Pakistan School
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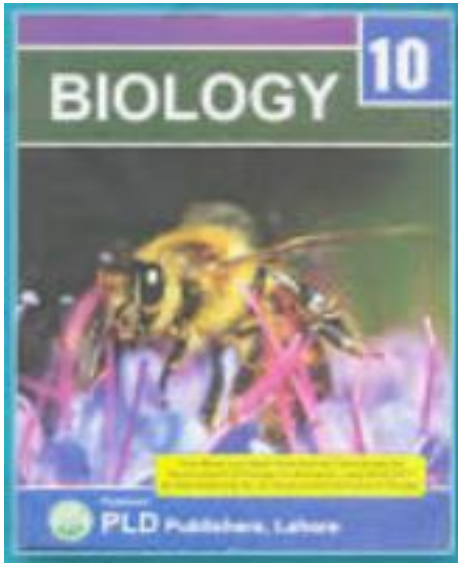

BIOLOGY
10
PLD Publishers, Lahore

ENGAGING STARTER

???

- When I breathe in air, I bring in oxygen to my lungs.
- They end up in tiny air sacs called alveoli.
  - I have about 300 million alveoli.

Objectives

At the end of the lesson,Students will be able to

- analyze the mechanism of breathing in to two major phases i.e Inhalation and Exhalation.
- List major muscles involved in inspiration and expiration.
- Differentiate the effects of rest and exercise on rate of breathing.

Chapter 1. Gaseous Exchange

Topic: The Mechanism of Breathing

Page 7- 10

BREATHING – The process whereby air (gasses) move in and out of the body.

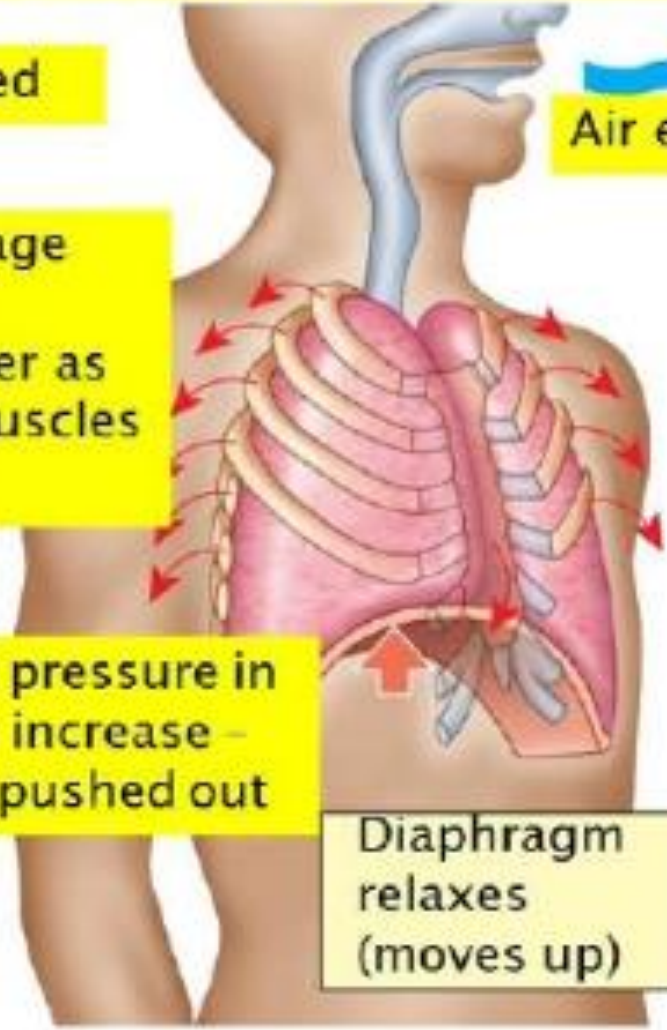
- INSPIRATION
- EXPIRATION

Air inhaled

Rib cage expands as rib muscles contract

When pressure in lungs decrease – air rush in

Diaphragm contracts (moves down)



