



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 16.

Concepts: EVENTS/STEPS IN RESPIRATION

LEARNING OUTCOMES:

The learner...

1. Explains the term respiration.
2. Identifies the different steps involved in respiration.
3. Draws the flow chart showing the events in respiration.

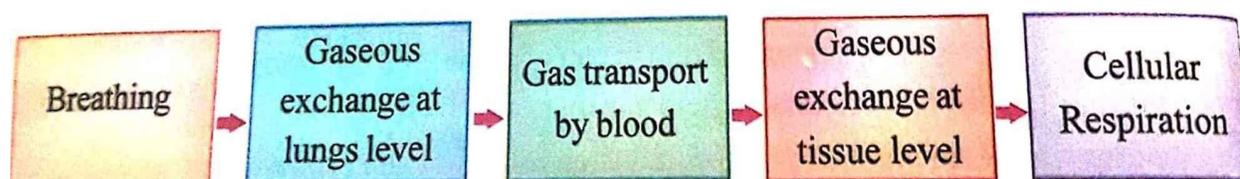
CONCEPT PRESENTATION:

The respiration is a process of taking O_2 and releasing CO_2 . It is an energy releasing process. The energy released in this process helps in various metabolic activities of the body.

- What is respiration?

Respiration is defined as the biochemical process where in the living cells of an organism produce energy by taking in O_2 and liberating CO_2 from the oxidation of complex organic substances like carbohydrates, fats and proteins.

Observe the flow chart:



- What are the general events in respiration?
- What are the end products of cellular respiration?

Generally, respiration involves five main events.

1. **Breathing:** Air moves into and out of lungs.
2. **Gaseous exchange at lungs level:** Exchange of gases between alveoli and blood.
3. **Gas transport by blood:** Transport of oxygen from blood capillaries of alveoli to body cells and return of carbon dioxide.



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Chapter: 2. Respiration

Work sheet No: 17.

Concepts: INHALATION - EXHALATION (BREATHING)

LEARNING OUTCOMES:

The learner...

1. Conducts experiment to know about the gas present in exhaled air.
2. Gives reasons for the turning of lime water into milky white.

CONCEPT PRESENTATION:

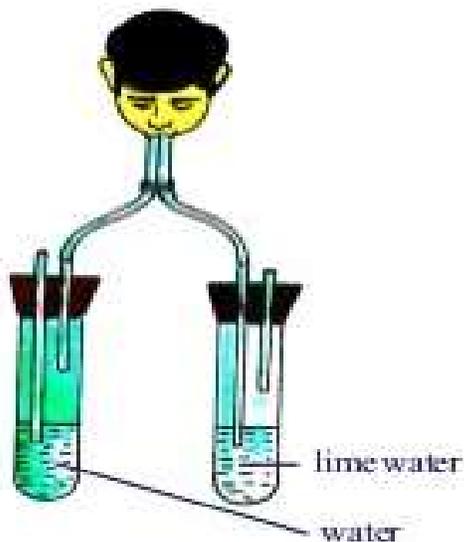
Respiration is a complex process involving different events.

- What happens during breathing?

Breathing involves movement of air into lungs and out of lungs. The inhaling air contains mixture of gases including nitrogen (N_2), oxygen (O_2), carbon dioxide (CO_2) and other gases.

- How would you identify the gas which is released in exhalation?
- Which gas is expelled during exhalation?

To test the gas which is expelled out from the lungs in exhalation, take two test tubes. Prepare lime water and take it in one test tube and normal water in another test tube. Using a straw, breathe out air into the test tube containing normal water and the test tube containing lime water.



- What did you observe in both the test tubes?

Lime water turned milky white as we breathe out air into the test tube. In the other test tube, there will be no change in the colour of the water. Because of the presence of CO_2 in exhaled air, the lime water in test tube turns into milky white. Based on this, we can prove that CO_2 is present in exhaled air.

SELF EVALUATION

1. Write about an experiment by which we prove that exhaled air has CO₂.

2. Which gas turns lime water into milky white?

3. Identify the gas present in breath out air from the following. []

A. Hydrogen B. Oxygen C. Carbon dioxide D. Nitrogen oxide

4. Choose the INCORRECT statement. []

A. Oxygen turns lime water milky.

B. Carbon dioxide is more in exhaled air.

C. Along with carbon dioxide water vapor is also present in exhaled air.

D. Breathing involves both inhalation and exhalation.



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 18.

Concept: PATHWAY OF AIR

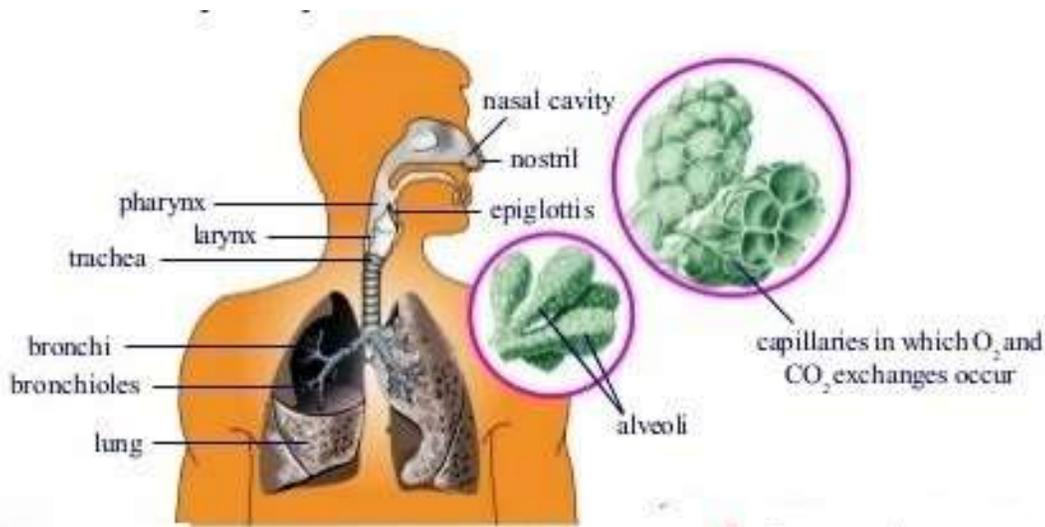
LEARNING OUTCOMES:

The learner...

1. Draws the flow chart showing pathway of air in human respiratory system.
2. Identifies the different parts of the respiratory system
3. Explains the functions of each part of human respiratory system.

CONCEPT PRESENTATION:

Respiration has different steps. Air moves from nostrils to alveoli involving different parts of the respiratory system. Observe the following figure;



- Identify the pathway of air in human respiratory system
- What changes occur in the gas that enters the nasal cavity?

Nostrils are the apertures through which air enters into the body. These nostrils open into nasal cavity. Air is filtered in the nasal cavity. The moist surface of the lining of the nasal cavity and the hair present on it, remove some of the tiny dirt and dust particles present in the inhaled air. The temperature of the inhaled air is brought close to that of body temperature and it takes up water vapour so that air that enters nasal cavity becomes moister than before.

- Name the structure which separates food pipe from wind pipe?
- Which structure is responsible for producing sound in humans?

A flap like muscular structure called 'Epiglottis' which controls the movement of food and air towards their respective passages. Pharynx leads to Larynx, commonly called voice box or sound box. This contains vocal cords. When air passes out of the lungs over the vocal cords, it causes them to vibrate. We could speak because of these vibrations.

- What is a tube-like structure present in the throat?
- Which parts does it form?

The tube-like structure present in the throat is called trachea or wind pipe. This opens into lungs. At the lower end in the thoracic region the trachea divides into two branches called bronchi, one bronchus to each lung. Each bronchus is further divides into smaller and smaller branches called bronchioles.

- Names the structures of lungs which help in gaseous exchange?

Bronchioles finally terminate in clusters of air sacs called 'alveoli' in the lungs. Alveoli are very small structures and in very large numbers. Gaseous exchange takes place in alveoli as blood capillaries take up O₂ and expel CO₂. Blood carries O₂ to each and every cell of the body.

SELF EVALUATION

1. Draw a flow chart showing the pathway of air in humans.
2. Draw the figure of human respiratory system and explain.
3. What changes occur in the gas that enters the nasal cavity?
4. Where is epiglottis located? What is its function?
5. Where does gaseous exchange takes place in humans?
6. What happens, if trachea is not moist?

7. Sound producing structures in the larynx. []

A. Vocal cords B. 'C' shaped cartilaginous rings C. Epiglottis D. Alveoli.

2. Identify the CORRECT pathway of air in humans. []

- A. Nostrils → Nasal cavity → Trachea → Blood
 B. Blood → Nostrils → Nasal cavity → Pharynx → Trachea
 C. Larynx → Trachea → Bronchus → Nostrils
 D. Nostrils → Pharynx → Larynx → Bronchus → Alveoli



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Chapter: 2. Respiration

Work sheet No: 19.

Concept: EPIGLOTTIS

LEARNING OUTCOMES:

The learners.....

1. Explains the function of epiglottis.
2. Gives reasons why food particles do not enter into the wind pipe.

CONCEPT PRESENTATION:

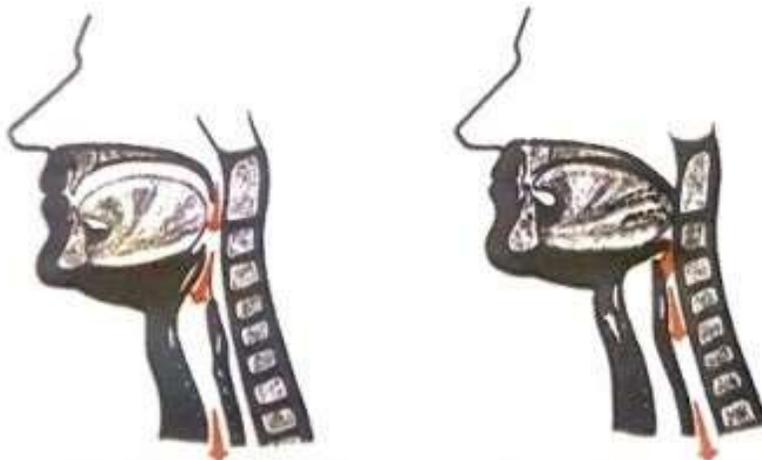
The inhaled air goes into lungs through different parts and ultimately reaches the blood. When air passes from the nasal cavity and goes into the pharynx.

- Name the part where the food and air are together and get separated?

The inhaled air goes into the pharynx from the nasal cavity. The food we eat reaches pharynx from the mouth. At the pharynx there are two passages, beginning with nearly same opening and ending into separate ones, one to the lungs and another one to the stomach.

- Which structure regulates the openings of food and wind passages?

It is important that air goes into one passage and the food into another passage. It is also important that food does not enter the tube through which air goes into the lungs. The traffic is kept properly channeled by a flap like valve called 'epiglottis' that protects the tube to the lungs arresting entry of food. Observe the following figure.



- What is difference between breathing and swallowing?
- How epiglottis works while breathing or swallowing?

The epiglottis is a flap like muscular valve that partly closed when we swallow food; it deflects food down to the stomach and keeps it out of the trachea or windpipe. The epiglottis opens more widely when we take a breath, and air enters the lungs. In this way epiglottis executes the movement of food and air properly into the respective passages.

