# RESPIRATION IN PLANTS & ANIMALS

5
CHAPTER

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## RESPIRATION

The process of taking oxygen into the cells, using it for enrgy release & then eliminating the waste products like $CO_2$ & $H_2O$ is known as respiration.

It is a very slow process. A number of enzyme help in the process of respiration.

## BREATHING

The process of taking in $O_2$ rich air into the lungs & giving out carbon dioxide rich air is known as breathing.

Breathing process include 2 steps -

◈ **Inhalation :**

The process of taking in air is called inhalation.

◈ **Exhalation :**

Giving out of air is called exhalation.

Breathing involves only exchange of gases.

## DIFFERENCE BETWEENBREATHING & RESPIRATION

| S. NO. | Breathing | Respiration |
|---|---|---|
| 1 | It is only a physical process in which oxygen is taken in and carbon dioxide is given out | It is a biochemical process in which glucose is oxidized and carbon dioxide and water are released |
| 2 | It occurs outside the cells | It occurs inside the cells |
| 3 | There is no release of energy | There is a gradual and step-wise release of energy |
| 4 | Enzymes are not involved in the process. | Enzymes are involved in the process |

## TYPE OF RESPIRATION

There are 2 types of respiration

### ◈ Aerobic respiration :

- In this types of respiration complete oxidation of glucose take place & $CO_2$, $H_2O$ & Energy are released.
- Aerobic respiration takes place in the presence of oxygen & is carried out in the bodies of almost all living animals & plants

$$\text{Glucose} \xrightarrow[\text{Aerobic respiration}]{O_2} CO_2 + H_2O + \text{Energy}$$

### ◈ Anaerobic respiration :

- In anaerobic respiration, there is incomplete oxidation of glucose $CO_2$, ethyl alcohol & energy are the end products.
- Anaerobic respiration takes place in the absece of oxyen.

$$\text{Glucose} \xrightarrow[\text{Anaerobic respiration}]{\text{Absence of } O_2} \text{Alcohol} + CO_2 + \text{Energy}$$

- Yeast & some bacteria show anaerobic respiration.
- Anaerobic respiration in microorganism present in food & alcohol causes fermentation.

## ANAEROBIC RESPIRATION IN HUMAN

- During excessive physical exercise, anaerobic respiration takes place in muscle to produce lactic acid.
- The accumulation of lactic acid in the muscle cause fatigue & pain.

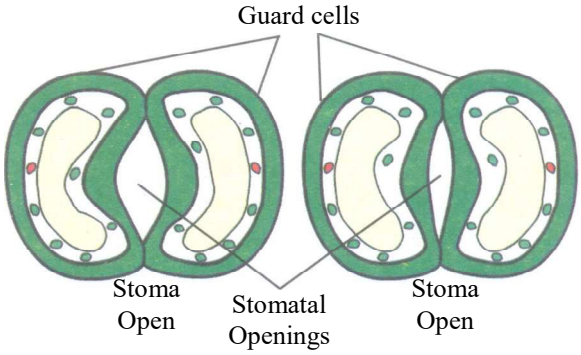
$$\text{Glucose} \xrightarrow{\text{Absence of } O_2} \text{Lactic acid} + \text{Energy}$$

## RESPIRATION IN PLANTS

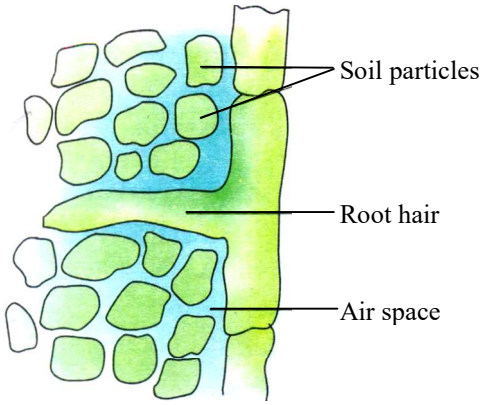
- Like all other living organisms, plants also respire for their survival. They also take in oxygen from the air and give out carbon dioxide. During this process most of the plants use atmospheric oxygen to break down glucose into carbon dioxide and water with the release of energy.
- In plants, breathing takes place through tiny holes or openings called stomata present under the leaves. Stomata traps air and the exchange of gases takes place inside the plant cells.

