



BAL BHARATI PUBLIC SCHOOL, PITAMPURA, DELHI – 110034

SUBJECT: Science

CLASS VII: Respiration in organisms

Week: 2nd November to 6th November, 2020

No of blocks: 2 or 3

TOPIC: Respiration

GUIDELINES FOR STUDENTS:

Dear Students,

- Refer to the following content of the chapter.
- These notes will help you to understand the concept of the lesson.
- Do the assignment questions in the Science notebook.
- Suitable Video links have been provided for better understanding of the concept.
- Do read NCERT too for better understanding of these concepts.

SUBTOPICS:

- Why do we respire?
- Breathing
- How do we breathe?

INSTRUCTIONAL AIDS /RESOURCES:

- NCERT LINK FOR THE CHAPTER:

<https://ncert.nic.in/ncerts/l/gesc110.pdf>

- YouTube Links

LEARNING OUTCOMES:

Learners will be able to:-

- Define respiration and breathing
- Describe the mechanism of breathing
- Deduce the reason/s for anaerobic respiration in human beings under certain conditions
- Draw and illustrate the human respiratory system

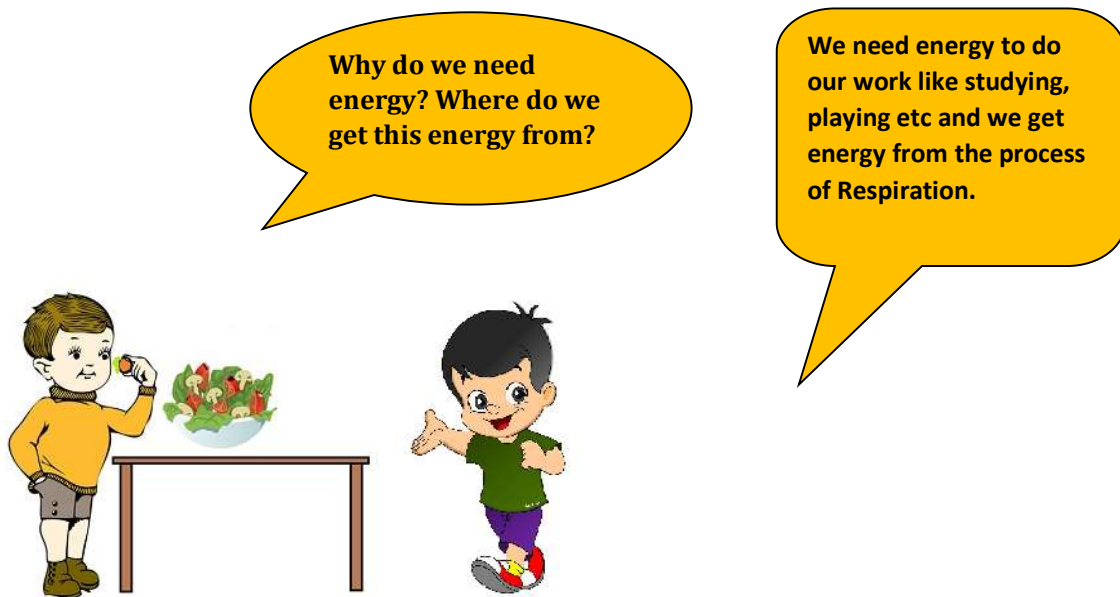
Introduction:

One day Mohan was eagerly waiting to meet his grandparents who were coming to the town after a long time. He was in a real hurry as he wanted to receive them at the railway station. He ran fast and reached the bus-stop in a few minutes. He was breathing rapidly. His grandmother asked him why he was breathing so fast. Mohan told her that he came running all the way. But the question got stuck in his mind. He wondered why running made a person breathe faster. The answer to Mohan's question lies in understanding why we breathe. Breathing is a part of respiration. Let us learn about respiration.

LESSON DEVELOPMENT:

Why do we respire?

<https://youtu.be/k9BWCnnXOG8>



- All the living organisms are made up of small microscopic units called the cells.
- These cells have different functions to perform in these organisms such as digestion, respiration, transportation and excretion.
- The cells can perform this function only if they get the energy to do so. Hence, all living organisms need food which gives them the required energy.
- The energy present in the food gets released when the organisms respire or breathe.

How food helps us in gaining energy?