SELF EVALUATION:

1. What will happen if epiglottis is absent?

2. What is the role of epiglottis in breathing and swallowing?

3. Which part prevents/arrests the entry of food into respiratory system? Where is it located?



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Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 20.

Concepts: 1.Inhalation 2.Exhalation 3. Diaphragm

LEARNING OUTCOMES:

The learner...

1. Explains the process of respiration.
2. Differentiates between inhalation and exhalation.
3. Identifies the parts which help in inhalation and exhalation.

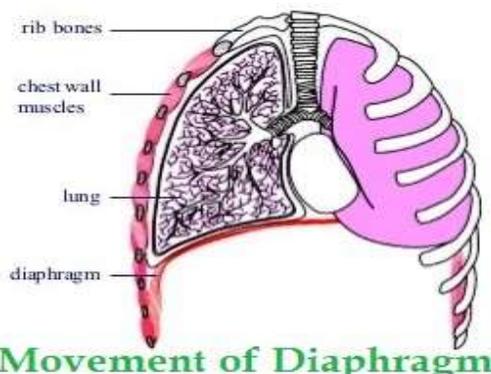
CONCEPT PRESENTATION:

Various organs assist during inhalation of air into lungs and exhalation of air out of the body. The major organs that help in respiration are lungs

- Place your hand on your chest and breathe in very deeply, and observe any changes in your chest as you breathe.

When you inhale/breathe in deeply you will notice that your chest becomes slightly bigger, and your chest returns to normal/regular size when you exhale/breathe out.

Observe the following figure.



- What are the parts that help in exhalation and inhalation?

The lungs themselves can neither draw in air nor push it out. Instead, the chest wall muscles and another flexible flattened muscle which separates chest cavity with stomach is called diaphragm help the lungs in moving air into and out of them.

Observe the following figure.



When the diaphragm is relaxed, we breathe out; it is in the shape of dome with the convex side of the dome extending into the chest cavity. When the diaphragm contracts during inhalation it flattens out a bit or the dome moves downward. As a result, the volume of the chest cavity is increased. When the diaphragm flattens and the volume of the chest cavity is increased, its normal pressure decreases and the air from outside rushes into the lungs. This is called as ‘inspiration’ or ‘inhalation’. Exhalation is opposite to inhalation. The chest wall is lowered and moves inward and the diaphragm relaxes and assumes its dome shape. As a result pressure increases in chest cavity. Hence the air squeezes out through the nose to the external atmosphere. This is called as ‘expiration’ or ‘exhalation’.

- What happens to our breathing rate, when we sleep or when we are at rest?
- Why breathing is faster when we do exercise?

Our breathing rate is slow and shallow, when we are at rest. It is deeper and faster when you exercise hard. Since oxygen is carried in blood, the heart beats faster to get the O_2 to cells quicker. More amount of CO_2 is formed. This needs to be transported back to the lungs quickly and exhaled. So, breathing rate must be increased. Indeed, patterns of breathing show a great range. They are coordinated with moment-by-moment needs of the body for supply O_2 and removal CO_2 . Diaphragm in men and ribs in women play a major role in breathing.

SELF EVALUATION:

1. What are the parts that help in exhalation and inhalation in our body?
2. What are the changes that take place during inhalation and exhalation?
3. Name the parts that play a major role in breathing in men and women respectively.

4. Which of the following statements are correct?

[]

- i).The diaphragm contracts-volume of chest cavity increases.
- ii).The diaphragm contracts-volume of chest cavity decreases.
- iii).The diaphragm expands-volume of chest cavity increases.
- iv).The diaphragm expands-volume of chest cavity decreases.

A. (i) only B. i and ii only C. ii and iii only D. iv only



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 21.

Concept: GASEOUS EXCHANGE

LEARNING OUTCOMES:

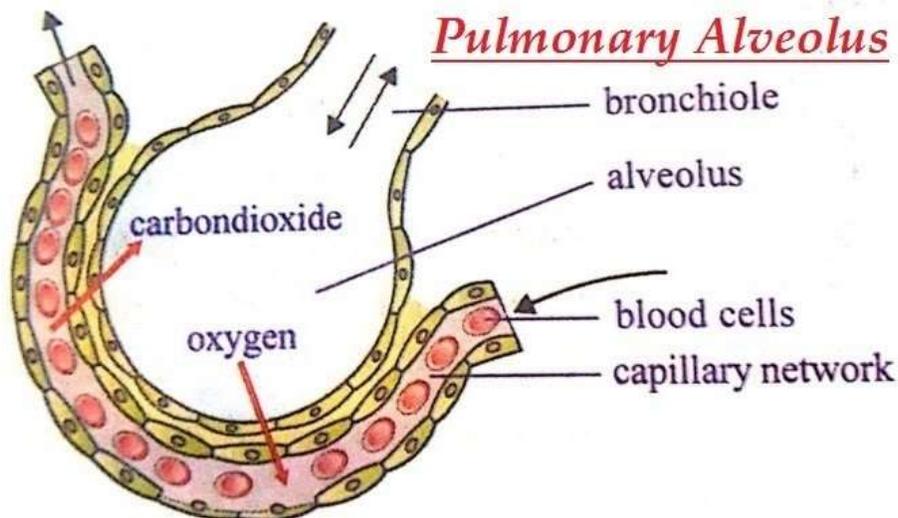
The learner...

1. Explains the gaseous exchange in lungs with the help of a diagram.
2. Identifies the parts of lungs, where gaseous exchange takes place.
3. Identifies the difference between inhaled and exhaled air composition.

CONCEPT PRESENTATION:

During respiration we breathe in O_2 and release CO_2 . Lungs play an important role in respiration. The exchange of gases takes place in alveoli. Observe the following figure.

- How does the exchange of gases takes place in alveoli?



Gaseous exchange takes place within the lungs by diffusion from the alveoli to blood capillaries and vice versa.

The alveoli in the lungs are numerous and only one cell thick. They are surrounded by capillaries that are also only one celled thickness. The CO_2 in the blood is exchanged for O_2 in the alveoli by diffusion process.

The composition of inhaled and exhaled air is different. Observe the table given below:

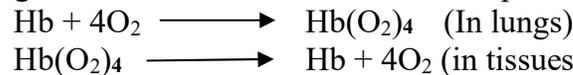
Gas	% in inhaled air	% in exhaled air
Oxygen	21	16
Carbon dioxide	0.03	4.4
Nitrogen	78	78

- Why the composition of inhaled and exhaled air is different?

Oxygen present in the inhaled air is diffused into the blood; hence the percentage of O₂ is decreased from 21% to 16%. And CO₂ passes out of the capillaries i.e. from blood stream into the alveoli; hence the percentage of CO₂ is increased from 0.04% to 4%. The percentage of N₂ (78%) does not change because it is not absorbed.

- How does gas transport occurs through blood?

When O₂ is diffused into the blood, it rapidly combines with the haemoglobin to form oxyhaemoglobin. When this blood reaches the tissues, the O₂ dissociates from haemoglobin and enters into the tissues. CO₂ usually transported as bicarbonate, while some amount of it combines with haemoglobin and rest is dissolved in blood plasma.



In tissues the cells continuously use O₂; hence the concentration of O₂ is quite low in them. Due to this oxyhaemoglobin releases the O₂ into the cells. It is used for the releasing of energy by producing CO₂ and water.

- Compare haemoglobin with chlorophyll.

Both haemoglobin and chlorophyll are pigments. Chlorophyll present in plants (leaves) contains **Magnesium ion (Mg⁺)**, which is used in the synthesis of starch by photosynthesis. Haemoglobin is present in RBC of blood and imparts red colour to it. It contains **Iron (Fe⁺)** and helps in the transportation of gases

SELF EVALUATION:

1. Explain the exchange of gases in lungs with the help of a figure.
 2. What are the consequences of haemoglobin deficiencies in blood?
 3. Compare haemoglobin with chlorophyll.
 4. Why CO₂ is more and O₂ is less in exhaled air?
 5. Write about the process of transporting gases through blood.
6. The pigment that binds oxygen in blood is ()
 A. Chlorophyll B. Haemoglobin C. Porphyrin D. Haemoglobin.
7. $\text{Hb}(\text{O}_2)_4 \longrightarrow \text{Hb} + 4\text{O}_2$ it occurs at.... ()
 A. Lungs B. Pharynx C. Larynx D. Tissues



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 22.

Concept: CELLULAR RESPIRATION.

LEARNING OUTCOMES:

The learner...

1. Explains about cellular respiration.
2. Gives reason for considering mitochondrion as power house of the cell.
3. Draws the structure of mitochondrion.

CONCEPT PRESENTATION:

The oxygen that is diffused from alveoli into the blood is transported to each and every cell of the body.

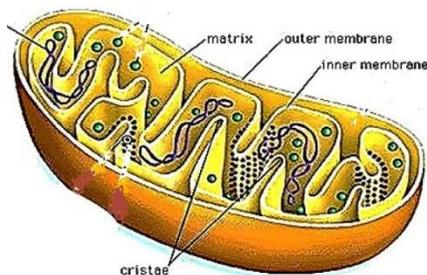
- What is cellular respiration?

Cellular respiration is the pathway by which cells release energy from the chemical bonds of food molecules that enter them. It provides that energy for the essential processes of life.

Cellular respiration in prokaryotic cells like bacteria occurs within the cytoplasm. In eukaryotic cells part of respiration occurs in cytoplasm and the remaining part in mitochondria.

Observe the following figure.

- Name the cell organelle shown in the figure.
- Why it is called as power house of the cell?



**MITOCHONDRIA-
STRUCTURE**

The cell organelle shown in the figure is mitochondria.

Mitochondria are rod like double membranous organelles found only in eukaryotic cells. The outer membrane is smooth and inner membrane shows inward folding, which are called as cristae. The produced energy is stored in mitochondria in the form of ATP. That is why mitochondria are called as 'power houses of the cell'.

- How does glucose releases energy?

From the breakdown of glucose the energy is released and stored up in a special compound, known as ATP (adenosine tri phosphate). It is a small parcel of chemical energy. Each ATP molecule gives 7200 calories of energy. The energy is stored in the form of phosphate bonds. Energy is released when these bonds break.

SELF EVALUATION

1. Draw a neat labeled diagram of Mitochondria.

2. Explain cellular respiration briefly.

3. What is energy currency?

4. Why mitochondria called as power houses of cell?

5. What is cellular respiration?

6. In cells the energy is stored in the form of []

- A. ATP B. ADP C. NADP D. NADPH

7. Choose the INCORRECT statement []

- A. Each ATP molecule gives 7200 calories of energy.
B. Mitochondria are called as power houses of the cell.
C. In prokaryotes respiration occurs in mitochondria.
D. In eukaryotic cells the cytoplasm and mitochondria are the sites of cellular respiration



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 23.

