Chapter – 6: Respiration in Organisms

- Boojho – ran very fast – reach bus station – breathing rapidly
- Confused – why running makes breathing faster?
- Answer – why we breathe?
- Breathing – part of respiration

Why do We Respire?

- All organisms – made of microscopic units – cells – smallest unit
- Each cell – certain functions – nutrition, transport, excretion, respiration
- These functions – require energy
- Where does it come from?
- Food – stored energy – released during respiration
- All living organisms – respire – get energy
- Breathing – breathe in air – contain oxygen – breathe out air – contain carbon dioxide
- Oxygen rich air – transported to all parts – to cells
- Inside cell – oxygen in air – helps in breakdown of food – energy released – **cellular respiration**
- Inside cell – food (glucose) – breaks into carbon dioxide and water
- Breakdown – in the presence of oxygen – **aerobic respiration**
    - Glucose → carbon dioxide + water + energy
- Some organisms – yeast – survive in absence of air – **anaerobes**
- Glucose – breaks into alcohol and carbon dioxide
- Breakdown – in the absence of oxygen – **anaerobic respiration**
    - Glucose → alcohol + carbon dioxide + energy
- Muscle cells – may respire anaerobically – temporary deficiency of oxygen
- During heavy exercise – fast running, cycling, walking, heavy lifting – demand of energy – high
- Supply of oxygen – limited
- Muscle cells – respire anaerobically – fulfil demand of energy
    - Glucose → lactic acid + energy
- Lactic acid – gets collected inside muscles – causes muscle cramps
- Hot bath or massage – improves circulation – supply of oxygen increases – lactic acid breaks into carbon dioxide and water

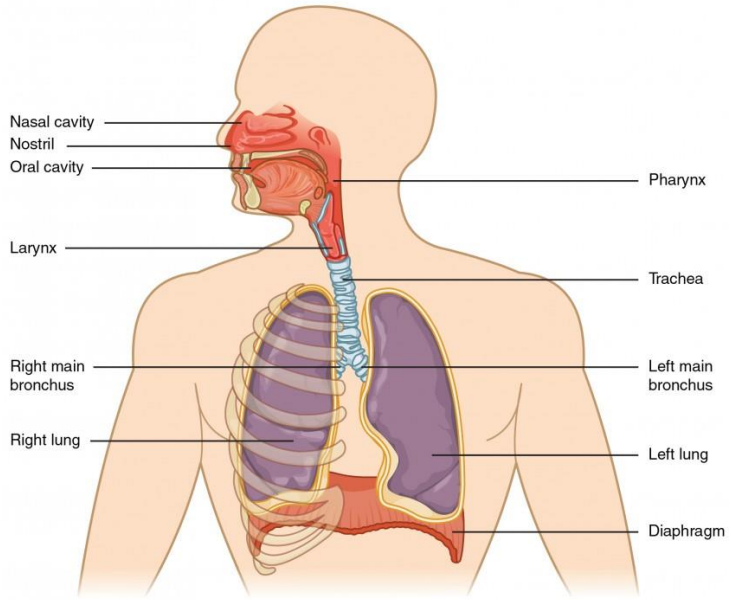
Breathing

- PERFORM UNDER TEACHER'S SUPERVISION
- Close nostrils and mouth – check a watch – record – how long you can keep it close
- You cannot survive for long without breathing
- Breathing – taking in oxygen rich air – taking out carbon dioxide rich air – with help of respiratory organs
- Taking in oxygen rich air – **inhalation**
- Giving out carbon dioxide rich air – **exhalation**
- Continuous process – goes on all the time – throughout life

- Number of times person breathes in per minute – **breathing rate**
- During breathing – inhalation and exhalation – alternatively
- One breath = one inhalation + one exhalation
- Record breathing rate – now take a walk for 10 minutes – record again – now run 100 m – record again – now take a rest – record again
- When more energy required – breathe faster – more oxygen supplied – speed ups breakdown of food – more energy supplied

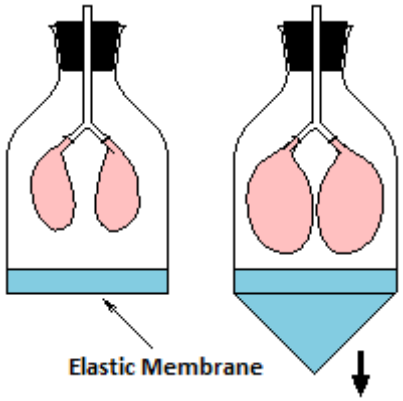
How do We Breathe?