- As we breathe, we take in the air that contains oxygen in it and breathe out air which contains carbon dioxide. This oxygen when transported to our cells helps in breaking down the food and we get energy.

- **Respiration:** It is defined as the process of gaseous exchange where oxygen is taken from the air and carbon dioxide is given out along with release of energy.

What is cellular respiration?

- Cellular respiration can be defined as the process in which the food that we eat is broken down inside the cells which results in the release of energy. All the cells in living organisms undergo cellular respiration.
- The oxygen that an organism breathes in, reacts with the carbohydrates (glucose) present in the food and results in the release of carbon dioxide, water and energy.
- There are two types of respiration: Aerobic and Anaerobic respiration.

Differences between aerobic and anaerobic respiration:

Aerobic respiration	Anaerobic respiration
1. Occurs in the presence of oxygen.	1. Occurs in the absence of oxygen.
2. Complete breakdown of organic food.	2. Incomplete breakdown of organic food.
3. All hydrogen atoms in the glucose are replaced.	3. All hydrogen atoms in the glucose are not replaced.
4. Releases relatively large amount of energy.	4. Releases relatively small amount of energy
5. Waste products are carbon dioxide and water	5. Produce carbon dioxide and ethanol in plants, and lactic acid in animal.

Let's look at the equation for **aerobic respiration:**



And **anaerobic respiration:**



Anaerobic respiration in human beings:

Have you seen people doing heavy exercise and running?



www. Google.com

Have you ever wondered why people get muscle cramps after heavy exercise?

The cramps occur when muscle cells respire anaerobically and lactic acid accumulates.



➤ **How do we get relief from these cramps?**

We get relief from cramps after a hot water bath or a massage.

➤ **Can you guess why it is so?**

Hot water bath or massage improves circulation of blood. As a result, the supply of oxygen to the muscle cells increases. The increase in the supply of oxygen results in the complete breakdown of lactic acid into carbon dioxide and water.

Following is the word equation of anaerobic respiration in Human beings:



Breathing:

Kindly refer to the link shared for better understanding of the Human Respiratory System. It will enable you to experience visual interpretation of the process.

<https://www.youtube.com/watch?v=mOKmjYwfDGU>

- **Breathing** can be defined as a process in which organisms, with the help of their respiratory organs, take in the oxygen-rich air present in the surroundings and release out air that contains high amount of carbon dioxide in it. Breathing occurs continuously in the organisms.
- **Breathing rate** can be defined as the number of times a person breathes in a minute.
- A breath can be defined as an inhalation followed by an exhalation.
- The breathing rate is not always constant in human beings. We generally breathe faster when our body needs more energy for example while exercising.
- This is so because the body needs more oxygen that can break down the food and produce more energy.
- An average adult human being breathes 15 to 18 times in a minute. While exercising, this rate can change up to 25 times a minute.

Let's perform some activities to understand our breathing and respiratory system better.

Activity1:

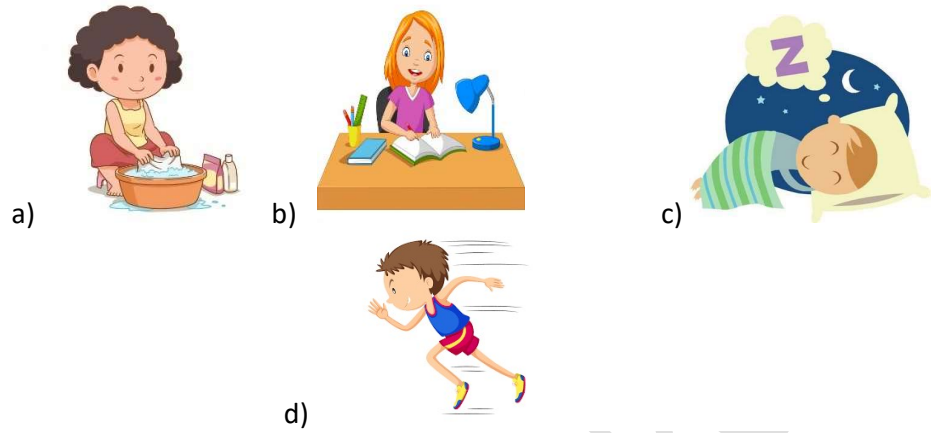
Generally, we are not aware that we are breathing. However, if you try you can count your rate of breathing. Breathe in and out normally. Find out how many times you breathe in and breathe out in a minute? Did you inhale the same number of times as you exhaled? Now count your breathing rate (number of breaths/minute) after brisk walk and after running. Record your breathing rate as soon as you finish and also after complete rest. Tabulate your findings and compare your breathing rates under different conditions with those of your family members/ friends. From this activity, you must have realised that whenever a person needs extra energy, he/she breathes faster. As a result, more oxygen is supplied to our cells. It speeds up the breakdown of food and more energy is released. Does this explain why do we feel hungry after a physical activity? When you feel drowsy, does your breathing rate slow down? Does your body receive sufficient oxygen?

