CHAPTER: LIFE PROCESSES

Grade: **10**
Board: **CBSE**
Book: **NCERT**

1.

Chapter Summary and Placement

<Read through the following to understand how this chapter is connected with the previous and next grades and also the important concepts covered in it.>

1. In the previous classes, students have learnt about living and nonliving things. They have also learnt that smallest unit of living things are cells. Cells together form tissues and tissues form organs.
2. This chapter introduces us to the life processes or the maintenance process of all living beings like Nutrition, Respiration, Transportation and Excretion.
3. Since the chapter is focussed on various life processes of living organisms, diagrams and real life examples have been used as Resource in the teaching plan.

2.

LEARNING OUTCOMES

<On completion of the chapter, students will be able to:>

1. Define Life processes
2. Define and explain Autotrophic Nutrition and heterotrophic Nutrition.
3. Detail mode of nutrition in single celled organisms
4. Explain how human beings obtain nutrition.
5. Understand two types of respiration - Aerobic and Anaerobic.
6. How do organisms like plants, terrestrial and aquatic animals take in oxygen?
7. Detail the breathing process in human beings
8. Explain the structure and functioning of human heart.
9. Describe the circulation of blood within heart and from heart to lungs and from lungs to heart.
10. Understand the role of blood vessels.
11. Discuss about the circulatory system in fish, amphibians and reptiles.
12. Understand the transporting system in plants.
13. Define excretion and understand the process of excretion in unicellular organisms.
14. Understand the excretory system and the excretion process of human beings.
15. Explain excretion in plants.

3. KEYWORDS

Definitions of some terms used in the chapter:

Autotrophic nutrition: The process of intake of simple inorganic materials from the environment and using an external energy source like the Sun to synthesise complex high-energy organic material

Heterotrophic nutrition: The process which involves the intake of complex material prepared by other organisms.

Cellular Respiration: A series of metabolic processes that take place within a cell in which biochemical energy is harvested from organic substance (e.g. glucose) and stored as energy carriers (ATP) for use in energy-requiring activities of the cell.

Aerobic Respiration: A form of cellular respiration that requires oxygen in order to generate energy.

Anaerobic Respiration: A form of cellular respiration that occurs when oxygen is absent or scarce.

Systemic circulation: The circulation of blood through the arteries, capillaries, and veins of the general system, from the left ventricle to the right atrium.

Pulmonary circulation: The circulation of blood to and from the lungs.

Double Circulation: A type of blood circulation system in which the blood flows through the heart twice. In this type of circulation, the pulmonary circulation is separate from the systemic circulation.

3. TEACHING PLAN

Follow this section for getting ideas on teaching the content covered in the chapter. The subtopic given in the first column with the matching learning outcome can be explained using instructions and resources listed subsequently

Subtopic and Learning Objective #1

What are Life Processes?, Autotrophic Nutrition

1. What are Life Processes?
2. Define and explain Autotrophic Nutrition.

Teacher Activity

1. Explain to students that a living organism requires certain maintenance processes for the life to continue.
2. Brief students that these life processes require energy, for which we eat food - a source of energy. (Nutrition - a process in which an outside source of energy is transferred to the inside of the body.) The intake of food and its assimilation varies in different types of organisms.
3. Another life process required is respiration. (Process in which food eaten is broken down with the help of oxygen inhale from outside to gain energy). Exchange of gases take place differently in simple and complex organisms.
4. Explain students that food absorbed by the body, oxygen inhaled and the energy released in cells need to be transported to all parts of the body for which a process called Transportation is required.
5. Describe the need of the process of Excretion in living organisms. (removal of unwanted substances from our body to outside).

6. Now discuss nutrition in plants (Autotrophic nutrition - making their own food). (Raw materials required - Water, minerals absorbed by roots from soil, Carbon dioxide from atmosphere through stomata, Chlorophyll of leaves). Refer Resource 1.
7. Perform Activity 1 to make students understand the role of carbon dioxide for photosynthesis in plants.
8. Discuss the role of stomata (exchange of gases by the action of guard cells; when water flows into guard cells - stomata open; when guard cells shrink - stomata close) in this process.

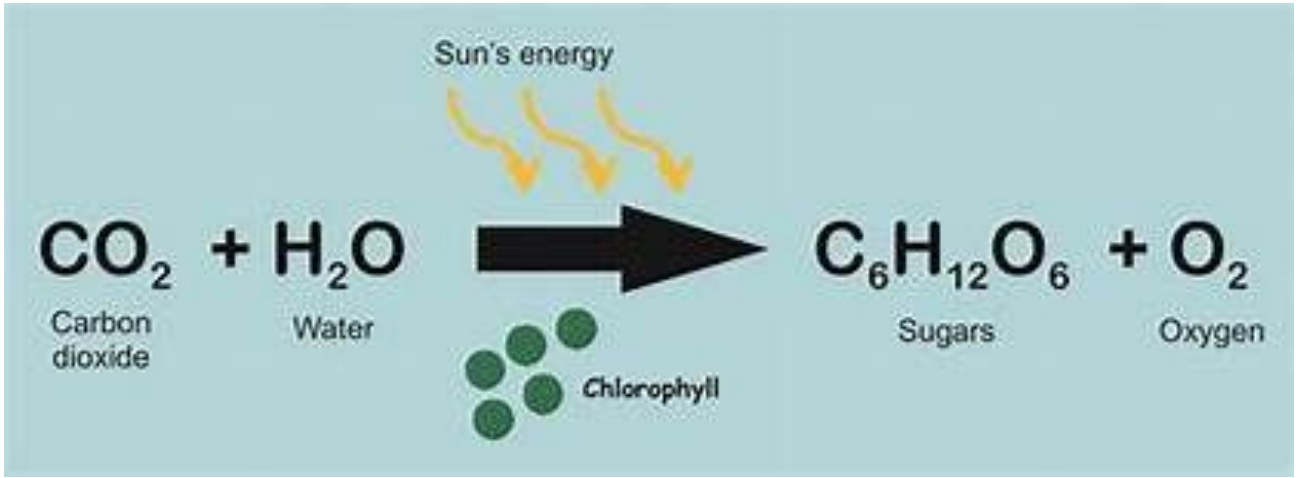
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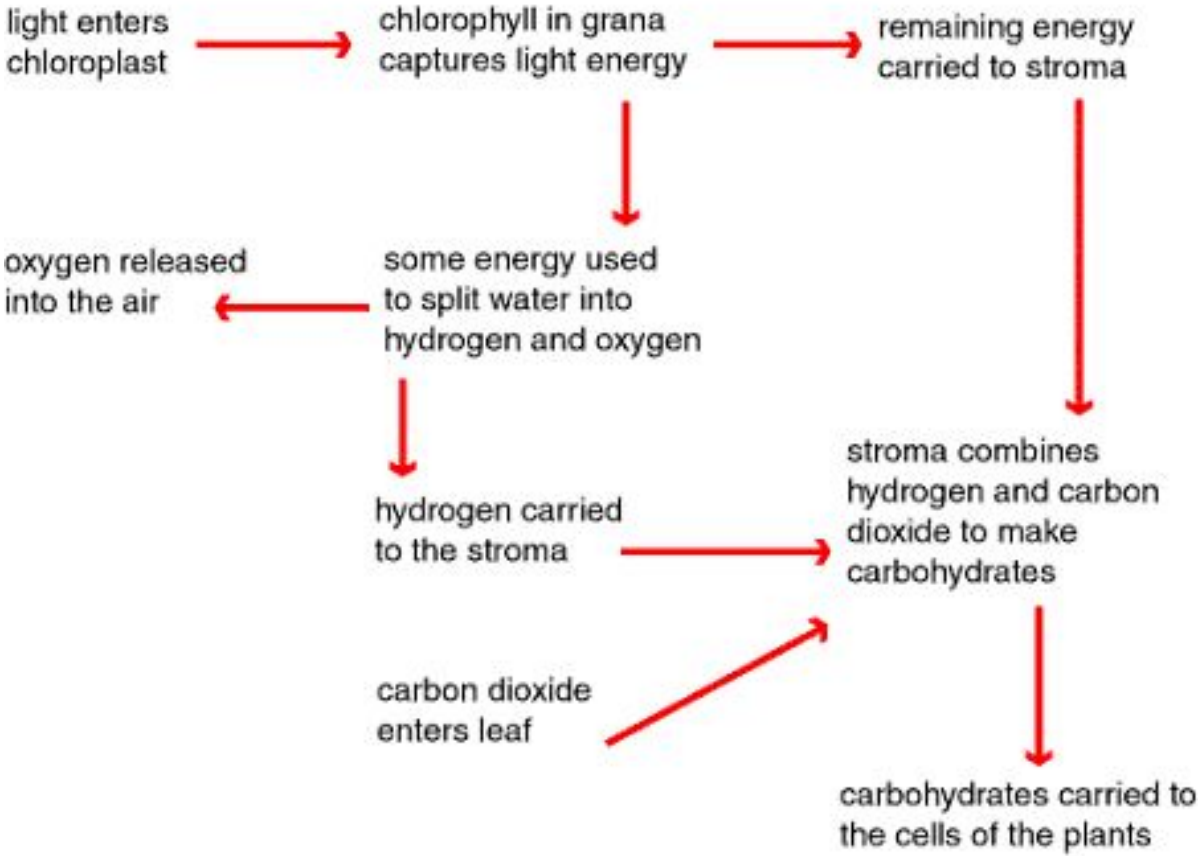
a. Why do we require the process of respiration in human beings?
b. Give the chemical equation for the photosynthesis in plants.

Resources Suggested

Blackboard, chalk, Resource1

Resource 1:


Sun's energy
CO_2
Carbon dioxide
+ H_2O
Water
Chlorophyll
$C_6H_{12}O_6$
Sugars
+ O_2
Oxygen


light enters chloroplast
chlorophyll in grana captures light energy
remaining energy carried to stroma
oxygen released into the air
some energy used to split water into hydrogen and oxygen
hydrogen carried to the stroma
stroma combines hydrogen and carbon dioxide to make carbohydrates
carbon dioxide enters leaf
carbohydrates carried to the cells of the plants

Activity 1

Name of the activity – Role of carbon dioxide in photosynthesis.
Type of activity – Group/Demonstration
Use it for – Describing the role of carbon dioxide in photosynthesis
Materials – Materials as shown in the experimental set up as shown in the diagram below.

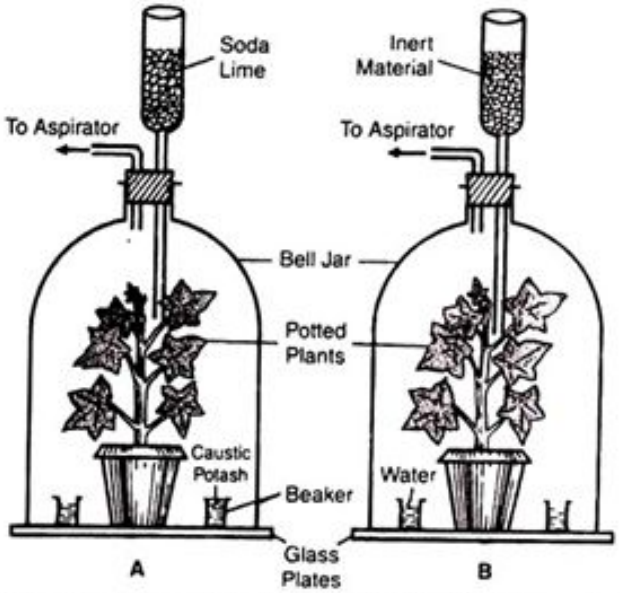


Fig. 35. Experiment for showing necessity of CO_2 for photosynthesis.