Air exhaled

Rib cage gets smaller as rib muscles relax

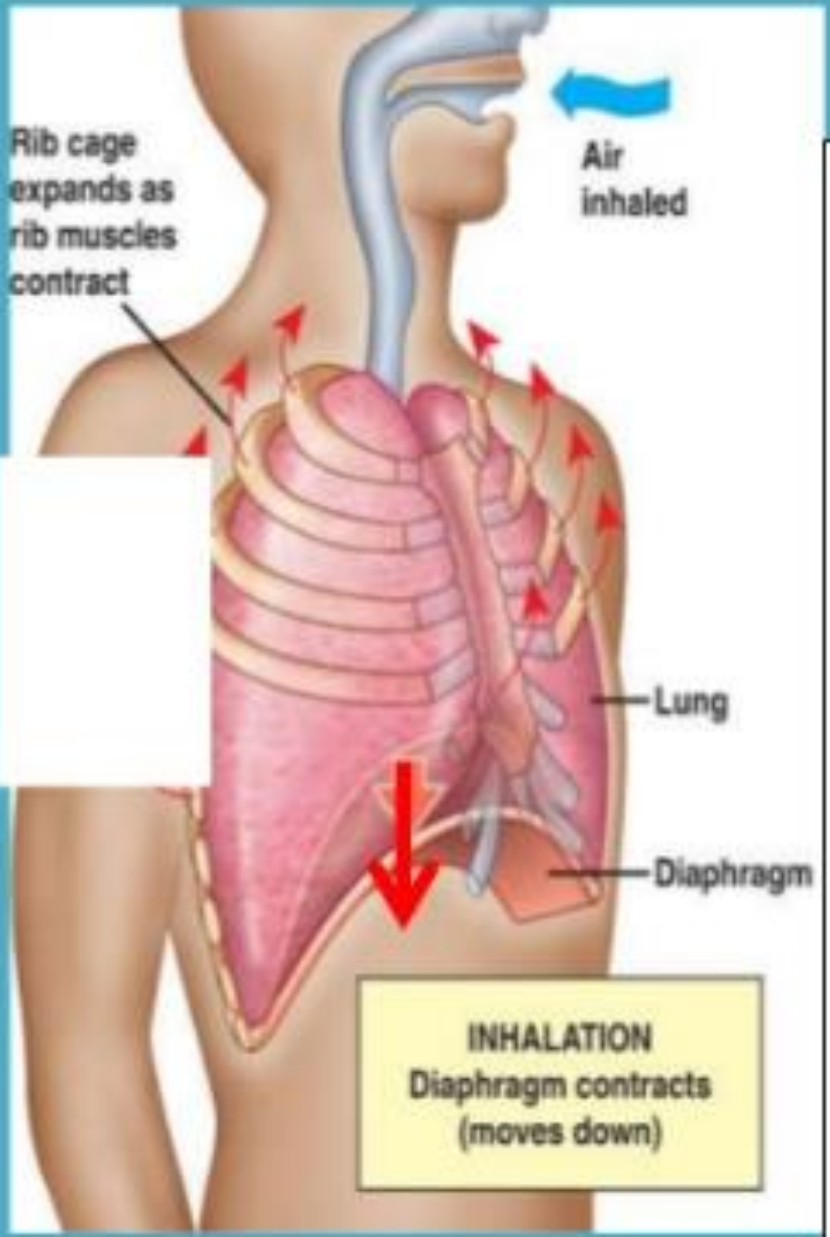
When pressure in lungs increase – air is pushed out

Diaphragm relaxes (moves up)

Checking Understanding

- What is Breathing?
- Why do we breathe?
- Why do our cells need Oxygen?