Table (a): Changes in breathing rate under different conditions

			BREATHING RATE			
S. No.	Name of Family member	At rest	Normal	Under brisk walking	Running at one place	Watching TV

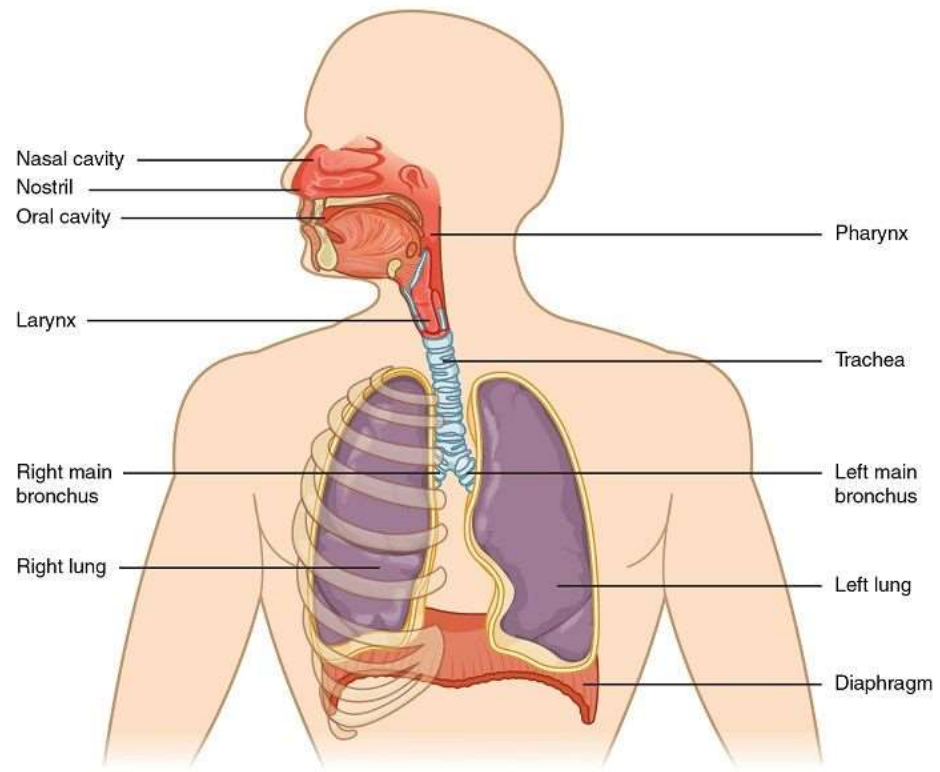
Activity 2:

Figures below show the various activities carried out by a person during a normal day. Can you say in which activity, the rate of breathing will be the slowest and in which it will be the fastest? Assign numbers to the pictures in the order of increasing rate of breathing according to your experience.



- Let us now learn about the mechanism of breathing:

Respiratory system of Human Beings:

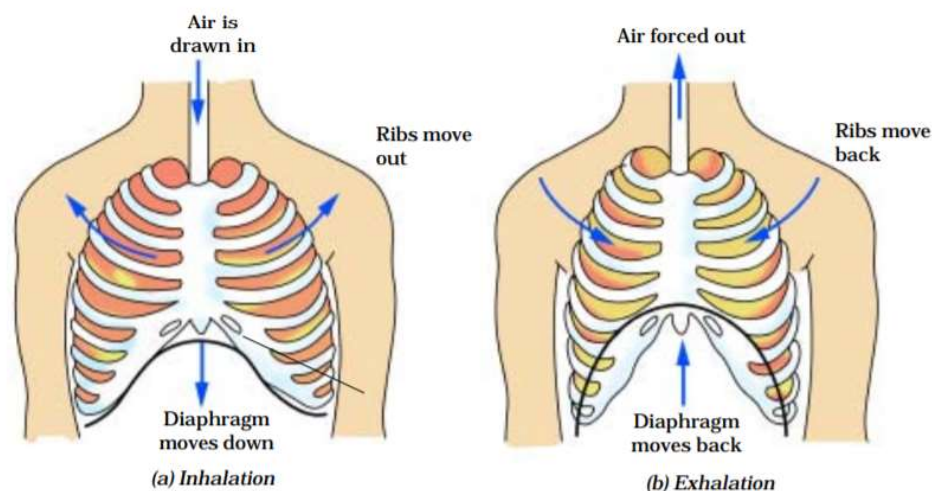


Mechanism of Breathing:

- Breathing starts with inhalation. **Inhalation** is the process of taking the air that contains oxygen inside the body. When an individual breathes in, the diaphragm

pulls downward, creating a vacuum that causes a rush of air into the lungs through the nose or mouth.

- It travels down the back of the throat and into windpipe, which is divided into air passages called **bronchial tubes**.
- Lungs perform their best when these airways need to be opened.
- As the bronchial tubes pass through your lungs, they divide into smaller air passages called **bronchioles**. The bronchioles end in tiny balloon-like air sacs called **alveoli**. The body has about 600 million alveoli.
- The alveoli are surrounded by a mesh of tiny blood vessels called **capillaries**. Here, oxygen from inhaled air passes into the blood
- After absorbing oxygen, blood goes to the heart which then pumps it through the body to the cells of tissues and organs.
- As the cells use the oxygen, they make carbon dioxide that goes into the blood. The blood then carries the carbon dioxide back to lungs, where it's removed from the body when one exhales. **Exhalation** is a process of releasing out air that contains carbon dioxide out of the body. In **exhalation**, the diaphragm relaxes upward, pushing on lungs, allowing them to deflate.
- Inhalation and exhalation take place alternatively in the breathing process.



Mechanism of Breathing in Human Beings

Activity 3:

Take a wide plastic bottle. Remove the bottom. Get a Y-shaped glass or plastic tube. Make a hole in the lid so that the tube may pass through it. To the forked end of the tube, fix two deflated balloons. Introduce the tube into the bottle as shown in the video given below. Now cap the bottle. Seal it to make it airtight. To the open base of the bottle tie a thin rubber or plastic sheet using a large rubber band. To understand the expansion of the lungs, pull the rubber sheet from the base downwards and watch the balloons. Next, push the

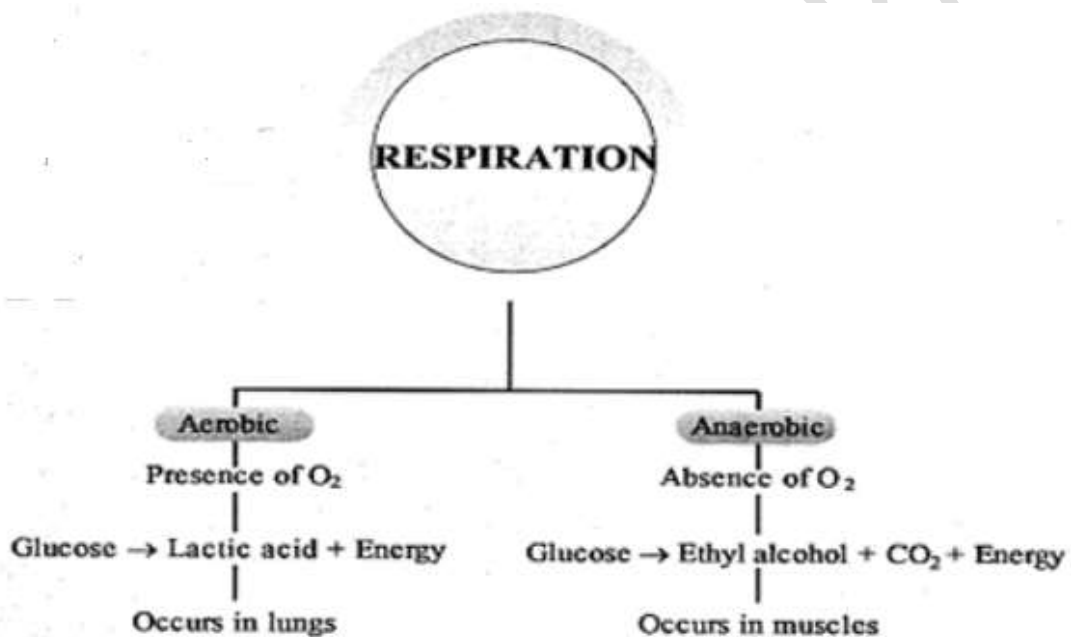
rubber/plastic sheet up and observe the balloons. Did you see any changes in the balloons? What do the balloons in this model represent? What does the rubber sheet represent? Now, you should be able to explain the mechanism of breathing.