Procedure –

1. The plants shown in the image were kept in darkness for 2 days to make them de-starched. And then as set up in the experiment as shown in the diagram.
2. Explain the setup to students and the role of each material/part (Caustic potash, Water, Aspirator, Soda lime) used in it.
3. After a few hours, you can ask students to test the leaves of both the plants for starch (by placing them in iodine solution). They can be asked to note down their observation (Leaves of bell jar with caustic potash - Negative for starch; Leaves of bell jar with water - Positive for starch).
4. Explain the reasons to them for their observation. (Bell jar A - CO_2 from entering air is absorbed by soda lime and that released by the plant during respiration is absorbed by caustic potash; Bell Jar - No absorption of CO_2)

Conclude the activity by explaining the importance of carbon dioxide in photosynthesis.

Subtopic and Learning Objective #2

Heterotrophic Nutrition, How Do Organisms Obtain their Nutrition, Nutrition in Human Beings,

1. Define and explain Heterotrophic Nutrition.
2. How do Amoeba and Paramecium obtain their nutrition?
3. Explain how human beings obtain nutrition.

Teacher Activity

1. Explain to students about heterotrophic nutrition. (Organisms acquire food from plants or from other animals.) Refer Resource 2.
2. Discuss that various organisms having heterotrophic nutrition are adapted to its environment. The process by which food is taken in and broken down depends on the body design of every organism. Refer Resource 2.
3. State how unicellular organisms like amoeba (through Pseudopodia) and paramecium (through cilia) feed themselves. Refer Resource 2.
4. Now, the teacher will take up the human digestive system in detail.
5. Ask student as to what happens to the food we eat. It enters our mouth and then goes inside the body. What happens next? All answers to these questions will be answered next.
6. Show the students the image of digestive tract/alimentary canal as shown in Resource 2 or draw it on the blackboard and list down its various parts (buccal cavity, oesophagus, stomach, small intestine, large intestine, rectum, anus).
7. First the food enters our mouth/buccal cavity. Discuss the role of teeth and tongue in digestion. Also discuss that saliva released in mouth, contains salivary amylase, which breaks down starch into simple sugars.

8. Next, the food enters the food pipe (oesophagus), the movement of its walls helps pushing the food downward (peristalsis). This movement occurs all along the gut.
9. Show the diagram to students and tell that from oesophagus food enters the stomach, its wall has gastric glands which release HCl acid, pepsin (a protein digesting enzyme) and mucus.
10. Discuss role of small intestine - From stomach, the food enters small intestine (site of complete digestion of carbohydrates, proteins and fats) (liver and pancreas release their secretions here)(herbivores have longer small intestine than carnivores). Refer Resource 2.
11. The digested food is taken up by the walls of the small intestine (has finger-like projections called villi - which increases the surface area for absorption, villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body)
12. Discuss role of large intestine (The unabsorbed food moves to large intestine whose walls also has villi which absorb water from it. The rest is removed from the body through anus via anal sphincter.)

Check your Understanding

a. What is the role of bile juice?
b. Is any part of food digested in large intestine?

Resources Suggested

Blackboard, chalk, Resource 2

Resource 2:

HETEROTROPHIC NUTRITION



Bees suck nectar



Baby cow feeds on milk



Snake feeding on mouse

Holozoic nutrition in *Amoeba*



1. *Amoeba* senses food.



2. Pseudopodia surround the food.



3. The food is enclosed in a food vacuole (food + water).



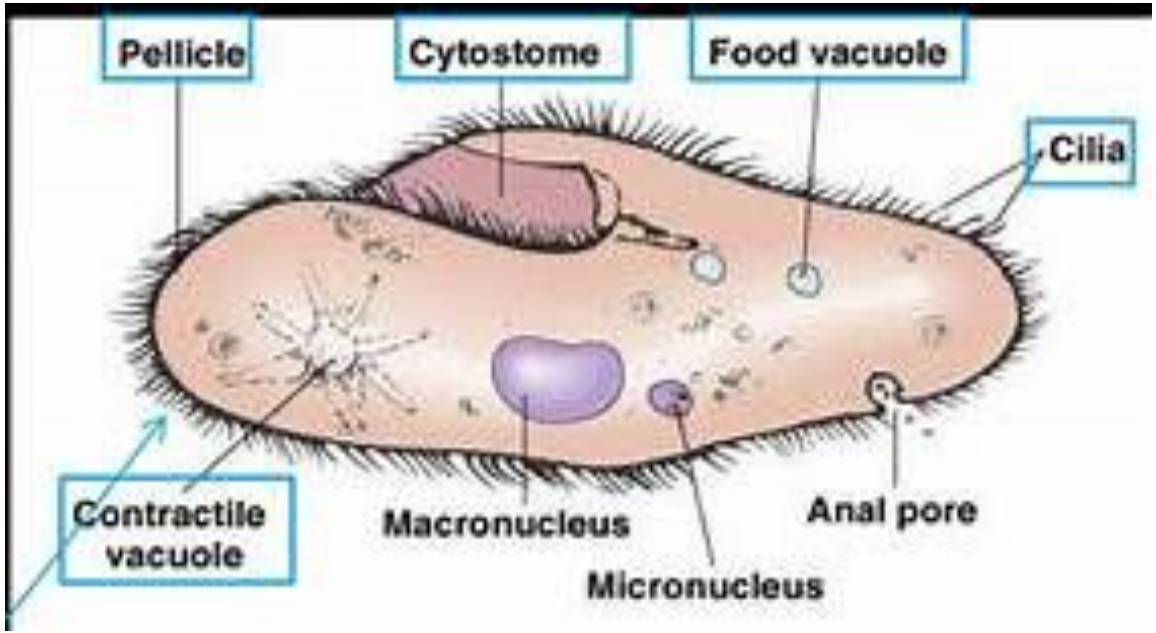
4. Enzymes from the cytoplasm are secreted into the food vacuole.



5. Food is digested and soluble materials are absorbed and assimilated (used up).



6. Undigested waste is expelled.


Pellicle
Cytostome
Food vacuole
Cilia
Contractile vacuole
Macronucleus
Anal pore
Micronucleus

Parts of alimentary canal

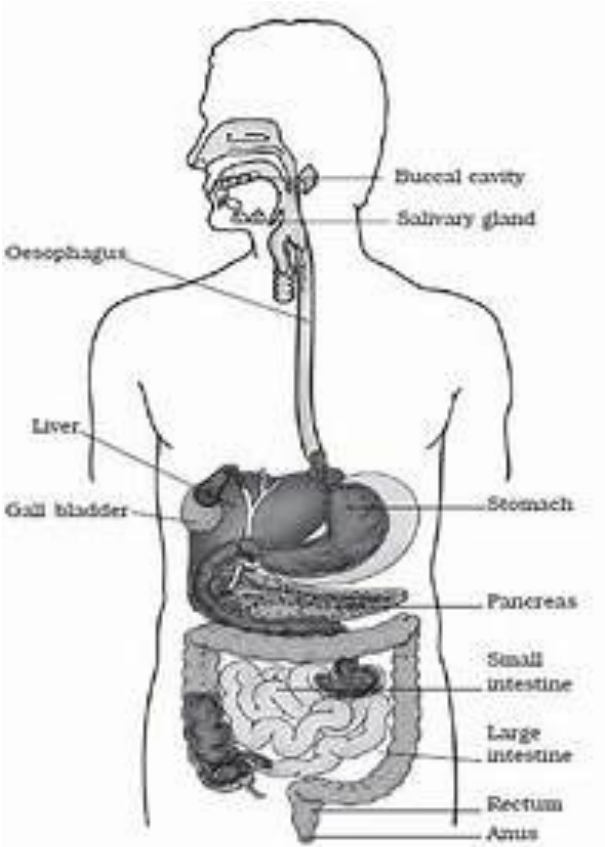


Fig. 2.2 *Human digestive system*

Effects of Digestive Enzymes

Active Site	Enzyme	Effect on Food
Mouth	Salivary amylase	Breaks down starches into disaccharides
Stomach	Pepsin	Breaks down proteins into large peptides
Small intestine (from pancreas)	Amylase	Continues the breakdown of starch
	Trypsin	Continues the breakdown of protein
	Lipase	Breaks down fat
Small intestine	Maltase, sucrase, lactase	Breaks down remaining disaccharides into monosaccharides
	Peptidase	Breaks down dipeptides into amino acids

Subtopic and Learning Objective #3

Respiration

1. Understand two types of respiration - Aerobic and Anaerobic.
2. How do organisms like plants, terrestrial and aquatic animals take in oxygen?
3. How do human beings breathe?

Teacher Activity

Students have already been taught that the food is digested and absorbed by organisms.

1. Discuss that the absorbed food reaches every cell and is used to produce energy for various purposes (Respiration).
2. Introduce two types of respiration aerobic and anaerobic respiration (occur in muscle cells and in yeast). Refer Resource 3.
3. Explain to students that the energy is released in cells in the form of ATP. Refer Resource 3.
4. Make students recall that organisms which undergo aerobic respiration (plants and animals), need to ensure that there is sufficient intake of oxygen.
5. Refer Resource 3 to explain aerobic respiration in plants.
6. Refer Resource 3 to make students understand how aquatic animals (you can also show aquatic animals in an aquarium) and terrestrial animals breathe.

7. Discuss different ways of gas exchange among terrestrial animals. Refer Resource 3.
8. Explain the pathway of air which is inhaled in humans or anatomy of human respiratory system. Refer Resource 3.
9. Perform Activity 2 with students to make them understand breathing mechanism in humans.
10. Discuss the exchange of gases that takes place in alveoli, once air reaches here. Also inform them how oxygen and carbon dioxide is transported by referring to Resource 3.

Check for understanding:

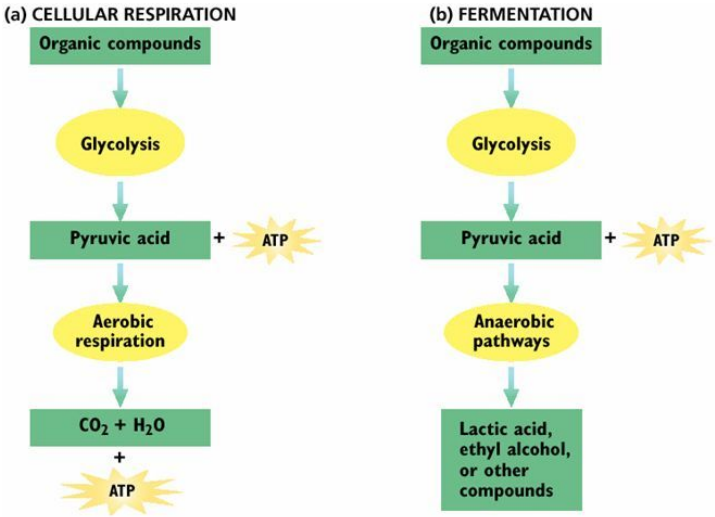
a. How does exchange of gases take place in insects?
b. What is the state of ribs, diaphragm and lungs during inhalation

Resources Suggested

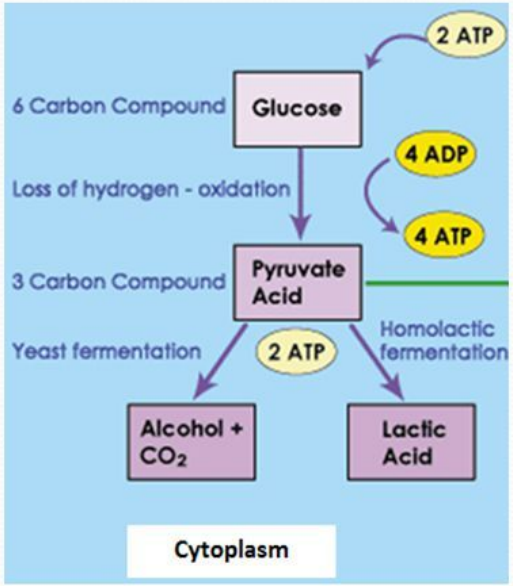
Blackboard, chalk, Resource 3.