Concepts: 1. AEROBIC RESPIRATION, 2. ANAEROBIC RESPIRATION

LARNING OUTCOMES:

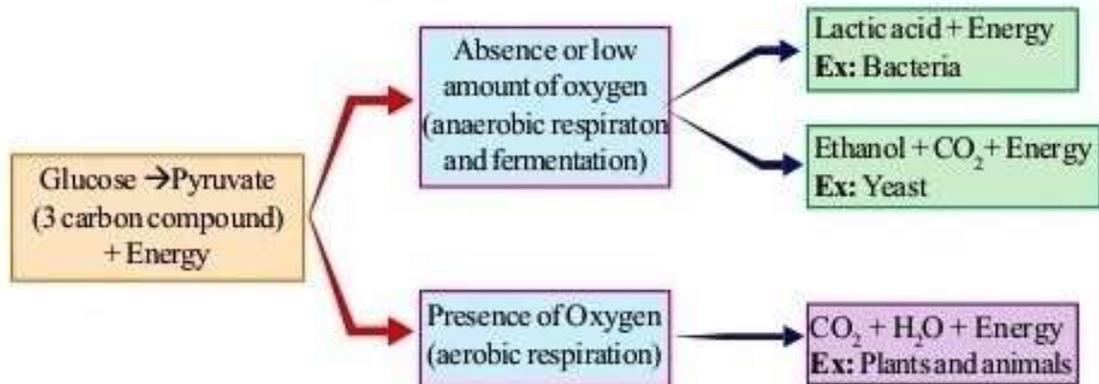
The learner...

1. Explains the differences between aerobic and anaerobic respiration.
2. Identifies the substances formed in fermentation.
3. Gives reasons for muscular pain.

CONCEPT PRESENTATION:

There are two types of cellular respiration takes place in living organisms. They are aerobic and anaerobic. Aerobic respiration occurs in the presence of O_2 , and anaerobic occurs when O_2 is less or in the absence of O_2 .

Observe the following chart and equations;



1. Aerobic Respiration



2. Anaerobic Respiration

- Name the end products of aerobic respiration.
- Name the end products of anaerobic respiration.
- What are the examples of organisms that use anaerobic respiration?

In all the organisms glucose is oxidized in two stages. In first stage glucose is broken down to two pyruvic acid molecules. In second stage, in **aerobic respiration** glucose is completely oxidized. In this process CO_2 , H_2O are formed as end products and large amount of energy is released. It is common in most of the **plants** and **animals**. In **anaerobic respiration** glucose is incompletely oxidized. In this process CO_2 and ethanol (in yeast) or lactic acid (in Bacteria) are formed as end products and a very little amount of energy is released.

- Why do we feel pain in muscles, when working more than usual?

Oxygen deficiency occurs in body, when we work more than usual. With this anaerobic respiration occurs in muscles and lactic acid is formed. Accumulation of lactic acid results muscular pain. Getting enough oxygen by resting and will get back to normalcy.

- **What is fermentation?**
- **Write the food products which are prepared by fermentation process.**

Fermentation is the process of converting carbohydrates to alcohol or organic acids using microorganisms like yeasts or bacteria under anaerobic conditions. If yeast and sugar solution are left to stand without O_2 for some day's ethanol is produced. Ex., Idli, Dosa, Curd etc. are prepared by fermentation process.

SELF EVALUATION:

- 1. Write the differences between aerobic and anaerobic respiration.**
- 2. What is fermentation? What are the end products of fermentation?**
- 3. Why do muscles pain when we work more than usual?**
- 4. The total amount of energy released from one glucose molecule in an anaerobic respiration** []
A. 686 K. Cal B. 412 K. Cal C. 343 K. Cal D. 56 K. Cal
- 5. Identify the correct statement about aerobic respiration from the following.** []
A. In the presence of O_2 , ethanol and CO_2 are produced from glucose.
B. In the presence of oxygen CO_2 , H_2O and energy are produced from glucose.
C. In the absence of oxygen CO_2 , and H_2O are produced from glucose.
D. It is found in lower organisms like bacteria and yeast.



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 24.

Concepts: ANAEROBIC RESPIRATION

LARNING OUTCOMES:

The student...

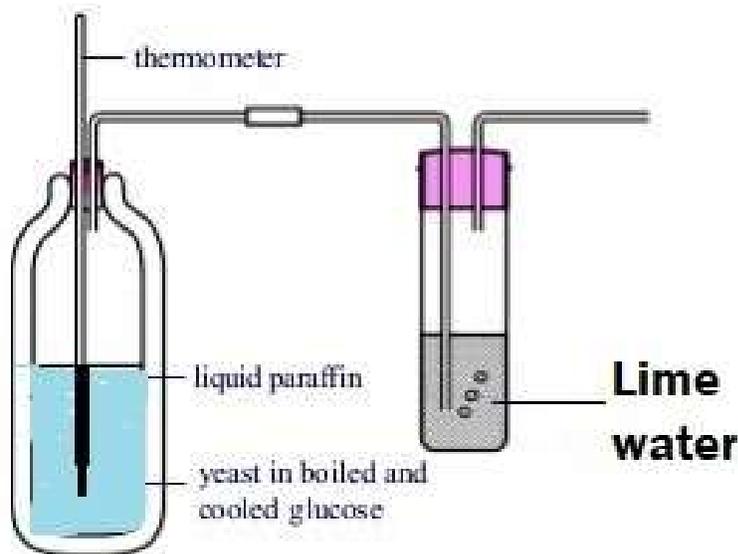
1. Identifies the gas released in an anaerobic respiration.
2. Conducts experiment to prove the anaerobic respiration.
3. Gives reason for removing O_2 from the glucose solution while conducting the experiment to prove an anaerobic respiration.

CONCEPT PRESENTATION:

Some living organisms (like Yeast, Bacteria) release heat and CO_2 , when they are kept away from free supply of oxygen.

- How do you prove an anaerobic respiration?

Observe the activity given in the figure and answer the questions:



Arrange the apparatus as shown in the above figure.

Take glucose solution in a glass bottle, heat for a minute then cooling it without shaking to remove dissolved O_2 from it. Now put some yeast. The supply of O_2 from the air can be cut off by pouring one centimeter layer of liquid paraffin on to the mixture.

- How can we check that the oxygen has been removed

from the mixture?

Few drops of Diazine green or Janus Green B indicator solution is used to check that the oxygen has been removed from the mixture; It turns pink when oxygen availability is low.

- Which gas is released in an anaerobic respiration? How can you test that gas?

During anaerobic respiration some amount of CO_2 is released. This released CO_2 passes through the tube and turns lime water (Bicarbonate solution) into milky white.

- Why the thermometer is used in this activity?

We use thermometer to know the changes in temperature during this activity.

- What would happen, if yeast and sugar solution are left to stand without O_2 for some days?

If yeast and sugar solution are left to stand without O_2 for some days, they develop a characteristic smell, it is due to the production of ethanol.

In this activity we observe that there is a rising temperature along with the production of CO_2 when living organisms like yeast is kept away from the supply of O_2 . But in this process very little amount of energy is released.

SELF EVALUATION:

- 1. Write the experiment to that heat and CO_2 is released during anaerobic respiration.**
- 2. Why do use paraffin solution in the experiment to prove anaerobic respiration?**
- 3. Which chemical is used to know the presence of O_2 in the solution?**
- 4. What products are produced with fermentation process?**
- 5. Identify the chemical solution used in the yeast experiment.** []
 - A. Diazene green
 - B. Potassium hydroxide
 - C. Betadine solution
 - D. Methylated spirit.



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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 25.

Concepts: 1. RESPIRATION, 2. COMBUSTION.

LEARNING OUTCOMES:

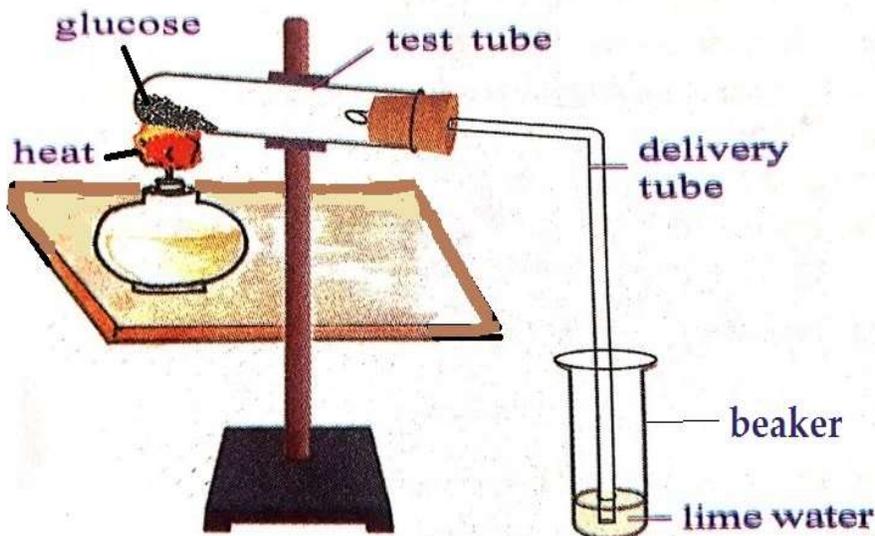
The learner...

1. Compares the Respiration with Combustion.
2. Conduct activity to observe the changes during Combustion of sugar.

CONCEPT PRESENTATION:

Respiration is a process in which carbohydrates get oxidized to release CO_2 and heat energy. It is a very slow process and here O_2 combines with carbon and hydrogen. Robinson stated that respiration is a type of combustion, and it is the source of heat in animals.

Observe the following figure;



How can the combustion process be proved?

- What are the materials used in above activity?
- Which gas is released after burning glucose?
- What are the end products of burning glucose?

In combustion glucose is burnt at high temperature with the releasing of heat energy, CO_2 and H_2O .

- What are the differences between combustion and respiration?

Combustion	Respiration
When glucose burnt at high temperature energy will be released.	If it happened in our cells, all cells would be burnt even at optimum temperature.
Once glucose starts burning, it can't be stopped easily.	In living cells are able to exercise control over the sort of burning of glucose in the presence of O₂.
Water normally stops combustion.	While cells contain lot of water and respiration still goes on.

SELF EVALUATION

1. Write the differences between respiration and combustion.

2. Why is respiration considered as a combustion process?

3. What will be released when glucose is burnt?

4. Identify the correct statement about combustion.

[]

i. In combustion energy is released in the form of heat and light.

ii. In combustion energy is released in one go.

iii. In combustion heat energy is released slowly and step wise.

iv. In combustion intermediary products are formed.

A). i, ii, iii are correct

B). i and ii is correct

C). iii and iv is correct

D). i and iii is correct.



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LEVEL - 2

Class: 10

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Subject: Biology

Chapter: 2. Respiration

Work sheet No: 26.

Concept: EVOLUTION IN GAS EXCHANGING SYSTEM.

LEARNING OUTCOMES:

The learner...

1. Identifies the respiratory organs in different organisms
2. Explains about the respiratory organs of different organisms.

CONCEPT PRESENTATION:

The Exchange of gases is a common life process in all the organisms. It is not same in all. Animals are adapted to different types of respiration and possess different types of respiratory organs, mostly depend on their habitat. Body size, availability of water and type of their circulatory system are some of the reasons for the animals to develop different types of respiratory organs.

- Which organisms can respire only by diffusion process? Give some examples.

Single celled organisms like amoeba or multicellular organisms like Hydra and Planarians, Round worms and Earthworms obtain O_2 and expel CO_2 directly from the body by the process called diffusion.

- How does gas exchange takes place in insects?

