, earthworms, and fish, have unique respiratory adaptations such as spiracles, skin respiration, and gills.

The text expands on how plants also respire, absorbing oxygen through roots and exchanging gases through stomata. It notes the role of leaves in the breakdown of glucose. The concept of breathing rate is introduced, illustrating how it increases during physical activities. The chapter concludes by encouraging practical activities to observe and understand respiration processes in living organisms.