Resource 3:

Aerobic vs. Anaerobic



Anaerobic Cell Respiration



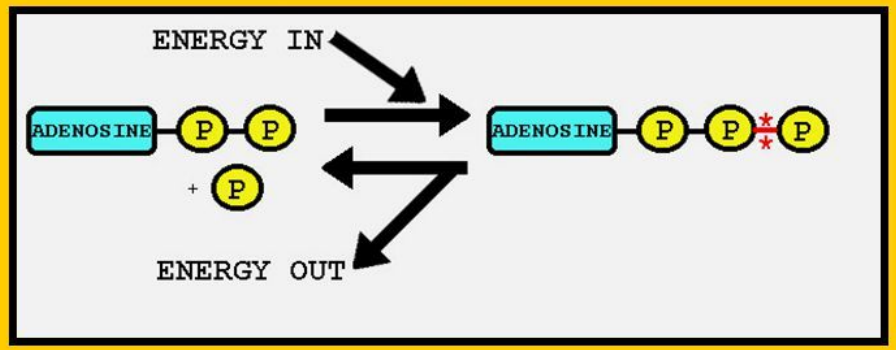
- **anaerobic cell respiration** occurs in the absence of oxygen
- during glycolysis glucose is broken breakdown in the cytoplasm
- leading to the production of pyruvate,
- production of small amount of energy (2 ATP molecules per molecule of glucose)
- in muscles, pyruvate is converted into lactic acid during lactic acid fermentation
- anaerobic respiration occurs in animals during intense muscular activity
- in yeast & plant cells, pyruvate is converted into alcohol (ethanol) & CO_2 during alcoholic fermentation
- no additional APT is produced during fermentation

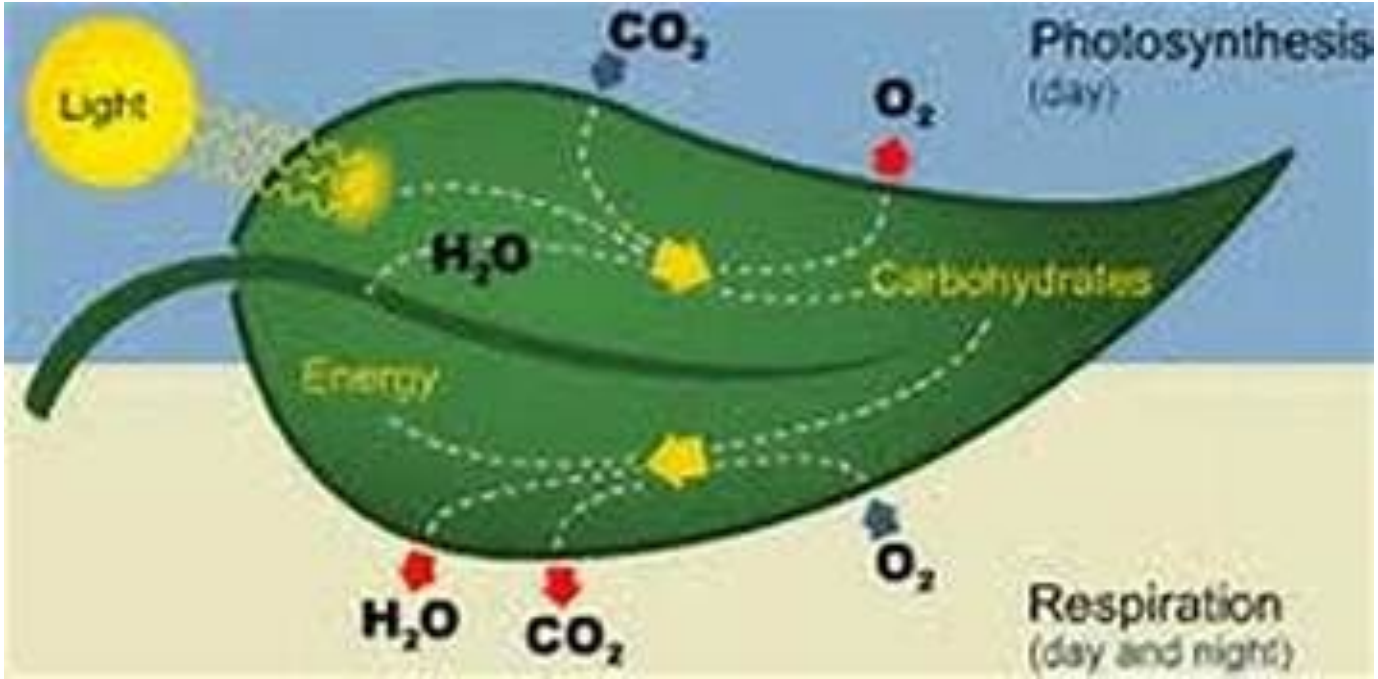
Metabolism and ATP

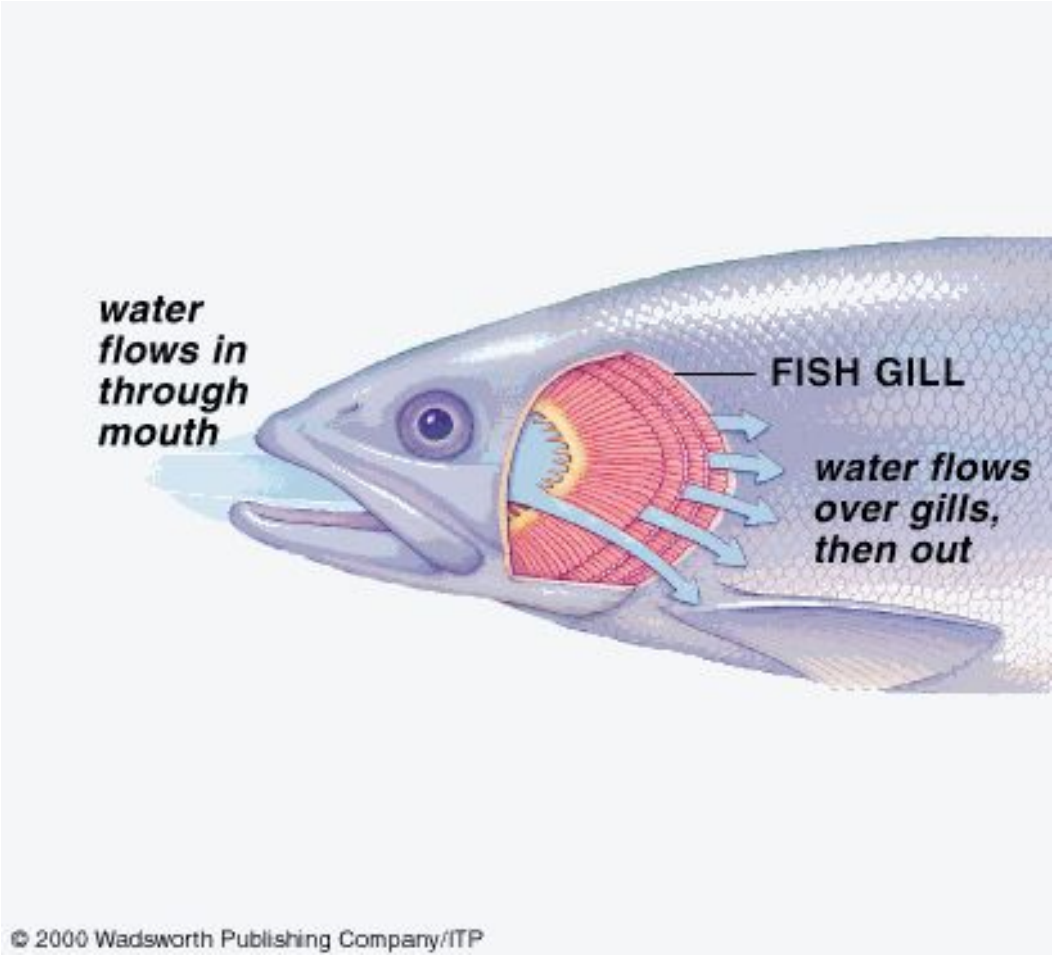
Most cell reactions (metabolism) require energy to occur. The energy 'currency' of cells is a molecule called **ATP.**

ATP has **3 phosphates**, the last two of which are held together by a **high energy bond**.

It takes a lot of energy to make this phosphate bond, and **energy is released when the bond is broken**.

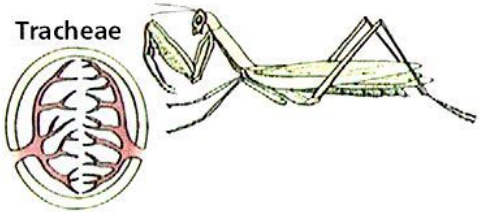


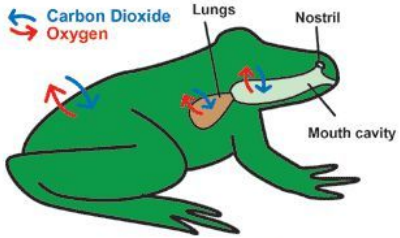

Light
CO_2
O_2
Photosynthesis
(day)
H_2O
Carbohydrates
Energy
O_2
H_2O
CO_2
Respiration
(day and night)

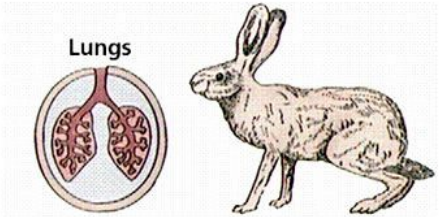

water flows in through mouth
FISH GILL
water flows over gills, then out
© 2000 Wadsworth Publishing Company/ITP