There is tracheal respiratory system in insects like cockroach, grasshopper etc., Tracheal respiration system consists of series of tubes called trachea. They are divided into fine branches called tracheales which carry air directly to the cells.

- How do fishes respire and what are their respiratory organs?

Fishes have special organs called gills or branchiae for branchial respiration. Fish take in oxygen-rich water through their mouths and pump it over their gills. As water passes over the gill lamellae, blood inside the capillary network picks up the dissolved oxygen.

- Which organisms use skin for exchange of gases? Give examples.

Respiration through skin is called cutaneous respiration. Amphibians like frogs can respire through skin, lungs and Buccopharyngeal cavity

- Which organisms have lungs as respiratory organs?

Terrestrial animals like reptiles, birds and mammals respire through lungs. This type of respiration is called 'pulmonary respiration'.

SELF EVALUATION:

1. Explain the process of respiration in fish.

2. Write the differences between bronchial and pulmonary respiration.

3. Which organisms can respire only by diffusion process?

4. Which organisms have lungs as respiratory organs?

5. Respiration in insects is ()

A. Cutaneous B. Pulmonary C. Tracheal D. Buccopharyngeal

6. Identify the correct pair of organisms which respire through skin. ()

A. Amoeba, fish B. Fish, frog C. Frog, earthworm D. Earthworm, cockroach



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 27.

Concepts: 1. Lenticels, 2. Respiratory roots (Aerial roots).

LEARNING OUTCOMES:

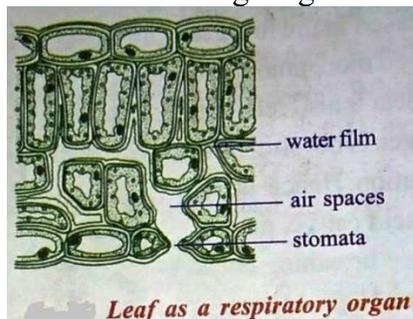
The learner...

1. Identifies different structures in plants that help in gaseous exchange.
2. Explains the process of respiration in plants.
3. Gives reasons for developing aerial roots for gaseous exchange in mangroves.

CONCEPT PRESENTATION:

In plants gaseous exchange takes place by stomata and lenticels (Aerating pores on stem).

Observe the following diagrams:



- What are the structures shown in the above figures? What are their functions?

Stomata are found on the surfaces of plant leaves and on young stems. There are other structures called lenticels present on mature stems and on aerial roots of mangroves. They help in gaseous exchange. They also help in transpiration.

- How does exchange of gases takes place in leaves?

The stomatal openings lead to a series of spaces between the cells inside the plant, which forms a network all over the plant. The spaces are very large in the leaves. The air spaces are lined with water there the O_2 is dissolved in this and passes through the porous cell wall into the cytoplasm. Hence the sugar in the cell is broken down into CO_2 and H_2O with the liberation of the energy. The CO_2 passes out into the air spaces by a similar path.

The process of exchange of gases takes place in plants by diffusion, as the O_2 is used up by the cells a gradient develops between the cells and the air in the spaces. Similarly between the air in the spaces and the air outside the stomata and lenticels, so O_2 passes in. In the same

way, as CO₂ is released by the cells a gradient occurs in the reverse direction and released into the environment.

Observe the figure:



- In which plants are these structures found?
- What is special about them?

Most plants can aerate their roots by taking in O₂ through the surface of their root hairs. They get O₂ soil air spaces. But, the marshy plants cannot obtain O₂, as they grow in O₂ poor soils where water-logged conditions prevail. The problem of air

transport is more difficult for such plants. They have aerial roots above the soil surface and take in O₂ through these roots efficiently. These roots are called respiratory roots. Ex: Mangrove trees

SELF EVALUATION:

1. How do stomata help in exchange of gases?

2. In plants through which parts exchange of gases take place?

3. Why respiratory roots are especially present in mangroves? Write the reason.

4. Draw the transverse section of leaf showing stomata and label it.

5. The parts that help in plant respiration.

- | | | | |
|-------------|---------------|---------------------|----------------|
| i. stomata | ii. Lenticels | iii. Pneumatophores | [] |
| | | | iv. Bark |
| A. i and ii | B. ii and iii | C. i, ii and iii | D. iii and iv. |

6. Match the following.

- | | | | |
|---------------------|----------|---------------------|----------|
| a) Large air spaces | () | i. Stem | [] |
| b) Aerial roots | () | ii. Leaves | |
| c) Lenticels | () | iii. Aquatic plants | |
| d) Stomata | () | iv. Mangroves | |

A). a-i, b-ii, c-iii, d-iv

B) a-iii, b-iv, c-i, d-ii

C). a-iii, b-i, c-iv, d-ii

D).a-ii, b-iv, c-iii, d-i



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TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 28.

Concept: EVOLUTION OF CO₂ IN RESPIRATION.

LEARNING OUTCOMES:

The learner...

1. Conducts an activity to prove that CO₂ is evolved during respiration.
2. Identifies the gas evolved during respiration in plants.
3. Explains the confirmation test of CO₂.

CONCEPT PRESENTATION:

In plants CO₂ is released during respiration.

- How can it be proved that plants release CO₂ during respiration?
Observe activity given in the following figure:



- What are the materials required to do this activity?

Take handful of moong or Bengal gram seeds. Soak the seeds in water a day before to perform this experiment. Keep these soaked seeds in a cloth pouch and tie with a string tightly. Keep the cloth pouch in a corner of your class room. Next day seeds will germinate. Take the sprouts from pouch; keep them in a glass bottle with wide mouth. Take a small beaker, with lime water; keep it in the bottle carefully and close the

bottle tightly. Keep this set undisturbed for two days.

- What did you observe?
- What change has seen in lime water?
- What is the reason for this change?

It is observed that the lime water in the bottle containing sprouted seeds turns milky due to the release of CO_2 . Sprouted seeds during respiration absorb O_2 and release CO_2 . This indicates that plants can respire and release CO_2 .

SELF EVALUATION:

- 1. Write the procedure of the experiment to prove that CO_2 is released during respiration in plants?**

- 2. Write about the confirmation test to detect carbon dioxide.**

- 3. The gas responsible for changing lime water to milky white. ()**
A. CO_2 B. Oxygen C. Hydrogen D. Nitrogen



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 29.

Concept: HEAT IS EVOLVED DURING RESPIRATION.

LEARNING OUTCOMES:

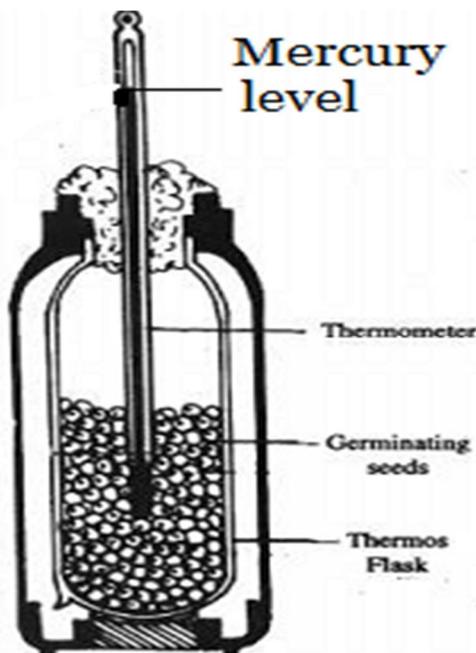
The student...

1. Conducts an activity to show that heat is evolved during respiration.
2. Identifies the materials needed for the experiment which is conducted to show that heat is evolved during respiration.

CONCEPT PRESENTATION:

Heat is evolved during respiration in plants.

- How can it be proved that heat is evolved during respiration in plants?
Observe the following figure;



Take sprouts in a Thermos Flask. Remove the lid and prepare a cork with thermocol or rubber through which bore a hole to insert a thermometer. Take care that the bulb of the thermometer should be dipped in the sprouts. Close the flask tightly with cork. Record the temperature for every two hours. You are advised to do this at least 24 hours.

- What kind of change in temperature was observed?
- Where does the heat come from?

It is observed that the sprouted seeds take O_2 present in the flask then absorbed by the cells of the seeds where in cellular respiration takes place and heat is released. Increasing temperature in the thermometer indicates that the release of heat during respiration.

SELF EVALUATION:

- 1. Write the procedure of the experiment, which can prove that heat is evolved during respiration?**
- 2. Write two precautions of the experiment, which can prove that heat is evolved during respiration?**
- 3. Draw and label the figure of an experimental set-up, which can prove that heat is evolved during respiration?**



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. Respiration

Work sheet No: 30.

Concepts: 1. PHOTOSYNTHESIS, 2. RESPIRATION.

LEARNING OUTCOMES:

The learner...

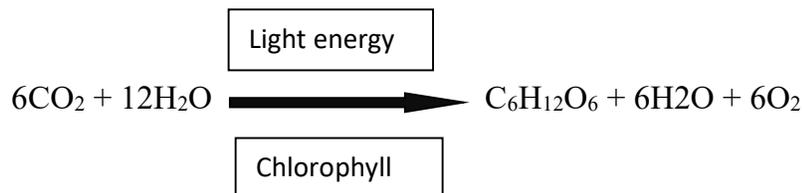
1. Compares photosynthesis with respiration.
2. Explains about anabolic and catabolic processes.

CONCEPT PRESENTATION:

In photosynthesis glucose is formed and oxygen is released, where as in respiration carbohydrates get oxidized to release CO₂ and energy.

- What is anabolic process?

The synthesis of larger molecules from simpler molecules is called anabolism. Photosynthesis is an example for anabolic process. In this the syntheses of complex molecules (glucose) occur from simpler ones like CO₂ and H₂O. Hence it is called an anabolic process.



- What is catabolic process?

The breakdown of complex molecules into simpler ones is called catabolism. Respiration and excretion are the examples for catabolism. Anabolism and catabolism together called as metabolism.



In the respiration process larger molecule like glucose breaks down into simpler molecules like CO_2 and H_2O . Hence respiration is considered as catabolic process.

- What are the differences between photosynthesis and respiration?

Photosynthesis and respiration appear to be opposing reactions, but both have very different biochemical pathways and are essential for a plant's metabolism. Photosynthesis takes place in the chloroplast to produce sugars, starch and other carbohydrates for the plant's metabolic needs.

Cellular respiration occurs in mitochondria where these carbohydrates are "burned" to produce chemical energy to function at the cellular level. During day time, the rate of photosynthesis is usually higher than that of respiration while at night it is just reverse in most plants.

SELF EVALUATION:

- 1. Write the differences between respiration and photosynthesis.**
- 2. Explain the differences between anabolism and catabolism with suitable examples.**
- 3. Write the chemical equations of photosynthesis and respiration.**

4. Anabolic process from the following is.... []

A. Photosynthesis B. Respiration C. Excretion D. Digestion

5. Identify the CORRECT statement. []

- i. In photosynthesis CO_2 is released.
- ii. In photosynthesis O_2 is released.
- iii. In respiration CO_2 is released.
- iv. In respiration O_2 is released.

A. ii and iv are correct
C. ii and iii are correct

B. i and iii are correct
D. i and iv are correct



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 31.

CONCEPTS: 1. PULSE; 2. HEART BEAT

LEARNING OUTCOMES:

The student....