### ◈ Stomal Apparatus :

- A stomatal opening surrounded with two guard cells and several subsidiary cells is called stomatal apparatus. The opening and closing of the stomata is brought about by the expansion and contraction of the guard cells. Guard cells expand and contract due to the flow of water in and out of the cells. The exchange of gases in plants is not as fast as in animals.




- Plant roots also respire. Roots take in oxygen from the air present between the soil particles.
- Some of the woody stems take in air through openings called lenticels.




## RESPIRATION IN ANIMALS

- Respiration through moist skin

  Eg. Frog & Earthworm

- Respiration through cell membrane

  Eg. Amoeba

- Respiration through Spiracles

  Eg. Cockroach

- Respiration through gills

  Eg. Fishes

## RESPIRATORY SYSTEM OF HUMAN

The respiratory system in human beings concsists of the following organs

### ◈ Nasal Cavity :

- Air enters the nose through the nostrils and reaches the **nasal cavity**.

### ◈ Larynx :

- The nasal cavity leads into the pharynx. From the pharynx air passes into a rectangular chamber called **larynx**

### ◈ Trachea :

- The trachea or wind pipe is a delicate muscular tube situated in the front of the neck. It is 12 cm in length and 2.5 cm in diameter. The trachea divides into two bronchi.

### ◈ Bronchi :

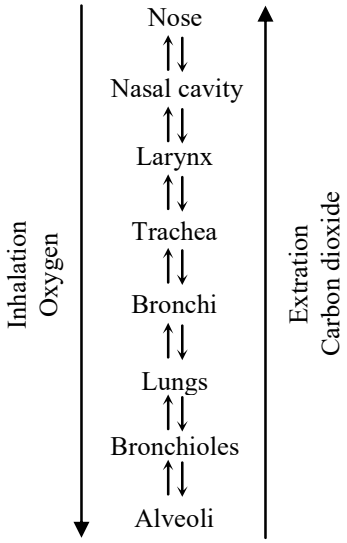
- Each bronchus leads to the lungs of its own side. Each bronchus then branches into smaller tubes known as **bronchioles.** They end in tiny globules called **air sacs or alveoli** where exchange of gases takes place.

### ◈ Lungs :

- Lungs are two in number and are present in the chest cavity of the body. Air sacs are richly supplied with blood vessels. When air enters the lungs, the blood takes in oxygen and gives out carbon dioxide and water

- Blood carries oxygen to all parts of the body from the lungs.

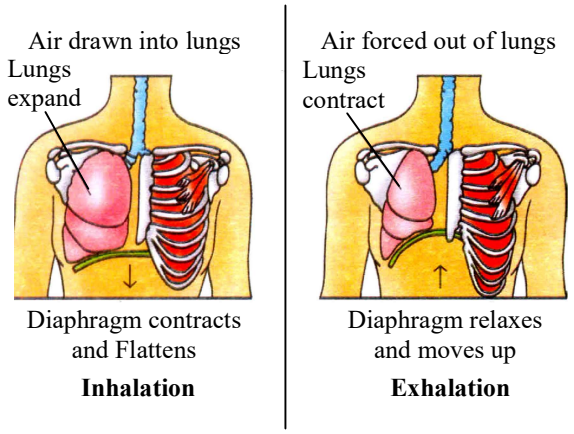
- When we exhale, the carbon dioxide rich air follows the reverse route finally moving out through the nose as shown below.



## MECHANISM OF BREATHING

- Breathing takes place with the help of the **intercostal muscles** between the ribs and the diaphragm. When we breathe in, the intercostal muscles contract and the ribs are pushed outwards. The chest cavity becomes larger and the air rushes into the lungs.

- During breathing out, the intercostal muscles relax and the ribs move inwards. The chest cavity shrinks and the air containing carbon dioxide is pushed out of the lungs.