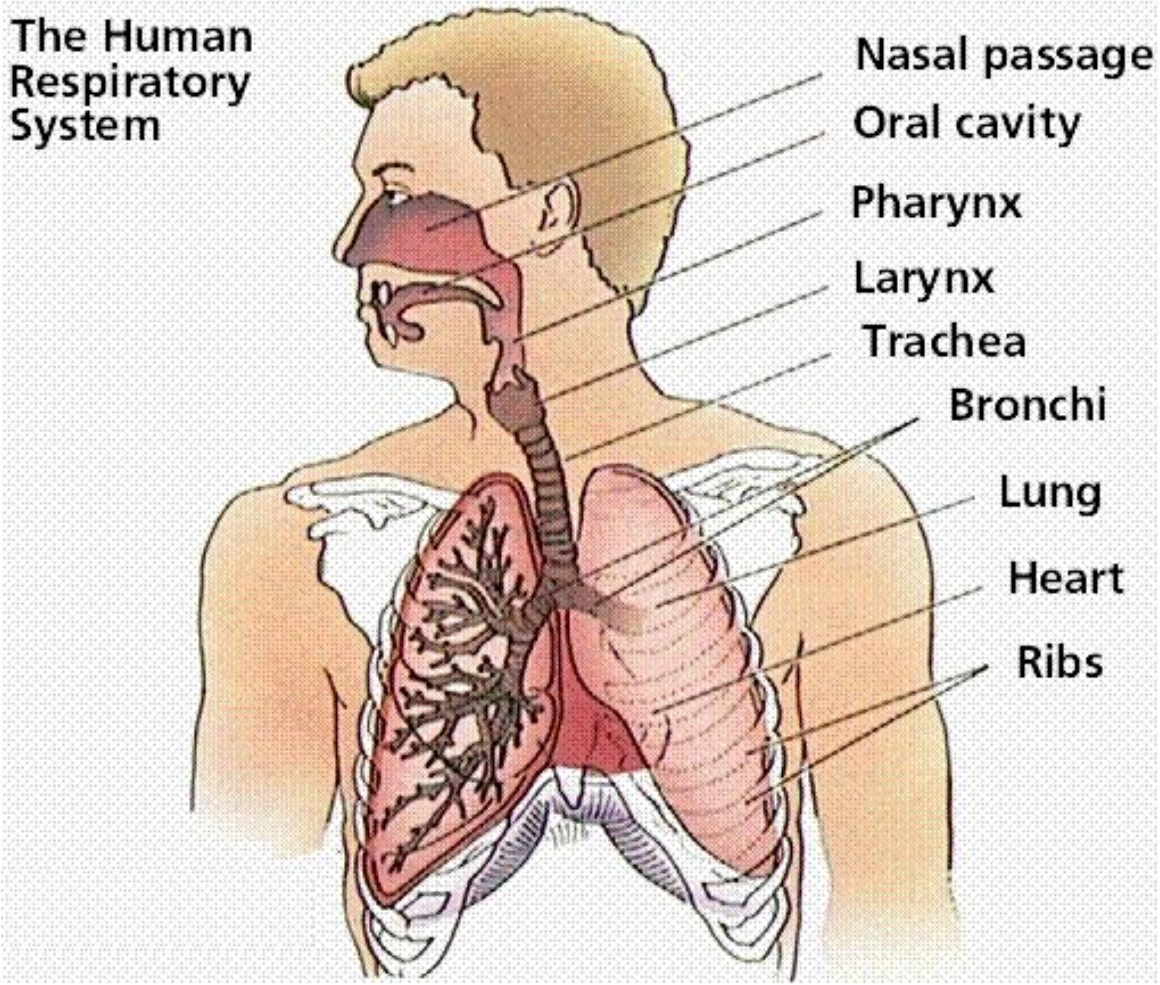
Gas exchange in terrestrial animals

- Oxygen is not already dissolved in water so moist surfaces must be provided for it to dissolve
- Surfaces need to be protected from drying out, as well as preventing physical damage
- Most animals have internal surfaces for gas exchange, although smaller animals living in moist conditions eg amphibians, worms can exchange gases through their skin
- The challenge is to provide protection and sufficient surface area for exchange



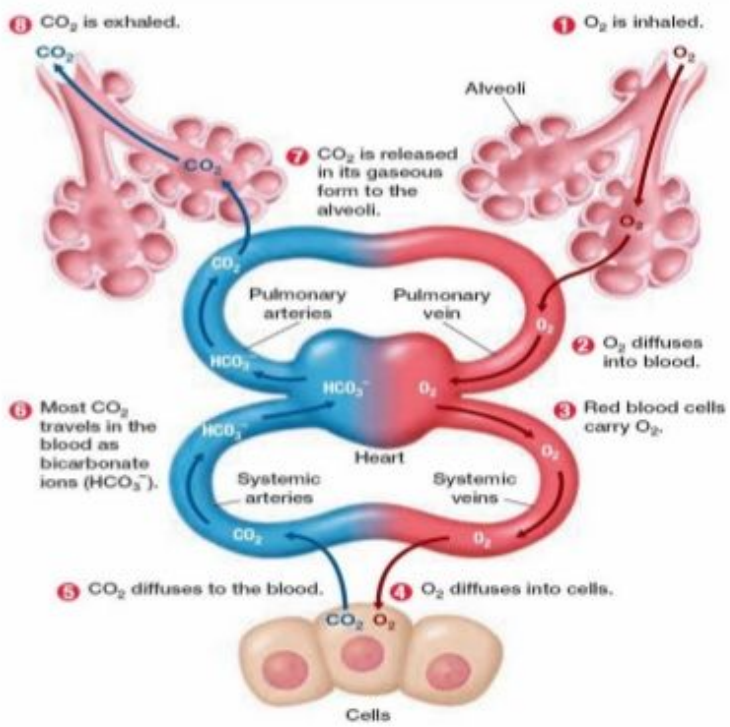





The Human Respiratory System
Nasal passage
Oral cavity
Pharynx
Larynx
Trachea
Bronchi
Lung
Heart
Ribs

Gas Transport in the Blood

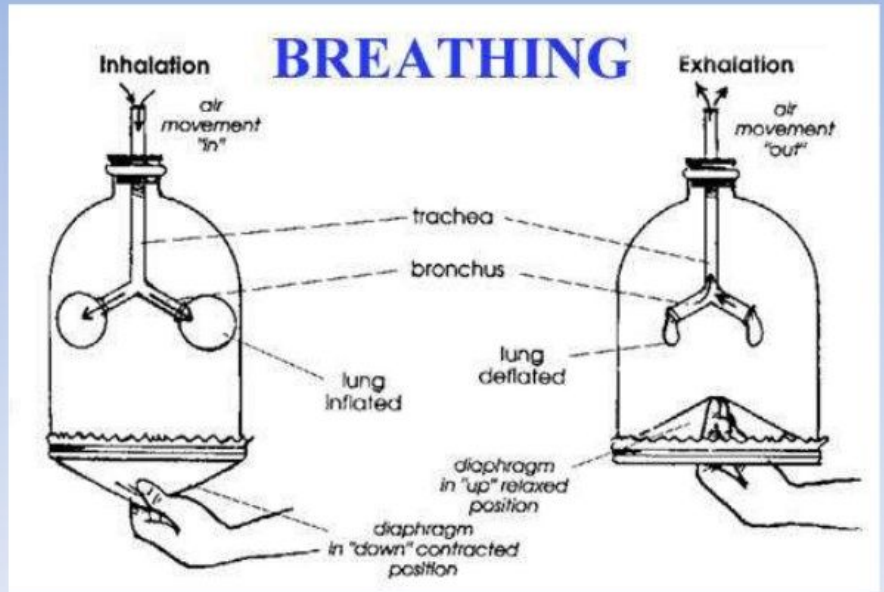
- Oxygen forms oxyhemoglobin with hemoglobin molecules
- CO2 in transported via bicarbonate in plasma



Activity 2

Name of the activity – How do we breathe?
Type of activity – Group/Demonstration
Use it for – Describing breathing mechanism in humans
Materials – Experimental set up as shown in the diagram (glass tube - trachea, bronchus; balloon - lungs, bell jar - thoracic wall; rubber sheet - diaphragm).

Explanation =



Procedure –

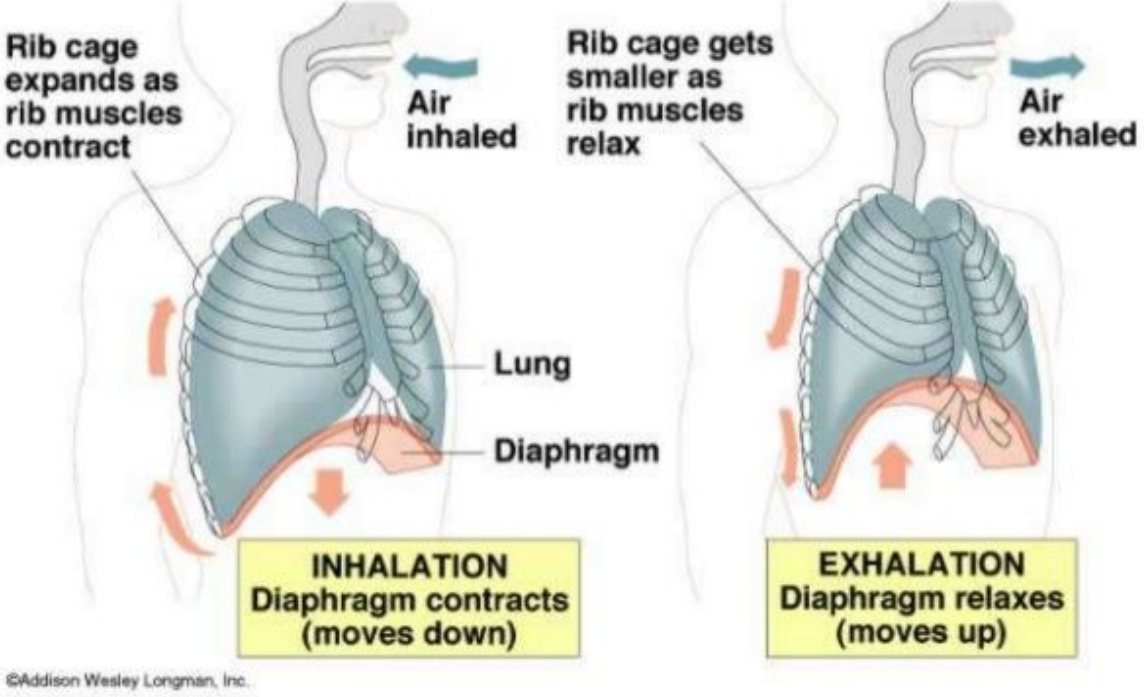
1. Ask students to observe the experimental set up keeping in view the human breathing parts. Tell them to pull the rubber sheet (diaphragm contracts) downwards and push upwards (diaphragm expands) one by one and observe what happens.
2. Observation:
   a) When the rubber sheet is pulled downwards, the balloons get inflated as the outside air enters the jar.
   b) When the rubber sheet is pushed upwards, the air from the balloons move out of the jar.
3. Explanation of the observation:

a) When the rubber sheet is pulled downwards, indicating that diaphragm is contracted, the ribs also move outward; increasing the size of the chest cavity. (Volume of the jar increases thus decreasing its pressure). Hence the pressure of the chest cavity decreases and the air is forced into the lungs. This is how inhalation of air takes place.

b) When the rubber sheet is pushed upwards, indicating that diaphragm is relaxed, the ribs also fall down and inward; decreasing the size of the chest cavity. (Volume of the jar decreases thus increasing its pressure). Hence the pressure of the chest cavity increases and the air is forced out of the lungs. This is how exhalation of air takes place.

Conclude the activity by explaining the breathing mechanism in human beings (Refer the diagram below.)

Inhalation and exhalation



Subtopic and Learning Objective #4

Transportation In Human Beings, Transportation in Plants

1. Explain the structure and functioning of human heart.
2. Describe the circulation of blood within heart and from heart to lungs and from lungs to heart.
3. Understand the role of blood vessels.
4. Discuss about the circulatory system in fish, amphibians and reptiles.
5. Understand the transporting system in plants.

Teacher Activity

Students have learnt uptil now that food, gases and waste materials have been transported throughout the body with the help of blood. They have learnt about blood - a connective tissue in previous classes.

1. Introduce to students that transportation system in human beings consists of heart, blood vessels and fluids - blood and lymph.
2. Explain the structure of human heart. (Has 4 chambers, size that of our fist, name of all its parts)(Refer Resource 4 or show the model of heart kept in laboratory).
3. Perform Activity 3 to make students understand the blood flow in the human body within heart and from heart to lungs and from lungs to heart. (Describe double circulation of blood.)
4. Also talk/discuss about the circulation of blood in fishes (2-chambered heart), amphibians and reptiles (3-chambered heart) and compare those with mammals and birds. Refer Resource 4.
5. In Activity 3, students have also learnt about types of blood vessels (arteries, veins and capillaries)

6. Make students recall that they have already learnt about blood (plasma and cells - RBC, WBC, platelets) in previous classes. Explain students that there is one more fluid inside human body apart from blood called lymph or tissue fluid.
7. Describe students about lymph (colourless, contains less of protein, carries digested and absorbed fat from intestine).
8. Tell students that plants also have a transportation system in them. Discuss its need in plants (During photosynthesis, roots absorb water and minerals which need to be transported; leaves synthesize food which also needs to be transported to every part of plant)
9. Make students recall that xylem and Phloem tissue constitute the transporting system of plants which they have studied in previous class. Refer Resource 4.
10. Discuss the water conducting channels in plants (xylem tissue, vessels and tracheids) by showing Resource 4 to students.
11. Discuss the translocation (transport of soluble products of photosynthesis from leaves to other parts of plants - takes place in sieve tubes.) Refer Resource 4.