1. Identifies the need of circulatory system in the organisms.
2. Conducts the activity to observe the pulse rate and heart beat rate
3. Compares the pulse rate with heart beat rate.

CONCEPT PRESENTATION:

All the living organisms need nutrients, gases. Liquids etc.. for growth and maintenance of the body. The circulatory system helps to send these substances to all parts of the body in all the organisms.

Observe the below figure



▪ Have you ever observed a doctor holding the wrist of the patient and looking at his watch for a minute? What is the doctor trying to find out from the watch and the wrist of the patient?

- What is pulse?

By holding the wrist of the patient the doctor is counting the heart beat of the patient per minute.

Do an activity by keeping index and middle finger on your wrist below the thumb with little pressure as shown in the above figure. You feel something pushing your fingers rhythmically up and down this is called Pulse.

- What is pulse rate per minute?
- What will be your pulse when your at rest?
- What will happen to your pulse rate when you do vigorous exercise or Jogging?

Now you stand up and jog for one minute at the same place. Note the pulse per minute. Observe the pulse of your friends and record it in the following table.

S.No	Name of the person	Pulse rate at rest	Pulse rate after jogging

Generally, the pulse rate is 72 times per a minute. Pulse rate is less at rest and more while doing exercise.

- Do all persons have same pulse rate?

The pulse rate varies from person to person and situation to situation. So it is not constant, when you are afraid or excited the pulse rate goes up.

- Name the apparatus used by the doctor to observe the heartbeat.

We get heart beat sound when we run fast. To observe the heart beat doctors use stethoscope. In the year 1816 Rene Laennec discovered the stethoscope. Rene Laennec used paper tubes first and after bamboo and now he has invented the stethoscope that we are using.

Observe the given figure.



- What is the difference between pulse and heart beat?
- How can we observe this?

we can find out the relation between pulse and heart beat by using pulse indicator. Take a shirt button or an injection bottle lid, insert a match stick, and place it on your wrist as shown in the figure. Observe movements in matchstick. Put your other hand on your chest or with the help of stethoscope.

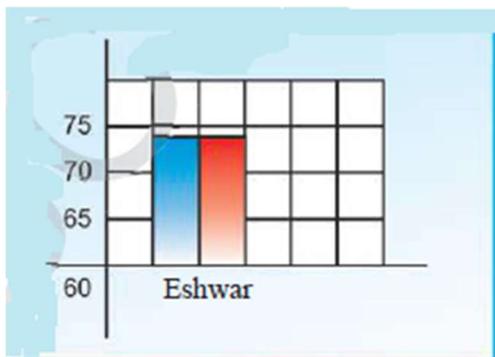
- Pulse, heart beat are equal. Let's do it.

Make a paper tube 10-inch-long and one inch in diameter. Keep one end of it at your ear and the other end on the chest of your friend, so that your friend's heart beat is audible to you. Listen carefully and count the heart beats for a minute. Note observations in the following tabular form.

S.No	Name of the Student	Heartbeat at rest /Min.	Pulse rate at rest/Min.
1	Eshwar	72	72
2			
3			
4			
5			

SELF ASSESSMENT:

- Write the procedure of an activity to observe the pulse rate.
- What is the relationship between the heartbeat and the pulse rate? How it can be observed?
- Prepare a stethoscope with locally available material like match stick, straw and thread etc. And count the heart beats with the help of that stethoscope
- The system involved in the transportation of materials in an organism is ()
 A. Digestive system B. Respiratory system C. Nervous system D. circulatory system
- Stethoscope was discovered by
 A. Laennec B. Robert brown C. Linnaeus D. Lamarck
- Observe the following graph and identify the correct statement ()



x-axis: Name of the student
 y-axis: Heart beat, pulse rate per minute

- Pulse rate and heart beat per minute is equal
- There is a difference in the pulse rate and Heart beat rate.
- Heart beat rate is more than pulse rate
- Pulse rate is less than heart beat rate.



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 32.

CONCEPT: 1. STRUCTURE OF THE HEART

LEARNING OUTCOMES:

The Student,

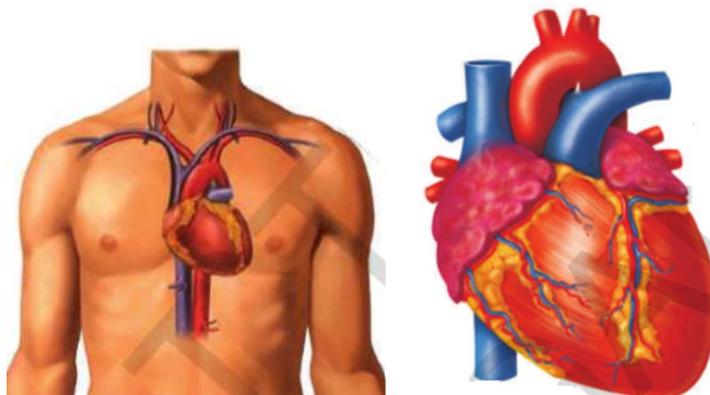
1. Explains the external and internal structure of heart with the help of diagram.
2. Identify the location of valves and blood vessels associated with the heart.
3. Conducts an activity to observe the structure of heart in the laboratory.
4. Differentiates between auricles and ventricles.

CONCEPT PRESENTATION:

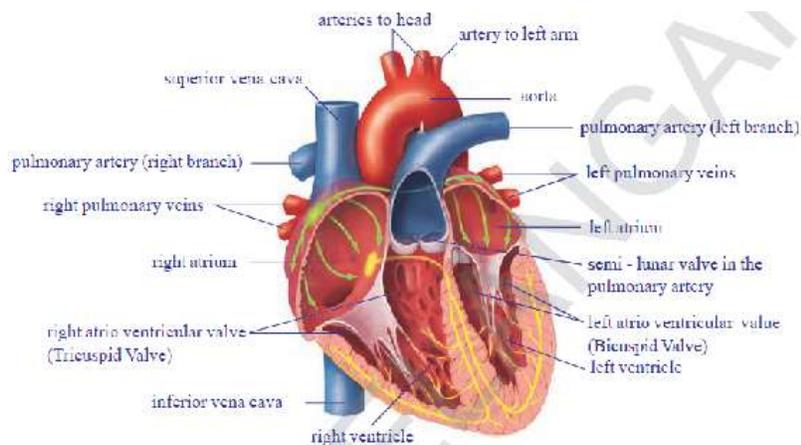
Circulatory system includes heart, blood and blood vessels.

The heart is a pumping organ in our body.

Observe the following figures



- Where is the heart located in our body?
- What is the shape of the heart?
- How many chambers are there in heart?



Heart is located in between lungs and protected by rib cage the size of our heart is the size of our fist. The heart is a pear shaped structure, triangle in outline, wider at the anterior end and narrower at the posterior end. The heart is covered by two pericardial membranes, the space between these two membranes is filled with

pericardial fluid, which protects the heart from shocks. Heart is divided into four chambers. Two upper are called atria (auricles) and two lower chambers are called ventricles.

- How can we observe the internal structure of mammalian heart?

Materials required: freshly collected specimen of heart of sheep, soda straws, used pen refills, sharp and long blade or scalpel, tray, a jug of water, dissection scissors, forceps.

Dissect the heart and observe the internal parts of the heart as shown in the figure.

- How many blood vessels are attached to the heart?
- Where do you find the valves in the heart?

The coronary vessels are present in the walls of the heart, which supplies blood to muscles of the heart. The deoxygenated blood from different organs of the body is transported through superior and inferior vena cava and from right atrium it reaches to right ventricle. Tricuspid valve is present in between right atrium and right ventricle. Right ventricle pumps deoxygenated blood to lungs through pulmonary artery. From lungs oxygenated blood enters in left atrium then it moves to left ventricle. From left ventricle oxygen rich blood is pumped to various parts of the body through aorta. Bicuspid (mitral) valve is present in between left atrium and left ventricle. Pulmonary valve is present at the region of pulmonary aorta and systemic valve is present at the region of systemic aorta.

SELF ASSESSMENT:

1. Explain the internal structure of heart with a neat labelled diagram.
2. What precautions would you take while observing the mammalian heart in the laboratory?
3. Where are the valves located in the heart?
4. Explain the blood flow from the heart to body parts and vice versa
5. Which blood vessels carry blood to the heart?
6. Write about the external structure of the heart?
7. The location of tricuspid valve is... ()
 - A. In between left atrium and left ventricle.
 - B. In between right atrium and right ventricle.
 - C. In between left atrium and right atrium
 - D. In between right atrium and left ventricle.
8. The main function of pericardial fluid is..... ()
 - A. To supply blood to the heart
 - B. Protect the heart from shocks
 - C. Giving shape to the heart.
 - D. Storage of waste materials.



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 33.

CONCEPT: 1. BLOOD VESSELS

LEARNING OUTCOMES:

The student....

1. Identifies the blood vessels which are involved in circulation.
2. Differentiates the structure and functions of arteries and veins.
3. Draws the well labelled diagram of T.S of artery, vein and blood capillaries.

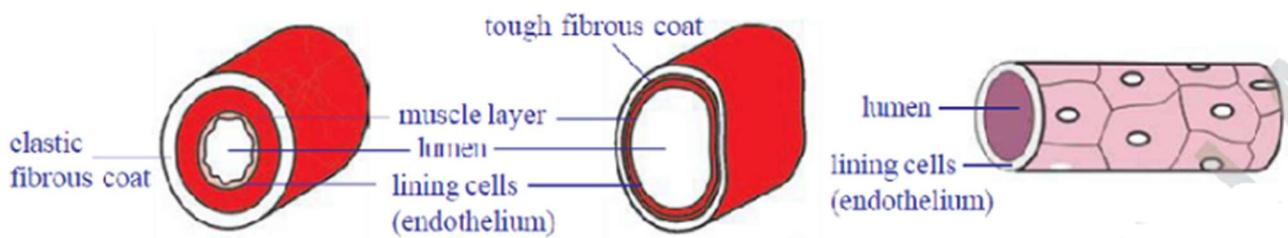
CONCEPT PRESENTATION:

The blood circulates in the blood vessels. The coronary blood vessels in the walls of the heart, which supply blood to the muscles of the heart.

- How many types of blood vessels present in our body? What are they?

Two types of blood vessels present in our human body. They are arteries and veins. Arteries carry blood from the heart to body parts. Whereas veins send blood from body parts to the heart. To establish continuity in between arteries and veins another type of microscopic blood vessels known as blood capillaries are also present.

Observe the following diagram



- Name the blood vessels shown in the above figure.
- Write the differences between artery and vein
- What are the functions of arteries and veins?

The blood vessels shown in the above figures are artery, vein and blood capillary.

Arteries and veins play an important role in blood circulation. The walls of the arteries are thick. In artery the lumen is smaller when compared to vein.

The walls of the veins are thin. The blood flow through the artery with high pressure. Except pulmonary artery other arteries carries oxygenated blood in the same way except pulmonary vein, other veins carries deoxygenated blood. Valves are present in veins. Arteries cannot retain their shapes when blood is absent but veins can retain their shapes.

Marcello Malpighi observed tiny blood vessels that were invisible with naked eye. He called these blood vessels as 'capillaries. They allow diffusion of various substances and establish continuity in between arteries and veins.