- Take in air – through nostrils
- Inhale air – passes into **nasal cavity**
- From nasal cavity – reaches **lungs** – present in **chest cavity** – surrounded by rib cage
- Large, muscular sheet – **diaphragm** – floor of chest cavity
- Breathing – movement of diaphragm and rib cage
- Inhalation –
    - Ribs – move up and outwards
    - Diaphragm – moves down
    - Increase space in chest cavity – air rushes into lungs
    - Lungs – fill with air
- Exhalation –
    - Ribs – move down and inside
    - Diaphragm – moves up
    - Reduces size of chest cavity – air is pushed out
    - Lungs – empty out the air



- Take deep breath – keep your palm on abdomen – feel movement happening during breathing
- Measure size of chest – take a deep breath – measure again – record the difference
- Demonstrate using a model
- Take a wide plastic bottle – remove the bottom – attach a Y-shaped tube inside bottle through the lid (cap) – attach 2 balloons to the forked end – seal the bottle airtight – fix a rubber sheet at the bottom

- Pull rubber sheet down – balloons inflate – push rubber sheet upwards – balloons deflate – lungs work the same way

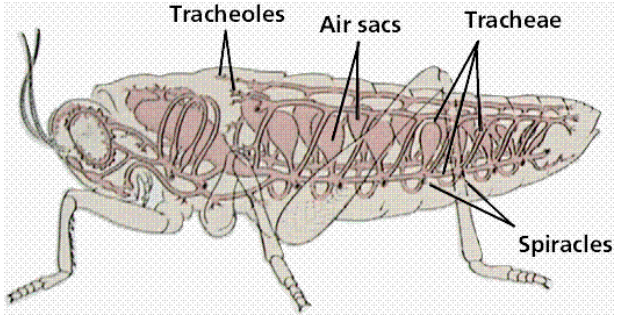


What do We Breathe out?

- Take a plastic bottle – pour lime water – tighten the lid – make a hole in it – attach a straw – blow it – lime water turns milky – indicates – exhaled air contain carbon dioxide
- Air – we inhale or exhale – mixture of gases
- Exhale on a mirror – film of moisture appears on it
- Regular traditional breathing exercise (pranayama) – increase capacity of lungs
- Inhaled air –
    - 21 % oxygen and 0.04 % carbon dioxide
- Exhaled air –
    - 16.4 % oxygen and 4.4 % carbon dioxide

Breathing in Other Animals

- Animals – elephant, lions, cows, goats, frogs, lizards, snakes, birds – chest cavities – lungs like human beings
- Cockroach –
    - Small openings – side of body
    - Other insects – similar openings
    - Openings – **spiracles**
    - Network of air tubes – **trachea** – gas exchange
    - Oxygen rich air – gets inside through spiracles – reach into tracheal tubes – diffuse into cells
    - Carbon dioxide – reach tracheal tubes – moves out through spiracles
    - This system – only in insects

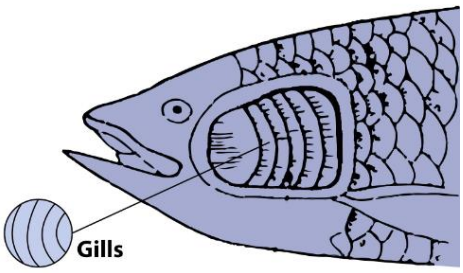


- Earthworm –
    - Breathes through skin – moist and slimy

- Gases pass through skin easily
- Frogs – have lungs and breathes through skin too

Breathing under Water

- Many organisms – breathe under water
- Fish – gills – projection of skin – use oxygen in water
- Gills – lots of blood vessels – exchange of gases



Do Plants also Respire?

- Plants also respire – like others
- They also take oxygen – give out carbon dioxide
- In animal cells – oxygen – breaks down glucose into carbon dioxide and water
- In plants – each part – breathes in oxygen and breathes out carbon dioxide
- Chapter 1 – leaves have tiny pores – stomata – exchange of gases
- Like other parts – root cells need oxygen – generate energy
- Roots – gets air from air space between soil particles
- Respiration – vital biological process
- All living organisms – respire – get energy for survival