INHALATION



Internal intercostal muscle relaxed

↓

External intercostal muscle contract

↓

Rib cage moves upwards & outwards

↓

Diaphragm contracts & flattens

↓

Volume of thorax cavity increase

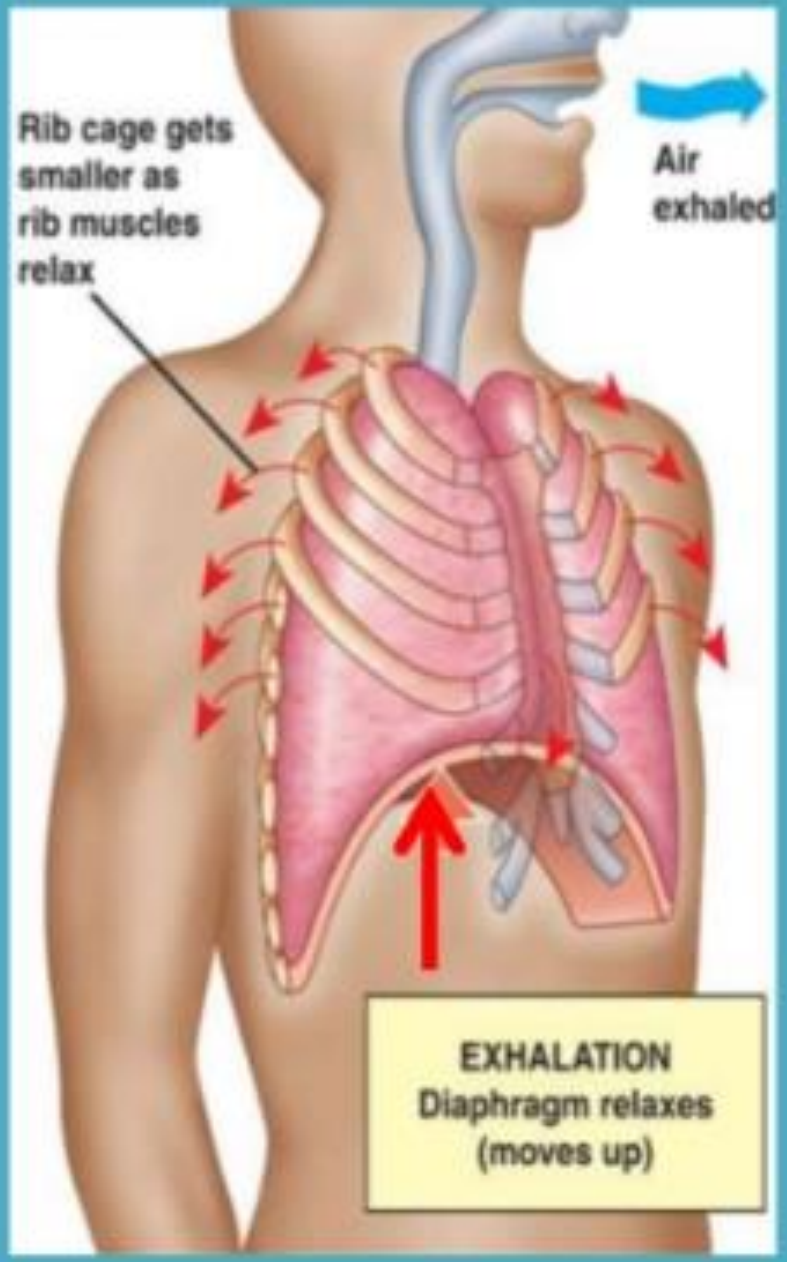
↓

Pressure in alveoli decrease

↓

Air moves in

EXHALATION



Internal intercostal muscle contract

↓

External intercostal muscle relaxed

↓

Rib cage moves downwards & inwards

↓

Diaphragm relaxes

↓

Volume of thorax cavity decrease

↓

Pressure in alveoli increase

↓

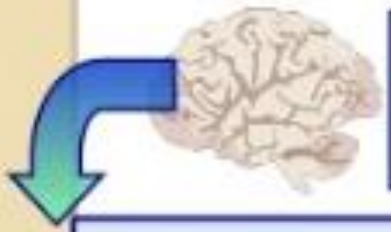
Air moves out

Checking Understanding

- What is difference between inhalation and exhalation?
- What is the humans breathing rate in normal circumstances?

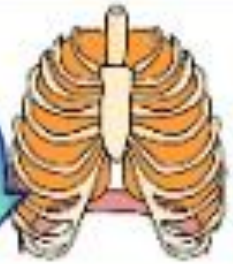
Breathing during exercise

Muscle cell respiration increases – more oxygen is used up and levels of CO_2 rise.