SELF ASSESSMENT:

1. Write the difference between arteries and veins in a tabular form.

2. Draw the diagrams of T.S of artery and T.S of vein

3. Identify the correct statement ()

- A. The walls of the veins are thick and lumen is small.
- B. The walls of the artery are thin and lumen is small
- C. The walls of the artery are thick and lumen is small
- D. The walls of the vein are thin and lumen is small

4. Pulmonary artery carries blood from ()

- A. Heart to kidney B. Heart to liver
- C. Heart to lungs D. Heart to stomach



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 34.

CONCEPT: 1. THE CARDIAC CYCLE

LEARNING OUTCOMES:

The student,

1. Explains different events occurring in cardiac cycle.
2. Draws the flow chart showing the different stages of cardiac cycle.
3. Differentiates between systole (contraction state) and diastole (relaxed state).

CONCEPT PRESENTATION:

Human heart start beating around 21st day during the embryonic development.

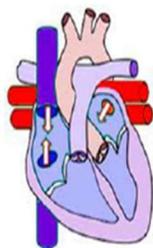
the contraction and relaxation of auricles and ventricles is called heartbeat.

Observe the below figures

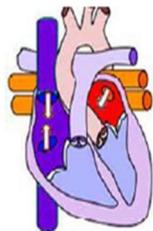
Observe the contractions and relaxation of auricles and ventricles.

How contraction and relaxation occur ? How the blood flow from auricles to ventricles?

When do we get Lub and dub sounds?



1. Imaginary relaxation of atria and ventricles.



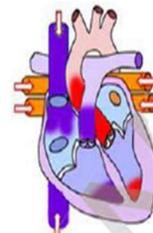
2. Blood flows into atria.



3. Contraction of atria and flow of blood into ventricles.



4. Contraction of ventricles. A.V. Valves closed (Lub) blood flows into arteries.



5. Relaxation of ventricles. The closing of arterial valves (Dub).

1. All the four chambers are in relaxed state (diastole)
2. Blood from vena cava and pulmonary veins enters the right and left atria respectively.
3. Now atria contract, forcing the blood to enter into the ventricles.(systole)

4. When the ventricles are filled with blood, atria start relaxing. On ventricular contraction due to pressure blood moves into aorta and pulmonary artery. The aperture between atria and ventricle is closed by valves. When the Atrio-ventricular valves are closed force bully . It creates first sharp sound 'lub'.

5. When the ventricles start relaxing the pressure is reduced. The blood which has entered the arteries try to come back .the valves which are present in the blood vessels(semi lunar valves) are closed to prevent backward flow of blood into ventricles. Now it creates dull sound of heart 'dub'.

- What are systole and diastole?
- What is cardiac cycle?

One contraction and relaxation of atria and ventricles is called one cardiac cycle. The sequential events in the heart which are cyclically repeated in the cardiac cycle. The cardiac cycle includes an active (contraction) phase systole and resting phase diastole of atria and ventricles. Total process is completed in 0.8 sec approximately. The time needed for atria contraction is 0.11-0.14 sec and ventricular contraction is 0.27-0.35 sec.

SELF ASSESSMENT:

1. What is cardiac cycle? Write the steps involved in the cardiac cycle?

2. Write the differences between systole and diastole

3. Explain the different stages of cardiac cycle with the help of flow chart.

4. The blood from pulmonary vein enters into ()

- A. Right atrium B. Right ventricle
C. Left atrium D. Left ventricle

5. Approximate time required to complete one cardiac cycle is ()

- A. 0.2 Sec B.0.4 sec C.0.5 sec D. 0.8 Sec



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 35.

CONCEPTS: 1. Single circulation 2. Double circulation

LEARNING OUTCOMES:

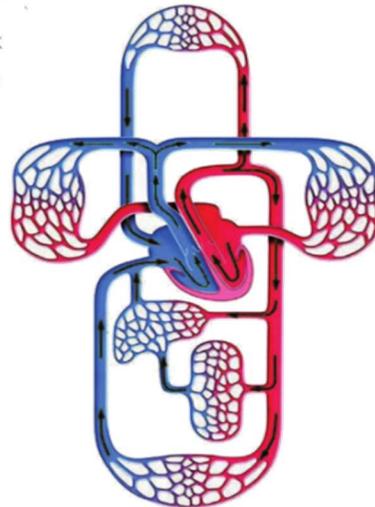
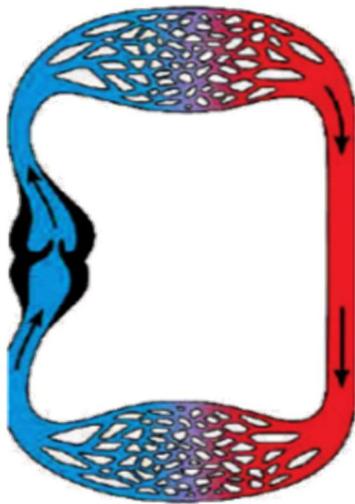
The Student,

1. Explains single and double circulation with the help of diagram.
2. Differentiates between single and double circulation
3. Gives examples of the organisms showing single and double circulation.

CONCEPT PRESENTATION:

The blood that is pumped by the heart reaches the body parts and comes back to the heart. The blood flows in the blood vessels. The circulation of blood is not same in all the animals.

Observe the figures.



- Which animal shows single circulation?
- Which animal shows double circulation?
- How many times blood passes through the heart in single circulation?
- How many times blood passes through the heart in double circulation?

- What is single circulation and double circulation?

Blood flows through heart only once to complete one circulation. This is called single circulation. In fish we find single circulation. Two chambered heart is present in the fish. Blood flows through the heart twice for completing one circulation. This is called double circulation.

In higher organisms like mammals, birds and reptiles double circulation is present. In man four chambered heart is present. In double circulation blood circulates from the body parts to the heart, and then heart to lungs, and again from lungs to the heart afterwards to the body parts. Pulmonary circulation is found in double circulation. Whereas it is absent in single circulation.

- Why blood is send to lungs?

Pulmonary circulation is the portion of circulatory system. Which carries deoxygenated blood away from the right ventricle to the lungs and returns oxygenated blood to the left atrium of the heart. This is called pulmonary circulation.

SELF ASSESSMENT

1. Explain single and double circulation with the help of diagram.
2. Write the differences between single and double circulation.
3. What happens in pulmonary circulation?
4. Two chambered heart is present in ()
A. Fish B. Man C. Frog D. Birds
5. The organs involved in pulmonary circulation are ()
A. Heart, kidney B. Heart, liver C. Heart, lungs D. Heart, stomach.
6. Identify the correct statement about double circulation ()
i) In double circulation pulmonary circulation is present.
ii) In double circulation blood flows twice through the heart.
iii) Double circulation found in fishes
iv) Double circulation found in mammals.
A. i & ii B. i, ii & iv C. ii & iii D. only iii



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ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 36.

CONCEPT: 1. Lymphatic system

LEARNING OUTCOMES:

The Student....

1. Explains the functions of lymphatic system.
2. Differentiates between blood and lymph
3. Identifies the importance of tissue fluid

CONCEPT PRESENTATION:

As blood flows to tissues through blood capillaries, some amount of fluids and certain solid materials are constantly flowing out of them at different junctions. Such materials are collected and sent back into the blood circulation.

- What is tissue fluid?

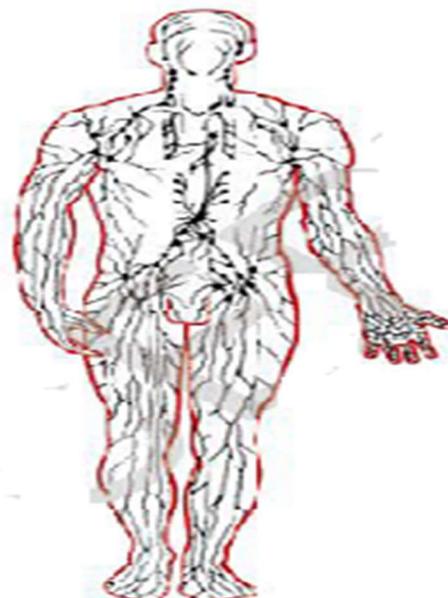
The liquid portion of the blood with nutrients, flows out of the capillaries this is called tissue fluid. This tissue fluid, which is present in the tissues should be transported into the blood vessels again. Some portion of the tissue fluid enters into the venule, which in turns form the vein, which carry blood to the heart.

Observe the lymphatic system in the diagram.

- What is lymphatic system?

To transport the tissue fluid into the main blood stream, a separate system is called lymphatic system.

Lymphatic system parallel to venous system. Tissue fluid transported into the blood vessels again. Some portion of the tissue fluid enters into the venules then veins and remaining enter into lymphatic system. Lymph is the vital link between blood and tissues by which essential substances pass from blood to cells and



excretory products from cells to blood. Valves are present in lymphatic vessels.

- What is the difference between blood and lymph?

Blood is a substance, which contains solid and liquid particles. Lymph is the substance that contains blood without solid particles.

- How is lymph pushed into lymphatic vessels?

The muscles which are attached to the skeleton act as a pump, when they contract and help in pushing the lymph flowing in lymphatic vessels and blood flowing in veins towards the heart. The valves that are present in the lymphatic vessels and veins stop the reverse flow of the blood.

- What is the main reason for swelling of the feet due to overnight journey?

Feet will be swollen after overnight journey in sitting position without moving due to blockage of lymph in lymph vessels. This condition is called edema. After moving the legs lymph will flow in the lymphatic vessels and swelling will reduce.

SELF ASSESSMENT

1. Explain the function of lymphatic system.

2. Write the differences between lymph and blood.

3. What is tissue fluid?

4. Lymph is the vital link between ... ()

- A. Blood & blood vessels
- B. Blood & tissue
- C. Blood & heart
- D. Blood & lungs

5. Identify the correct statement about lymph ()

- A. Lymph contains blood without solid particles.
- B. Lymph contains blood with solid and liquid particles.
- C. Lymph contains blood without solid and liquid particles.
- D. Lymph contains blood with solid particles.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 37.

CONCEPT: 1. Evolution of the transport system

LEARNING OUTCOMES:

The Student,

1. Identifies the process of circulation that takes place in different organisms.
2. Explains the evolution of transport system from lower to higher organisms.
3. Differentiates between open and closed circulatory system.
4. Gives examples for organisms showing open and closed circulatory system.

CONCEPT PRESENTATION:

The circulatory system plays an important role in transportation of materials that takes place in the body of animals. There is a gradual development of circulatory system from unicellular lower organisms to multi cellular higher organisms.

- How the nutrients and oxygen are transported in unicellular organisms?

In unicellular organisms like amoeba the protoplasm shows natural movements. These movements are called Brownian movements, because of which the nutrients and oxygen are distributed throughout the protoplasm equally.

- How transportation of materials takes place in sponges?

The parazoans like sponges, use marine water for transportation. the sponges create their own currents by beating of flagella that are present in their body.

- What is gastro vascular cavity?

Cnidarians like hydra, jellyfishes have developed blind sac like gastro vascular cavity which take up the function of digestion and transportation of nutrients to each and every cell.

- How the materials get transported in Platyhelminthes and Nematelminths?

In Fasciola like Platyhelminthes organism the digestive system is highly branched and supplies digested food to all the cells. In these animals most of the body is occupied by digestive and excretory system.