Watch the video for explanation:

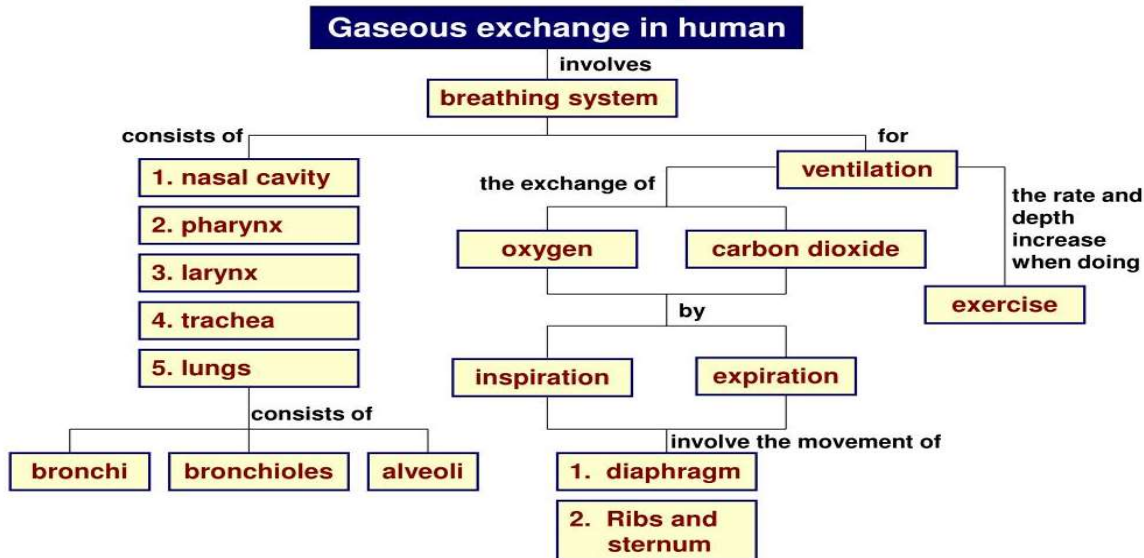
<https://www.youtube.com/watch?v=DAk9mmfDhBM>

LET'S SUMMARIZE

KEYWORDS: Aerobic respiration, Anaerobic respiration, Breathing rate, Cellular respiration, Diaphragm, Exhalation, Lungs, Inhalation, Ribs



Mind Map



LET'S DO AN ASSIGNMENT :-

Identify X in the given equation of aerobic respiration. $\text{Glucose} + X \rightarrow \text{CO}_2 + \text{H}_2\text{O} + \text{energy}$

Q1. A)

- i) Water ii) Oxygen iii) Ethyl alcohol iv) Nitrogen

B) When we inhale, we breathe in air into the lungs. What do we breathe out when we exhale?

- i) Only Hydrogen gas
 ii) Only Oxygen gas
 iii) Air that has more Oxygen than inhaled air
 iv) Air that has more Carbon dioxide than inhaled air.

Q2. State the role of diaphragm in breathing.

Q3. Discuss the structure of lungs in breathing.

Q4. Describe the mechanism of breathing in human beings.

Q5. Discuss the need of energy for humans. (At least 3 points)

Q6. Take a deep breath. Measure the size of the chest with a measuring tape and record your observations in Table given. Measure the size of the chest again when expanded and

indicate which family member/ friend shows the maximum expansion of the chest. We can understand the mechanism of breathing by a simple model.

Effect of breathing on the chest size:

Name of family member/ friend	Size of chest during inhalation	Size of chest during exhalation	Difference in size

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