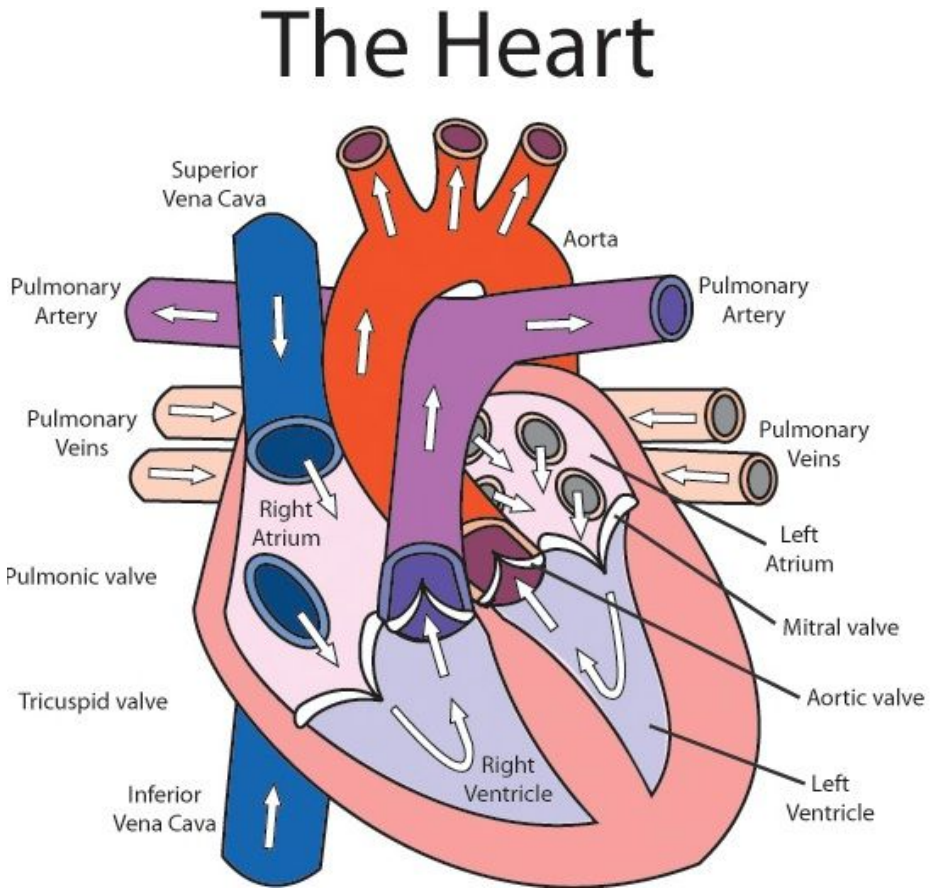
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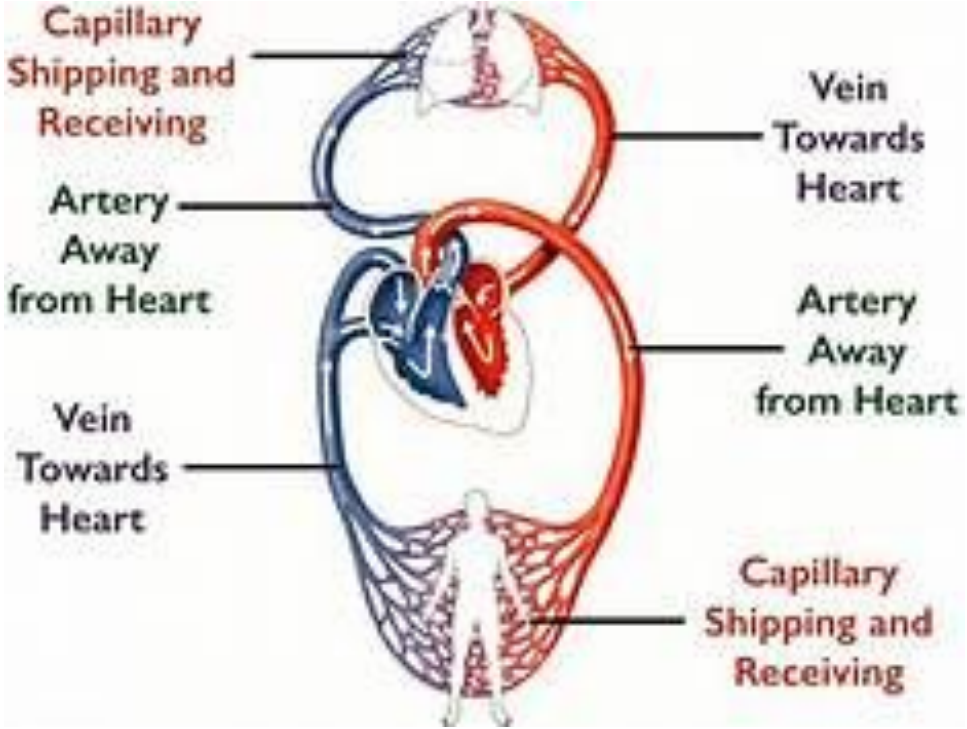
a. What do you mean by pulmonary circulation in human beings?
b. How is food transported in plants?

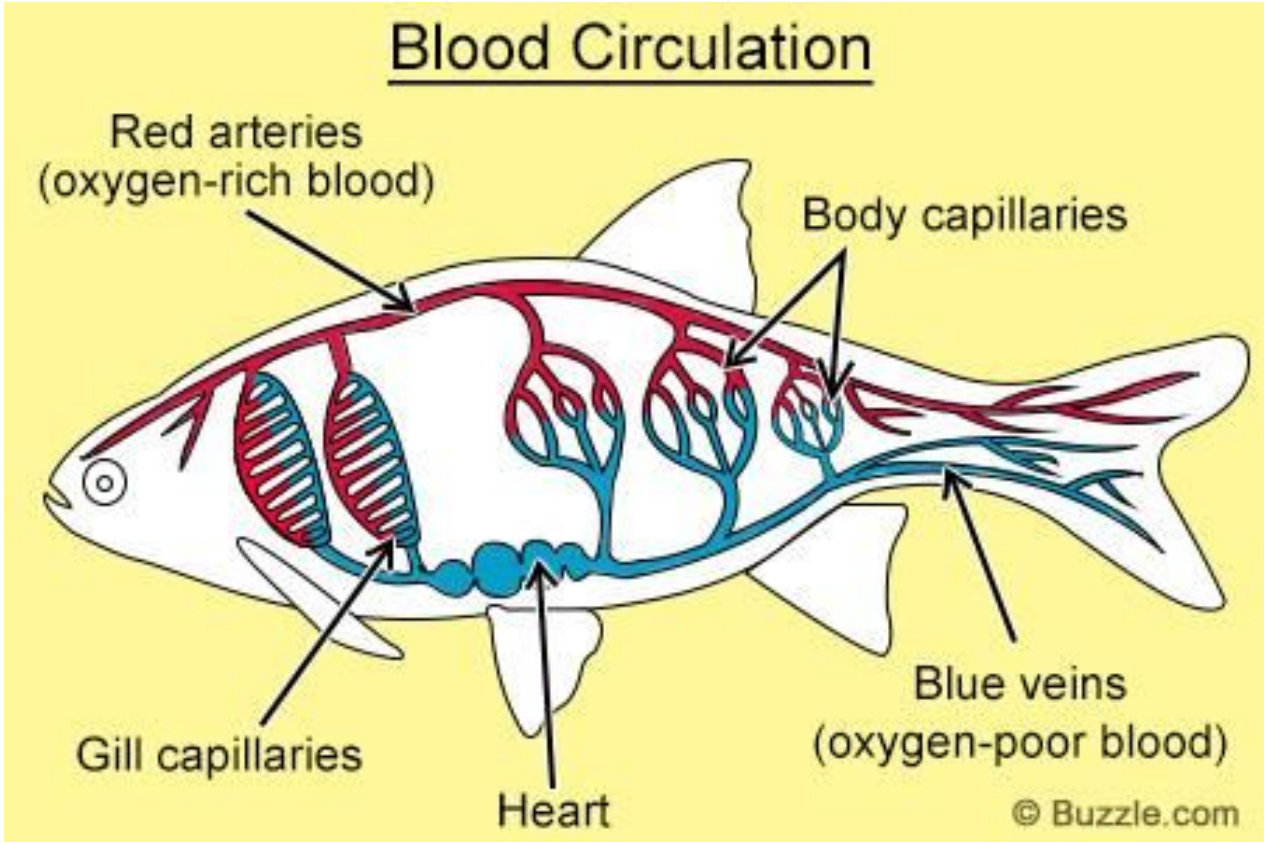
Resources Suggested

Blackboard, chalk, Resource 4

Resource 4:


The Heart
Superior Vena Cava
Aorta
Pulmonary Artery
Pulmonary Artery
Pulmonary Veins
Pulmonary Veins
Right Atrium
Left Atrium
Pulmonic valve
Mitral valve
Aortic valve
Tricuspid valve
Right Ventricle
Left Ventricle
Inferior Vena Cava


Capillary
Shipping and
Receiving
Artery
Away
from Heart
Vein
Towards
Heart
Vein
Towards
Heart
Artery
Away
from Heart
Capillary
Shipping and
Receiving

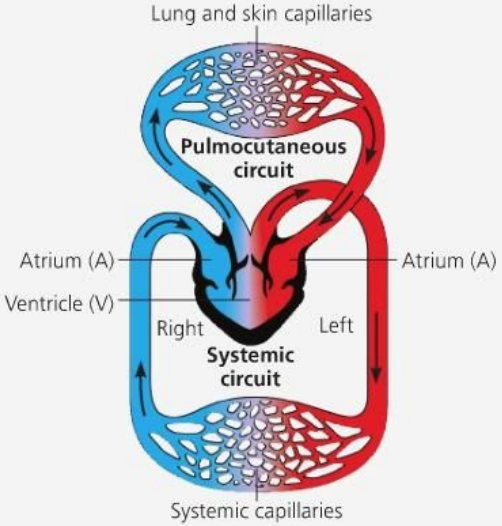


Single Circulation

Amphibians

Amphibians have a three-chambered heart and two circuits of blood flow: pulmocutaneous and systemic.

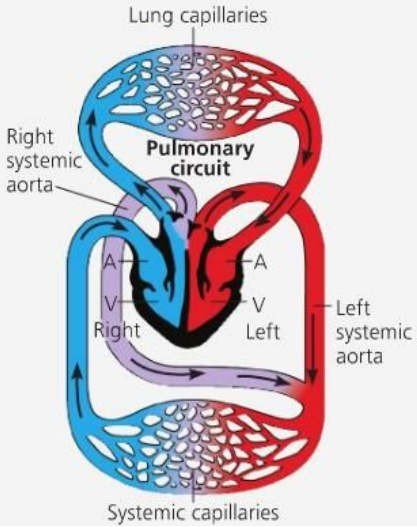




Reptiles (Except Birds)

Lizards, snakes, and turtles have a three-chambered heart, with a septum partially dividing the single ventricle. In crocodilians, the septum is complete and the heart is four-chambered.