In Nematelminths, the pseudocoelom will take up the function of collection and distribution of materials.

- How the transportation takes place in annelids?

The Annelids, the first eucoelomate animals have developed a pulsatile vessel to move the fluid and the transporting medium is blood.

- What is open circulatory system?

The arthropods have developed a pulsatile organ to pump the blood, the heart. The blood instead of flowing in blood vessels floods the tissues, such type of transportation in which blood supplies the material without blood vessels is called open type of circulatory system. Eg: Insects like cockroach, housefly, mosquito.

- What is closed circulatory system?

Blood takes the responsibility of delivering the materials which flows in the blood vessels is called closed type circulatory system. In this type of system, the blood flows through blood vessels Eg: Annelids, Echinoderms, Octopus like molluscs and higher chordates.

SELF ASSESSMENT

1. Write the difference between open circulatory system and closed circulatory system

2. Explain the evolution of circulatory system from lower organisms to higher organisms with suitable examples.

3. Write the different phyla, their animals and their circulatory system in a tabular form.

4. Match the following ()

- | | | |
|-----------------------------------|-----|------------------------------------|
| a) Pseudocoelom | () | i) Amoeba |
| b) Brownian movements | () | ii) Cockroach |
| c) Closed circulatory system | () | iii) Human being |
| d) Open circulatory system | () | iv) Round worm |
| A). a-iii, b-iv, c-i, d-ii | | B). a-ii, b-ii, c-i, d-iv |
| C). a-i, b-ii, c-iii, d-iv | | D). a-iv, b-i, c-iii, d-ii. |

5. The main function of gastro vascular cavity is ()

- | | |
|-------------------------------|-----------------------------|
| A. Digestion & respiration | B. Digestion & Reproduction |
| C. Digestion & transportation | D. Digestion & assimilation |



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. TRANSPORTATION

Work sheet No: 38.

CONCEPT: 1. BLOOD PRESSURE

LEARNING OUTCOMES:

The student,

1. Explains the blood pressure.
2. Differentiates between systolic and diastolic pressure
3. Conducts an activity to measure the B.P with sphygmomanometer

CONCEPT PRESENTATION:

To move the blood through this network of vessels, a great deal of force is required.

- How this force is provided in the body?

The force is provided by the heart and is at its highest when the ventricles contract, forcing the blood out of the heart and into the arteries then there is a drop in the pressure as the ventricles refill with blood for the next beat.

- What is blood pressure?

The pressure of the blood on the walls of blood vessels is called blood pressure. It is produced primarily by the contraction of heart muscles. Blood pressure is the force exerted in the arteries.

Observe the given figure



pressure

- Name of the device given in the figure
- What can we observe with that device?

The device given in the figure is called sphygmomanometer. It measures the blood (BP). B.P is always measured in the upper arm

artery with sphygmomanometer. B.P varies throughout the body. There are two pressure readings, of which one measures the strongest pressure during the time blood is forced out of the ventricles this is called **systolic pressure**. The second reading is taken during the resting period as the ventricles refill with blood this is called **diastolic pressure**.

- What is the normal blood pressure in healthy person?
- What is hypertension?

Normal blood pressure is 120/80 mm of Hg. People who have high B.P during resting period are said to have hypertension. If it is less than 120/80mm of Hg said to be Low B.P. B.P will change according to the activity in which the person is engaged , such as resting, walking and running.

SELF ASSESSMENT

1. What is the difference between systolic and diastolic pressure?

2. What are the main causes of hypertension?

3.Name the device used to measure the B.P ()

A. Lactometer B. Hydrometer C. Sphygmomanometer D. Spherometer

4. The blood pressure of healthy young adult is ()

A.120/80mm of Hg B.80/120 mm of Hg C.110/80 mm of Hg D. 90/120mm of Hg



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. TRANSPORTATION

Work sheet No: 39.

CONCEPT: 1. BLOOD COAGULATION

LEARNING OUTCOMES:

1. Explains the different stages involved in blood coagulation
2. Identifies the reasons for delay in blood coagulation

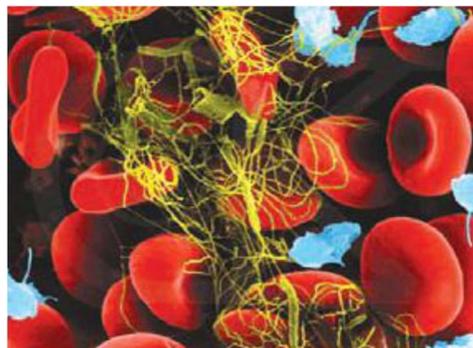
CONCEPT PRESENTATION:

When we cut our selves the blood flows out of the wound for only a short period of time. Then the cut is filled with a reddish solid material, this solid material is called a blood clot.

- What happens if blood does not clot?

If blood does not clot, anyone with even a slight wound bleed profusely. It leads to death.

Observe the figures.



- What are the stages involved in blood clotting?

Blood platelets play an important role in blood coagulation. Following are the stages involved in blood coagulation.

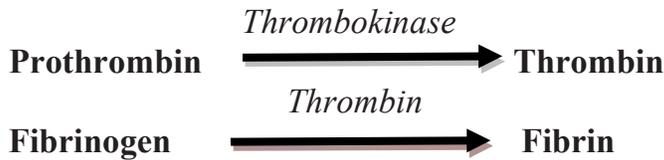
When the blood flows out, the platelets release an enzyme called thrombokinase.

Thrombokinase acts on another substance present in the blood called prothrombin.

Converting it into thrombin.

Thrombin acts on another substance called fibrinogen, which is in dissolved state.
Converting into insoluble fibrin.

The blood cells entangle in the fibrin fibres forming the clot.



- What is serum?

The straw yellowish coloured fluid portion after formation of clot is serum.

- How much time does it take for blood clotting?
- What might be the reasons for delay in blood clotting?

Normally the blood clots in 3-6 minutes.

Vitamin-K deficiency, it takes more time for blood clotting. Haemophilia is a genetic disorder;

SELF ASSESSMENT:

1. Explains the different stages involved in blood coagulation.

2. What happens if platelets are absent in the blood?

3. Write the blood clotting process in equation form .

4. The vitamin required for coagulation of blood is ()

- A. vitamin-A B. vitamin-E C. Vitamin-D D. vitamin-K

5. Identify the genetic disorder related to blood ()

- A. Diarrhoea B. AIDS C. Malaria D. Haemophilia



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 2. TRANSPORTATION

Work sheet No: 40.

CONCEPT: 1. TRANSPORTATION OF WATER IN PLANTS

LEARNING OUTCOMES:

The Student,

1. Explains the mechanism of transportation of water in plants.
2. Identifies that osmosis, root pressure and transpiration are the important factors in transportation of water.
3. Conducts activities to prove root pressure, transpiration

CONCEPT PRESENTATION:

The roots absorb water along with minerals from the soil; xylem plays an important role in transportation of water and minerals.

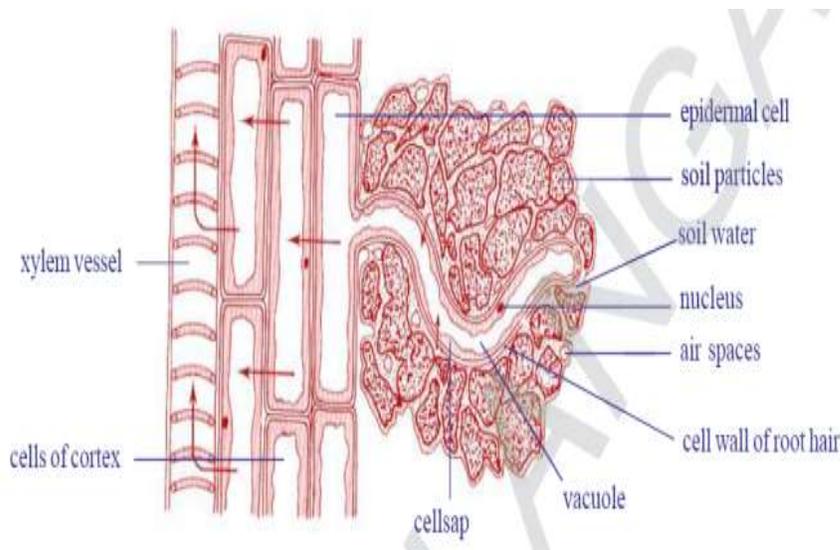
- Which part of the root plays an important role in absorption of water?

Root hairs absorb water. Water which is absorbed by root hairs will reach to the xylem vessels and then supply to all parts of the plant.

- Which factors are helpful for the absorption of water in root hair?

Osmosis, root pressure and transpiration are helpful for absorption of water in root hair.

Observe the following figure.



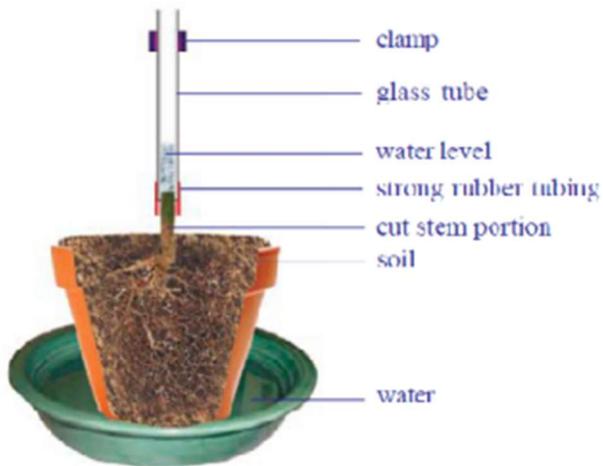
- How osmosis takes place while absorbing water through roots in plants?

Roots absorb the water by the process of osmosis. The soil water is an extremely dilute solution of salts. Soil water concentration is more dilute

than that of the cell sap in the root hair therefore water will enter into the root hairs by osmosis. The entry of water dilutes the contents of the root hair, so that it becomes more dilute than its neighbouring cell. Finally water enters the xylem vessels. As there are vast number of root hairs and root cells involved, a pressure in the xylem vessels develops which forces the water upwards. This total pressure is known as root pressure.

- How do we observe the root pressure?

Observe the following figure.



Take a potted plant, cut the stem portion 1 cm. above the ground level. Then connect a glass tube with stem by rubber tube. Take care while joining tube and stem being bound tightly, so that water cannot escape from the tube. Pour some water in the glass tube until water level can be seen above the rubber tube mark the level of [M1] in the tube. Keep your arrangement aside for 2-3 hours. Then observe the mark water level [M2] in the tube. Observed water

level increase in glass tube because of root pressure.

Observed the given figure.

- What is transpiration?

Evaporation of water through leaves in vapour form is called transpiration. Water evaporates through stomata of leaves and lenticels of stem. When the leaves transpire, there is a pulling effect on the continuous columns of water in the xylem vessels. The water continuous from xylem vessels to mesophyll cells from which it evaporates into the air spaces causing the pull.



Thus water is absorbed by osmosis into the plant from the soil by the root hairs, this is passed into the xylem vessels, which forms a continuous system of tubes through root and stem into the leaves. Extra water evaporates and releases into the atmosphere. The evaporation creates the main pull of water above root pressure which gives a major push from below.