- **Breathing rate :** The number of times a person breathes in a minute is termed as the breathing rate. The normal breathing rate in adult at rest ranges from 12 to 20.

# EXERCISE # 1

## A. Single Choice Type Questions

**Q.1** The air sacs at the end of the smallest air tubes inside the lungs are called.
(1) alveoli (2) bronchi
(3) bronchioles (4) larynx

**Q.2** Glucose is oxidised to ethyl alcohol in -
(1) aerobic respiration
(2) anaerobic respiration
(3) fermentation
(4) none of these

**Q.3** Normal range of breathing rate in an average adult person at rest is -
(1) 9 to 12 (2) 15 to 18
(3) 12 to 20 (4) 30 to 33

**Q.4** Plants get their oxygen requirement for respiration through -
(1) stomata
(2) lenticels
(3) both (a) and (b)
(4) None of these

**Q.5** Which one of the following can respire in the absence of oxygen? -
(1) fish (2) frog
(3) yeast (4) Man

**Q.6** An animal breathe through skin as well as lungs is -
(1) frog (2) Earthworm
(3) snail (4) fish

**Q.7** Air tube of an insect is called -
(1) Spiracle
(2) larynx
(3) pharynx
(4) gills

**Q.8** During inhalation the diaphragm moves -
(1) upwards
(2) downwards
(3) towards left
(4) towards right

**Q.9** During exhalation the ribcage moves -
(1) upward and outward
(2) downwards and inwards
(3) from side to side
(4) does not move at all

## B. Fill In The Blanks

**Q.10** All living organisms use _____ to perform life functions -

**Q.11** During respiration _____ is taken in and _____ is given out

**Q.12** The first phase of respiration is known as _____

**Q.13** Carbon dioxide turns lime water _____

**Q.14** Fermentation occurs in the _____ of oxygen

## C. Match The Following

**Q.15**

| Column-A | Column-B |
|---|---|
| 1. Stomata | a. Earthworm |
| 2. Gills | b. Man |
| 3. Tracheal tubes | c. Plants |
| 4. Lungs | d. Fish |
| 5. Skin | e. Cockoach |
| | f. Amoeba |

# EXERCISE # 2

## A. Very Short Answer Types Questions

**Q.1** How do unicellular organisms exchange gases with the environment?

**Q.2** Name the respiratory organs present in the leaves and woody stems.

**Q.3** Why do body cells require oxygen?

**Q.4** What brings oxygen to all parts of our body?

**Q.5** Which organ do earthworms use for gaseous exchange?

**Q.6** Name the process by which energy is released from the digested food.

**Q.7** Show the process of respiration through a word equation.

**Q.8** What happens to your breathing rate when you do exercise?

**Q.9** Name the respiratory organs of human's respiratory system.

**Q.10** Name one bad habit which can cause lung cancer.

## B. Short Answer Types Questions

**Q.11** What is anaerobic respiration?

**Q.12** List two ways in which we make use of anaerobic respiration.

**Q.13** How do insects respire?

**Q.14** What happens during cellular respiration?

**Q.15** Write one difference between breathing and respiration.

**Q.16** Write the names of different organs of breathing found in animals.

**Q.17** Under what conditions does anaerobic respiration take place in humans?

**Q.18** What is the importance of nostrils during breathing?

**Q.19** Name the breathing organs of

(a) Frog (b) Cockroach

(c) Fish (d) Amoeba

**Q.20** What do you understand by tidal volume?

## C. Long Answer Types Questions

**Q.21** Give a brief account of the various modes of respiration found in animals

**Q.22** Draw a neat labelled diagram of respiratory system of man

**Q.23** Give four differences between aerobic and anaerobic respiration

**Q.24** What is the role of stomatal apparatus in plant respiration?

**Q.25** What is the difference between respiration and breathing?

**Q.26** Show the respiratory organs of the following:

(a) Amoeba (b) Earthworm

(c) Frog (d) Cockroach

(e) Fish