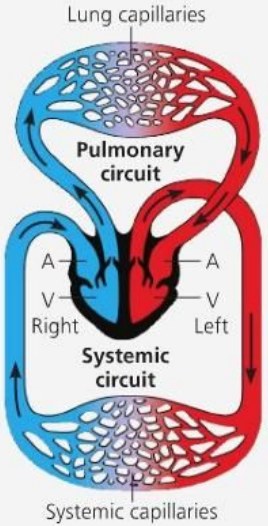




Mammals and Birds

Mammals and birds have a four-chambered heart. In birds, the major vessels near the heart are slightly different than shown, but the pattern of double circulation is essentially the same.

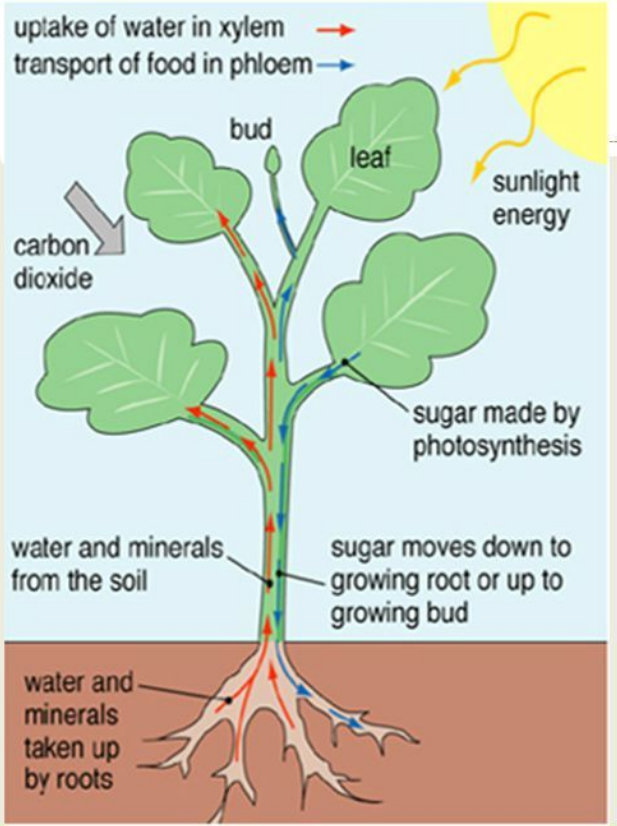




Comparison of circulation of blood in amphibians, reptiles, mammals and birds.

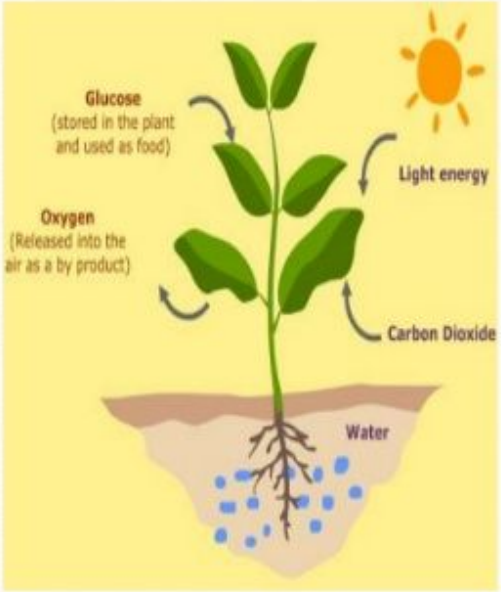
Transport systems

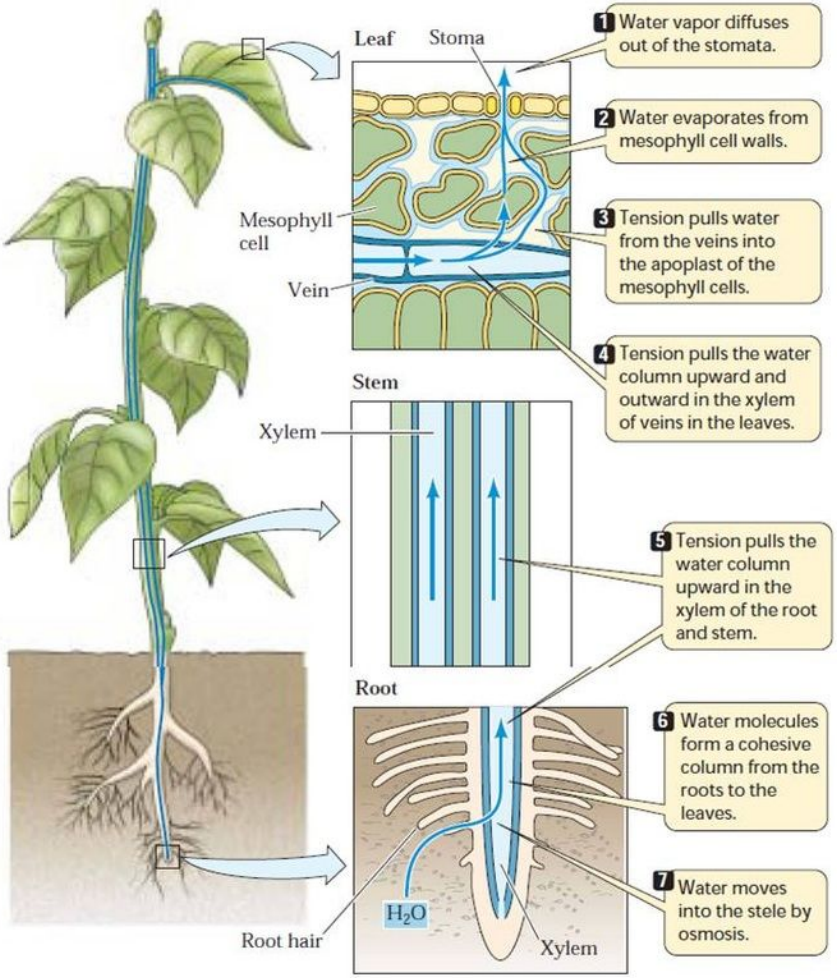
- There are two transport systems in a plant;
- One that transports water and minerals from root to all other parts.
- These vessels are called xylem vessels
- Another vessels transport sugars (sucrose) and amino acids made in leaves to all other plant parts.
- These are called phloem vessels.



Transport of Food (Phloem)

- During photosynthesis, food is produced in the leaves in the form of **sugar** (glucose) which is then transported to other parts of the plant via the **phloem**.
- There is a **higher** sugar concentration in the leaf than in the phloem vessels which are constantly transporting sugar to other parts of the plant.




Leaf
Stoma
1 Water vapor diffuses out of the stomata.
2 Water evaporates from mesophyll cell walls.
Mesophyll cell
Vein
3 Tension pulls water from the veins into the apoplast of the mesophyll cells.
4 Tension pulls the water column upward and outward in the xylem of veins in the leaves.
Stem
Xylem
5 Tension pulls the water column upward in the xylem of the root and stem.
Root
6 Water molecules form a cohesive column from the roots to the leaves.
7 Water moves into the stele by osmosis.
H_2O
Root hair
Xylem

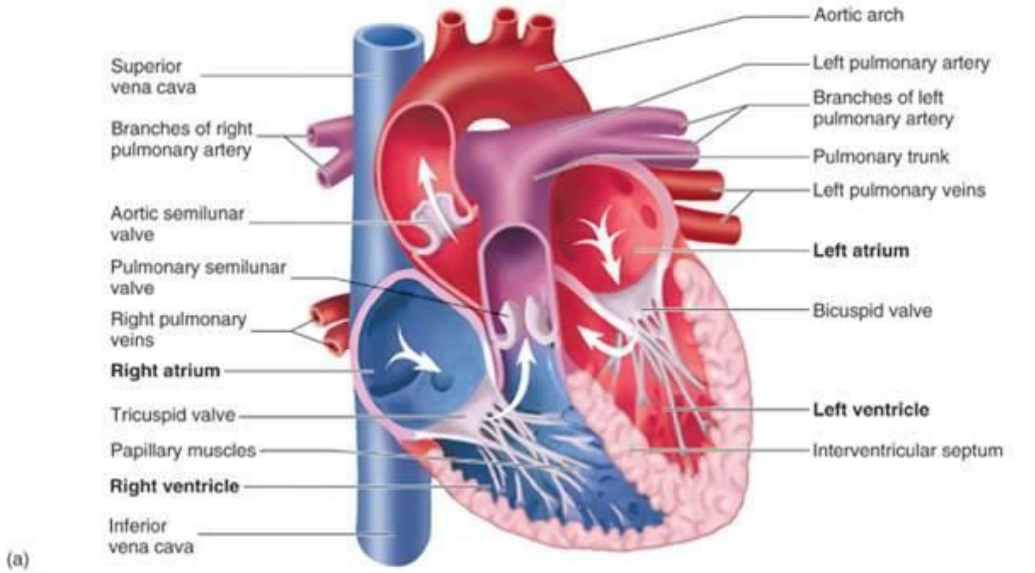
Activity 3

Name of the activity – How does blood circulate in our body?
Type of activity – Group/Demonstration
Use it for – Describing circulation of blood (both systemic and pulmonary - double circulation) in human body
Materials – Drawing papers (some red colored and some blue colored) with the parts of heart, lungs and name of blood veins written on them (as shown in diagram), Red and Blue arrows made of paper (as shown in diagram)
Procedure –

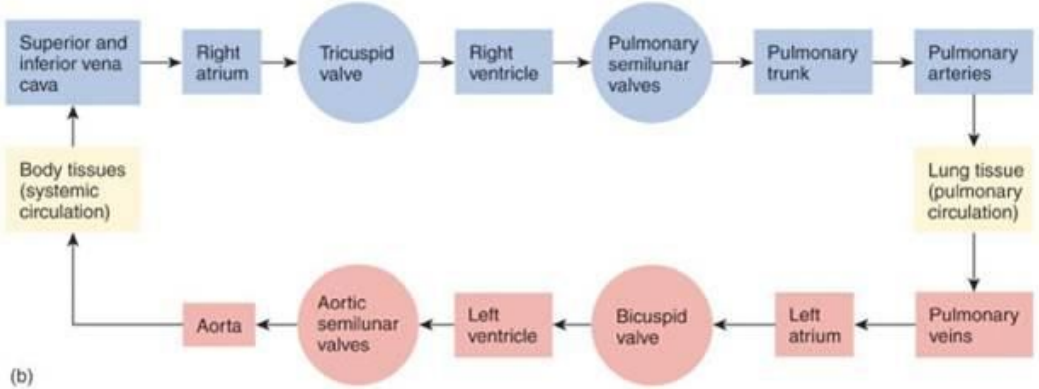
1. Ask the students to hold the drawing papers and arrows in an order as shown in the diagram.
2. Now you can explain the flow of blood within the heart easily by referring to the colored drawing papers and arrows. (See the diagram below)
3. Tell them that the arrows show different kinds of blood vessels (Arteries, Veins and Capillaries). Discuss about each of them, their structure and function. (See the images below)

Conclude the activity by explaining about two types of circulation - Systemic and Pulmonary.