The brain detects increasing levels of CO_2 – a signal is sent to the lungs to increase breathing.

Breathing rate and the volume of air in each breath increase. This means that more gaseous exchange takes place.



The brain also tells the heart to beat faster so that more blood is pumped to the lungs for gas exchange.

More oxygenated blood gets to the muscles and more CO_2 is removed.

Respiration and breathing

Respiration	Breathing
Takes place in every living cell	Takes place in the lungs
A process that involves the release of energy from food	A process of gaseous exchange – taking air in and out of the body
Uses the oxygen absorbed during breathing	Removes the carbon dioxide produced during respiration

Mechanism of Breathing

- Humans breathe 16 – 20 times / minute in normal circumstances i.e at rest.
- The rate of breathing is controlled by the respiratory centre in the brain. The respiratory centre is sensitive to the concentration of carbon dioxide in the blood.
- During exercise or other hard physical works the breathing rate may increase up to 30-40 times / minute.

Comparison Between Inspired air and expired air

Feature	Inspired Air	Expired Air
Amount of oxygen	21%	16%
Amount of Carbon dioxide	0.04%	4%
Amount of Nitrogen	79%	79%
Amount of water vapors	Variable	Saturated
Amount of Dust particles	Variable	Almost None
Temperature	Variable	Almost equal to the body temp.

Checking Understanding

- Q. Can we control the rate of breathing?
- Amount of various gases in the air we breathe
- Breathe in Breathe out
- Oxygen ---------- ----------
- Carbon dioxide--------- ----------
- Nitrogen ---------- ----------

ACTIVITY1

Name _____ Day _____ Date _____

Inhaling/Exhaling Questions

Write the letter of the word or phrase from the bank to answer questions 1-8

phrase/word bank:

A. relaxes and moves up
B. capillaries
C. pleura
D. breathing in
E. cilia
F. exhale
G. contracts and flattens out
H. carbon dioxide

_____1.What does inhaling mean?
_____2. What happens to your diaphragm when you inhale?
_____3. What keeps mucus and dirt out of the lungs?
_____4. What allows oxygen to pass into your blood?
_____5. What word means to breathe out?
_____6. What happens to your diaphragm when you exhale?
_____7. What is the waste product you breathe out?
_____8. What is the name of the protective layer around the lungs?

9. Name 3 parts of the respiratory system ***air passes through*** when entering the body.

_____
_____
_____

ACTIVITY 2

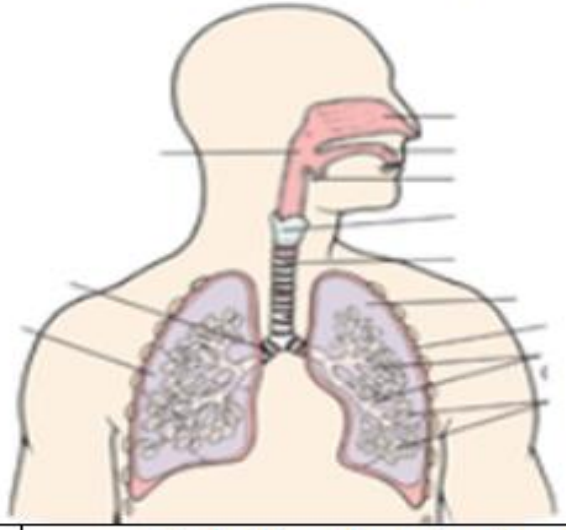
Worksheet

List some examples of Gas exchange

List four features effective Gas exchange surfaces

1.
2.
3.
4.

Label the parts of the hman respiratory system



does each listed Feature change or act?	Inhaling (inspiration)	Exhaling (expiration)
The diaphragm		
Intercostal Muscles		
Volume of chest cavity		
Pressure in chest cavity		
Overall effects on Lungs		

Closure

- Today we have done the topic_____
- The mechanism of breathing is of_____types.
- During Inspiration the rib muscles_____
  and ribs are_____.
- During Expiration the_____ air is Expelled out.
- During exercise breathing rate may increase____ times / minutes,