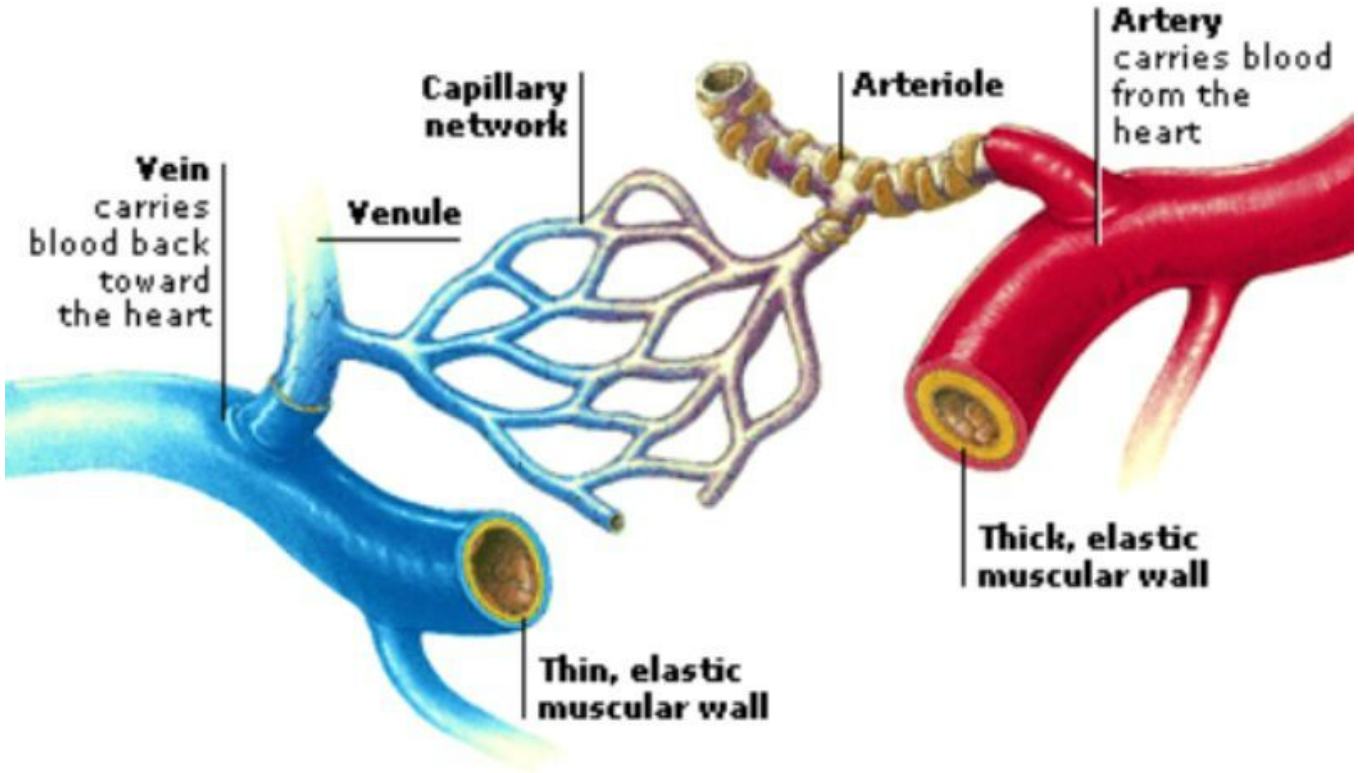
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(a)



(b)


Artery
carries blood from the heart
Arteriole
Capillary network
Vein
carries blood back toward the heart
Venule
Thick, elastic muscular wall
Thin, elastic muscular wall

	Arteries	Capillaries	Veins
Function	Carry blood **away** from the heart at **high** pressure	-Supply all cells with their **requirements** -Take away **waste** products	**Return** blood to the heart at **low** pressure
Structure of wall	-**Thick**, strong -Contain **muscles**, **elastic** fibres and **fibrous** tissue	**Very thin**, only one cell thick	-**Thin** -Mainly **fibrous** tissue -Contain far **less** **muscle** and **elastic** tissue than arteries
Lumen	-**Narrow** -Varies with heartbeat (increases as a pulse of blood passes through)	-**Very narrow** -Just wide enough for a red blood cell to pass through	**Wide**
Valves	(-)	(-)	(+) Prevent backflow
How structure fits function	-Strength and elasticity needed to withstand the pulsing of the blood, prevent bursting and maintain pressure wave -Helps to maintain **high blood pressure**, preventing blood flowing backwards	- No need for strong walls, as most of the blood pressure has been lost -Thin walls and narrow lumen bring blood into close contact with body tissue, allowing **diffusion** of materials between capillary and surrounding tissues. -White blood cells can squeeze between cells of the wall	- No need for strong walls, as most of the blood pressure has been lost - Wide lumen offers **less resistance** to blood flow

Subtopic and Learning Objective #4

Excretion In Human Beings, Excretion In Plants

1. Define excretion and understand the process of excretion in unicellular organisms.
2. Understand the excretory system and the excretion process of human beings.
3. Explain excretion in plants.

Teacher Activity

1. Explain the structure of human excretory system (pair of kidneys, pair of ureter, urinary bladder, urethra). Refer Resource 4.
2. Explain the structure of a filtration unit - nephron. Refer Resource 4.
3. Explain formation of urine by explaining the filtration, absorption and reabsorption process. Refer Resource 4.
4. Now discuss how plants get rid of their waste products. (through transpiration)

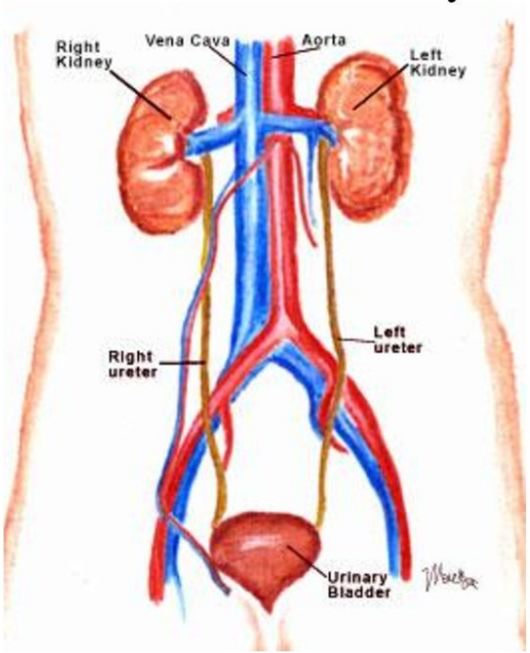
Resources Suggested

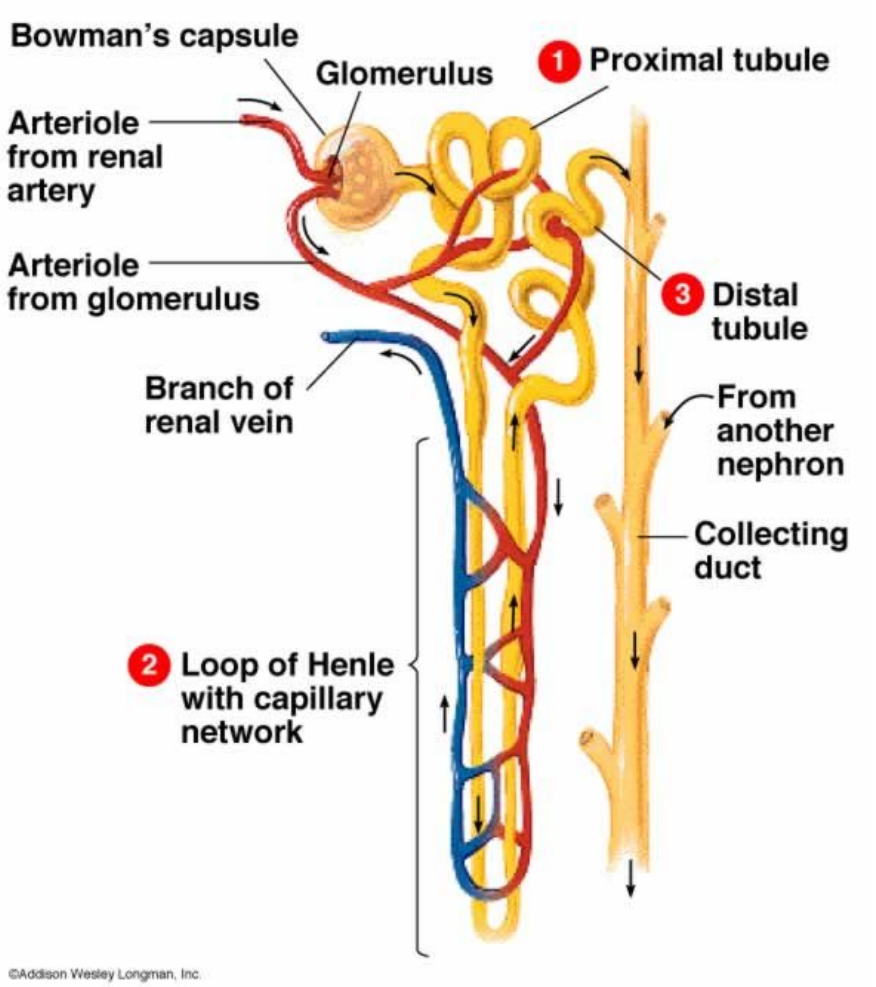
Blackboard, Chalk, Resource 5

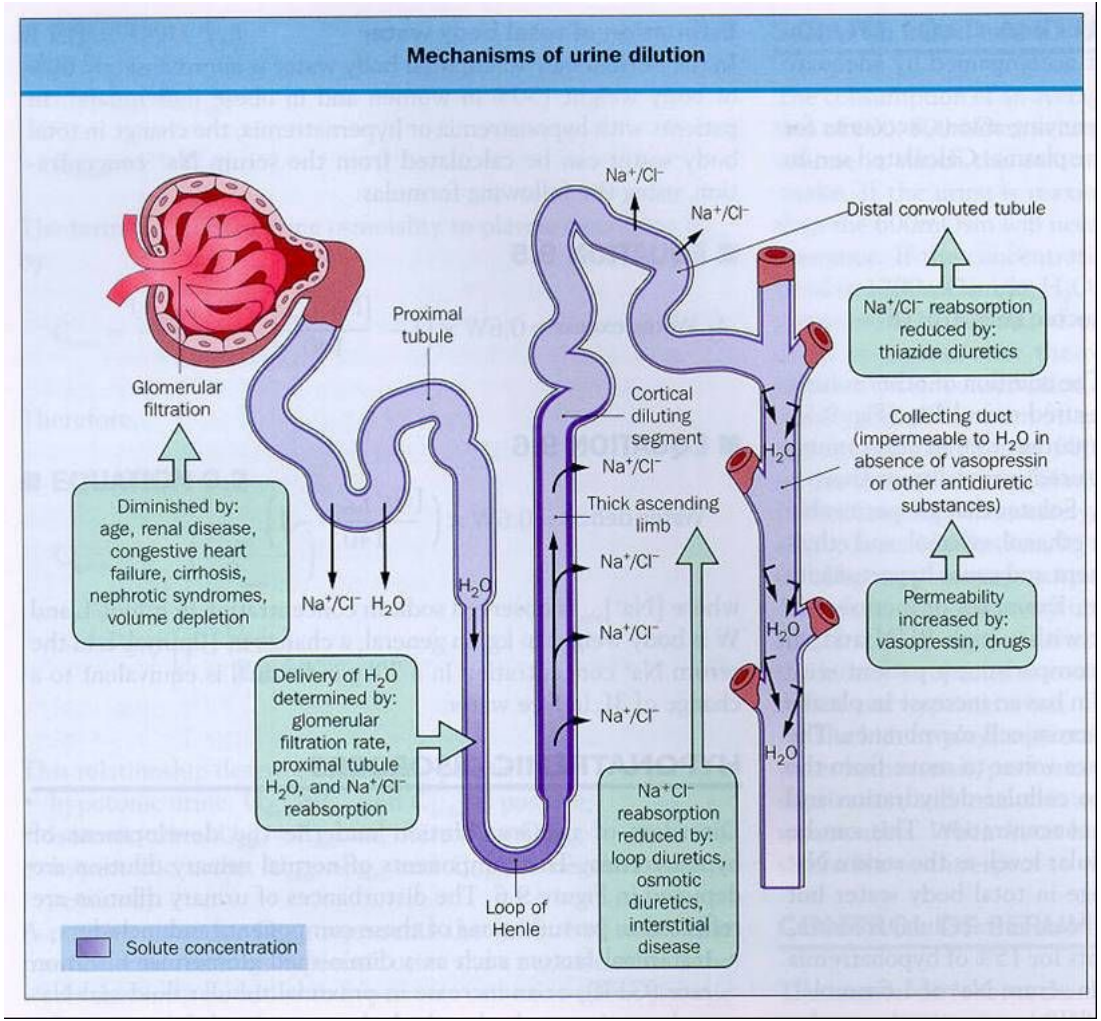
Resource 5:

Excretory System

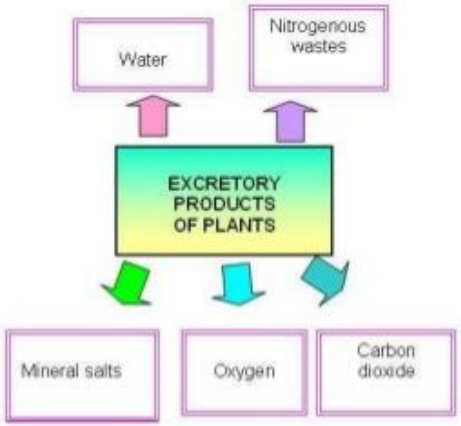
- Removal of waste from the body




Bowman's capsule
Glomerulus
1 Proximal tubule
Arteriole from renal artery
Arteriole from glomerulus
3 Distal tubule
Branch of renal vein
From another nephron
Collecting duct
2 Loop of Henle with capillary network
©Addison Wesley Longman, Inc.


Mechanisms of urine dilution
Na+/Cl−
Na+/Cl−
Distal convoluted tubule
Na+/Cl− reabsorption reduced by: thiazide diuretics
Proximal tubule
Glomerular filtration
Cortical diluting segment
Collecting duct (impermeable to H2O in absence of vasopressin or other antidiuretic substances)
Na+/Cl−
H2O
Thick ascending limb
Diminished by: age, renal disease, congestive heart failure, cirrhosis, nephrotic syndromes, volume depletion
Na+/Cl− H2O
H2O
Na+/Cl−
Na+/Cl−
H2O
Permeability increased by: vasopressin, drugs
Delivery of H2O determined by: glomerular filtration rate, proximal tubule H2O, and Na+/Cl− reabsorption
Na+/Cl−
H2O
Na+Cl− reabsorption reduced by: loop diuretics, osmotic diuretics, interstitial disease
Loop of Henle
Solute concentration

EXCRETORY PRODUCTS OF PLANTS



- Most of the waste products produced by plants are excreted mainly by ***simple diffusion*** through the ***stomata.***
- ***Nitrogenous wastes*** are mostly converted into insoluble granules which are kept within the plant cells.
- Waste products in the form of ***oil droplets*** can be used to make ***perfumes*** and ***aromatic oils.***

4. WORKSHEETS

Print or copy the worksheet questions on the blackboard and ask the students to attempt them. They can be given as homework or a class test as well.

Worksheet 1

Use it like: test after introduction of photosynthesis, homework, class assignment

1. How is the opening and closing of stomata occur?
2. How does the absorption of food takes place in small intestine?
3. Name a fluid which is a part of circulatory system other than blood. Give its function.
4. How does exchange of gases in alveoli take place?
5. What is the function of urinary bladder?

Worksheet 2

Use it like: checking students understanding in class, oral test

Multiple choice questions:

1. Which of the following tissue in plants help in translocation of food?

a) Xylem
b) Xylem tracheids
c) Phloem
d) Connective Tissue

2. Which of the following systems of human body comprises of these set of organs?
Kidney, Ureter, Urinary Bladder, Urethra

a. Excretory System
b. Respiratory System
c. DIgestive System
d. Excretory System

3. In human body, oxygen is transported by _____.

a. Blood
b. Veins
c. Capillaries
d. Heart

4. State whether the following statement is true or false.
In fishes, single circulation of blood occur.

a. True
b. False

5. Which of the following has three chambered heart?

a. Birds
b. Amphibians
c. Mammals
d. Fish

6. In humans, the site of exchange of gases is _____.

a. Lungs
b. Trachea
c. Alveoli
d. Nose

7. Can amoeba digest and excrete food?

a. Yes
b. No

8. Which of the following glands releases secretion in small intestine?

a. Gall Bladder
b. Liver
c. Pancreas
d. Both b) and c

9. Which of the following blood cells help in blood clotting?

a) RBC

b) WBC

c) Platelets

d) Both a) and b)

10. From where is the blood collected by vena cava?

a. Heart only

b. Lungs only

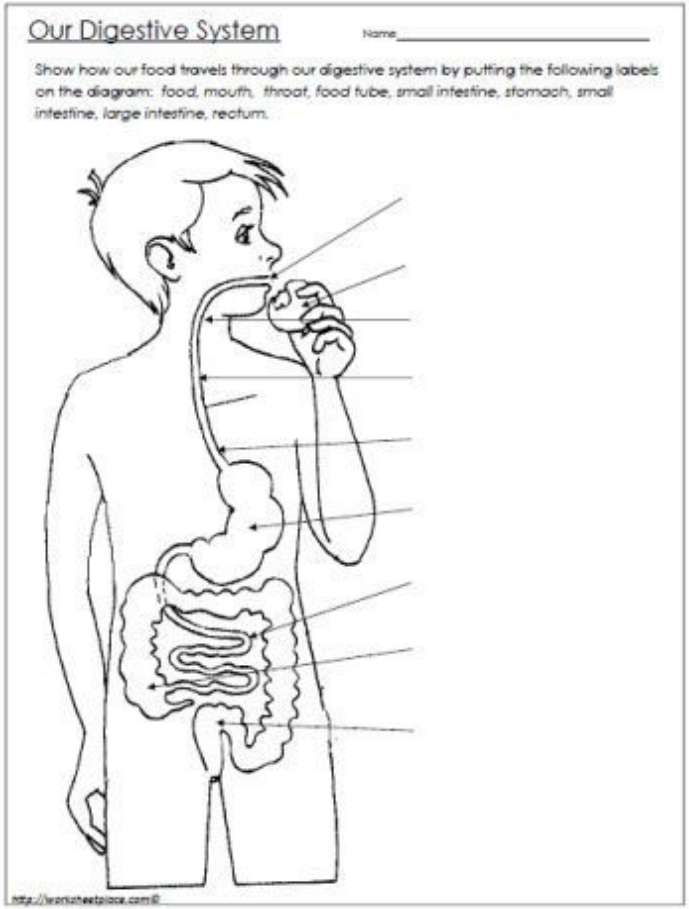
c. All the parts of the body

d. Brain only

Worksheet 3

Use it like: after Activity 3, classwork

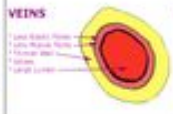
1. **Label different parts:**



2. **Fill in the blank spaces in the table given below related to the blood vessels.**

Blood Vessels

- Fill in the table using the words below to help you.

Diagram			
Name	**Artery**	**Vein**	**Capillary**
Type of Blood			
Direction			
Pressure			
Size of Hole (lumen)			
Wall Thickness			
Valves?			

You may need to use some of these more then once.

deoxygenated	away from the heart	no valves	large lumen	thick walls
oxygenated	towards the heart	valves	small lumen	thinner walls
High pressure	low pressure	1-cell thick	tiny lumen	

5. SOLUTIONS

This section gives you sample answers for activities and questions listed above.

Worksheet 1

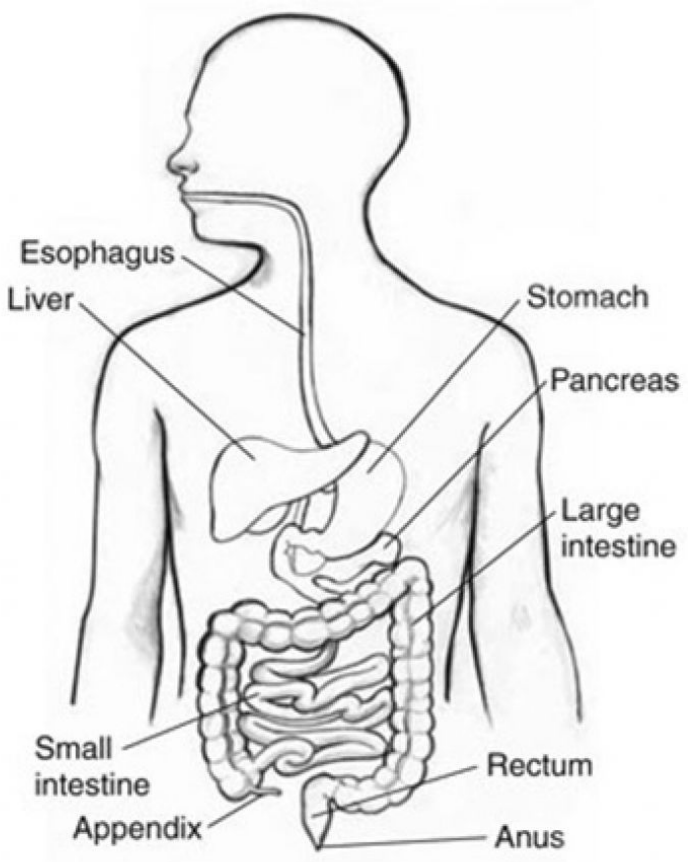
1. The opening and closing of stomata is a function of guard cells. The guard cells swell when water flows into them causing the stomatal pore to open. As the guard cells shrink the stomatal pore closes.
2. The inner lining of the small intestine has numerous finger-like projections called villi which increases the surface area for absorption. The villi are richly supplied with blood vessels which take the absorbed food to every cell of the body. In cells, this absorbed food is utilised for obtaining energy, building up new tissues and repairing of old ones.
3. Lymph is a fluid other than blood which is a part of circulatory system. Lymph carries digested and absorbed food from extracellular space back into the blood.
4. The surface area of alveoli is quite large where the exchange of gases take place. Its walls contain an extensive network of blood vessels. The blood in these blood vessels carry carbon dioxide from all parts of the body to release into the alveoli, and the oxygen from the alveoli is taken up by these blood vessels to be transported to all the cells in the body.
5. Urine is stored in urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra.

Worksheet 2

1. c) Phloem
2. d) Excretory System
3. a) Blood
4. a) True
5. b) Amphibians
6. c) Alveoli
7. a) Yes
8. d) Both b) and c)
9. c) Platelets
10. c) All the parts of the body

Worksheet 3

1. Esophagus is the same as food pipe.



2.

	Artery	**Vein**	**Capillary**
Type of Blood	Oxygenated	Deoxygenated	Both oxygenated and deoxygenated
Direction	Away from heart	Towards heart	Both away and towards heart
Pressure	High pressure	Low pressure	Low pressure
Site of Hole	Large lumen	Small lumen	Tiny lumen
Wall Thickness	Thick walls	Thinner walls	1-cell thick
Valves	No	Valves	No

6. EXTRA RESOURCES

Carry out the following suggested activities/ tasks if you have the time and resources to do them

1. **Video Links:**

   Show the following videos to the students on computer/ tablet/ screen:

a) Life Processes
   https://www.youtube.com/watch?v=HyFuW9jVo9w

b) Excretion In Humans
   https://www.youtube.com/watch?v=EhnRhfFLyOg

2. **Extension Activity 2:**
   Ask students to make model of any one life process of human beings - nutrition, respiration, circulation and excretion. Ask them to carefully study the process and do the project.