SELF ASSESSMENT

1. Explain the procedure to prove the root pressure.

2. Explain the mechanism of transportation of water in plants.

3. Explain the absorption of water through root hair in plants.

4. Match the following

()

- | | | | |
|----|---------------|-----|--|
| a. | Xylem | () | i) Developed in xylem vessels |
| b. | Root hairs | () | ii) Transportation of water & minerals |
| c. | Osmosis | () | iii) Absorption of water |
| d. | Root pressure | () | iv) Moving of substances through Semi Permeable membrane |

A). a-iii, b-iv, c-i, d-ii

B). a-ii, b-iii, c-iv, d-iv

C). a-i, b-iii, c-iv, d-ii

D). a-iv, b-i, c-iii, d-ii.

5. Identify the activity shown in the figure

()



A. Osmosis

B. Root pressure.

C. Transpiration

D. Diffusion



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: TRANSPORTATION

Work sheet No: 41

CONCEPT: 1. TRANSPORTATION OF FOOD IN PLANTS

LEARNING OUTCOMES:

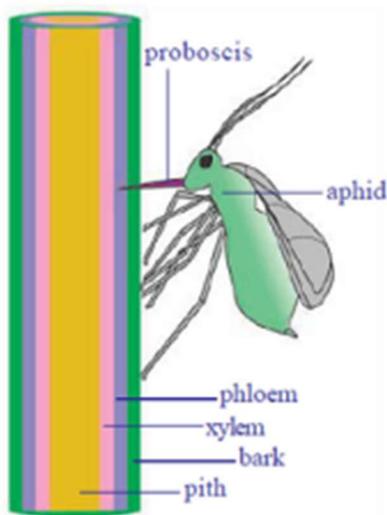
The Student,

1. Explains transportation of food in plants.
2. Identifies that phloem plays an important role in transportation of food in plants.

CONCEPT PRESENTATION:

Phloem plays an important role in transportation of food, manufactured in the leaf. Food such as sugar is synthesized in the green parts of the plants; this has to be transported to all living cells. The veins of the leaf consist of xylem; phloem. these tissues are continuous with stem.

Observe the figure given below.



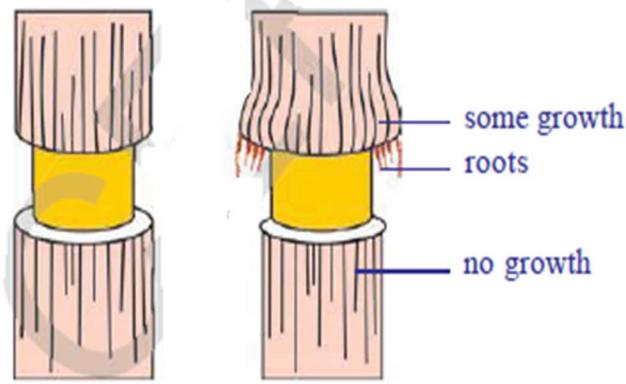
- To which part of the plant aphid penetrates its proboscis?

Biologists studied about food transportation in plants with the help of aphids (green flies). When a feeding aphid is killed and the proboscis carefully sectioned, the proboscis only penetrates up to phloem sieve tube.

It is found that, because the contents of the phloem sieve tubes are under slight pressure the fluid slowly exudes from the Cut end of the proboscis in the form of drops. These drops are then collected and analysed. This fluid is found to contain sugars and amino acids. The scientists came to the conclusion that transportation of food is by phloem.

- Parts of the plant which have been attacked by aphids often become sticky, why?
Aphids absorb so much sugar from the phloem that they cannot assimilate all of it. And it excretes out of the body as sticky syrup called honeydew. Leaves which have been attacked by aphids often become sticky as a result of honey dew.
- How can we prove the conduction of sugars by the phloem?

Observe the following figure.



Remove the bark, including the phloem from a shoot to expose the wood. After few days when the tissues above and below the ring were analysed. It was shown that food had accumulated above the ring, but was not present below it. If it is left for some more time, the stem increases in thickness immediately above the ring, no growth occurring below it. So any

damage to the phloem all around the stem will prevent the food from passing down to the roots and the tree will die. So that transportation of food in plants takes place through phloem. Because bark of the trees damaged more than a half, even then the tree is alive. With this experiment we can confirm that food is transported through phloem.

SELF ASSESSMENT

1. Explain the procedure adopted by biologists to study the transport of food in plants through phloem with the help of aphid.
2. Write the experiment to prove sugar is transported through phloem.
3. Following organism was studied by Biologists to observe the transportation of food through phloem. ()
A. Cockroaches B. Grasshoppers C. Aphids D. Wasps
4. The vascular bundles are found in this part of the leaf ()
A. Leaf apex B. Leaf margin C. Veins D. Stipules



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 42.

Concept: Excretion

LEARNING OUTCOMES:

The learner...

1. Explains the term excretion.
2. Identifies the waste materials formed in the body.
3. Compares the blood test report with urine test report.

CONCEPT PRESENTATION:

All living organisms need energy for their survival and to perform metabolic activities. Organisms use different substances for their metabolic activities, resulting in different products.

- Name the products generated in photosynthesis.
- Name the products generated in Respiration.

In photosynthesis CO_2 and H_2O are utilized to form glucose and O_2 as products. These products are utilized in respiration to release CO_2 and energy.

- Write the waste materials that are formed in our body.

As a result of metabolic activities, waste materials like CO_2 , urine and faecal matter are formed. They should be removed from our body from time to time. Otherwise they cause harm to our body.

- Name the process by which waste materials are removed from the body

The process of separation and removal of waste (or) non-useful products from the body is known as excretion

- What are the waste materials that are produced in our body?

Compare the blood and urine reports given in the following tables:

Report on Plasma/Serum (Blood)				Report on Urine			
Test	Result	Units	Range	Test	Result	Units	Range
Glucose	82	mg/dl	60-100	Glucose	65	mg/dl	50-80
Urea	29	mg/dl	15-40	Urea	35	mg/dl	20-30
Uric acid	7.50	mg/dl	3.0-5.0	Uric acid	800	mg/dl	>600
Cholesterol	221	mg/dl	150-200	Creatinine	2.7	mg/dl	1-2

Calcium	9.40	mg/dl	8.0-10.5	Calcium	305	mg/dl	>200
Phosphorus	4.50	mg/dl	3.0 – 4.5	Phosphorus	0.8	mg/dl	>1g
Bilirubin	0.7	mg/dl	0.1-0.8	Protien	90	mg/dl	<100

- What are the common substances found in both blood and urine?
- Name the substance which is exclusively found in blood.
- What are the materials needed to be removed from our body?
- Name the organs which are present in our body to separate excretory materials.

Calcium and phosphorus are common substances found in both blood and urine. Materials like urea, uric acid have to be removed from our body. Waste materials are separated and get removed from our body through special excretory organs like kidney, large intestine, lungs, liver and skin. If waste materials remain in our body they become toxic and cause harm to the body.

SELF EVALUATION:

1. What are the waste materials that are formed in our body by various metabolic processes?
2. Write the end products formed in plants and animals during metabolic activities.
3. What happens if excretory materials are not removed from our body?
4. Why doctors advise us to go for a blood and urine tests for diagnosis of any disease?
5. Identify the useful one to our body from the following. []
A). Urea B). Uric acid C).O₂ D). CO₂
6. Match the following []
a. Urea ()i. Lungs.
b. CO₂ ()ii. Kidney.
c. Faeces ()iii. Skin.
d. Sweat () iv. Large intestine.
A). a-iv, b-i, c-ii, d-iii B). a-ii, b-i, c-iv, d- iii
C).a-ii, b-iii, c-i, d-iv D). a-iii, b-iv, c-ii, d-i.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 43.

Concept: Excretory system in human beings

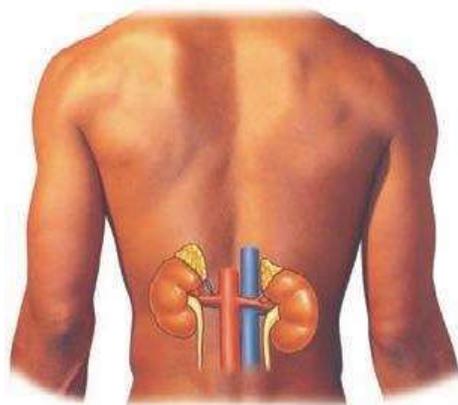
LEARNING OUTCOMES:

The learner...

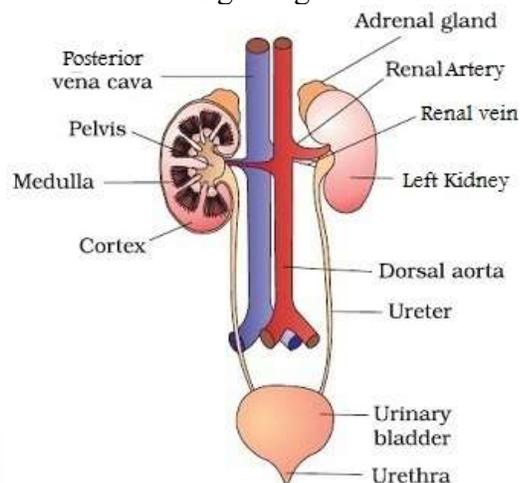
1. Explains the parts present in the human excretory system.
2. Draws the diagram of human excretory system and label the parts.
3. Makes the model of human excretory system with locally available materials.

CONCEPT PRESENTATION:

In human beings excretion occurs mainly through the excretory system. It consists of some interlinking parts, which are connected together. Observe the figures given below:



Location of Kidneys



Human Excretory system

- Where are the kidneys located in the human body?
- What is the shape of kidneys?

The human excretory system consists of a pair of kidneys, ureters, urinary bladder, and urethra. Along with these parts, blood vessels known as renal artery and renal vein are present. Kidneys are bean-shaped structures present in the abdominal cavity on dorsal body wall on either side of the back bone. The right kidney is often situated slightly lower than left one, due to the presence of the liver.

- Name the (2) blood vessels which are associated with the excretory system.
- Name the structures through which urine formed in the kidneys is transported to urinary bladder.
- Name the part where urine is temporarily stored.
- Name the part by which urine is excreted out.

Above the kidneys an endocrine gland called adrenal gland is present. The urine formed in the kidneys passes through the ureters and is stored temporarily in the urinary bladder and finally expelled out through urethra.

SELF EVALUATION:

- 1. Draw the labelled diagram of human excretory system?**
- 2. Why right side kidney is situated slightly lower than left side kidney in humans?**
- 3. Prepare a model of human excretory system with locally available materials.**
- 4. What are major parts of human excretory system?**

5. Identify the correct sequential order of excretory parts in humans. []

- A). Kidney → Urinary bladder → Ureter → Urethra
 B). Kidney → Ureter → Urinary bladder → Urethra
 C). Kidney → Urethra → Urinary bladder → Ureter
 D). Kidney → Urinary bladder → Urethra → Ureter

6. Match the following []

- | | | |
|--------------------|----------|------------------------|
| a. Kidney | () | i. Expels the urine. |
| b. Ureter | () | ii. Urine is formed. |
| c. Urinary bladder | () | iii. Urine is carried. |
| d. Urethra | () | iv. Urine is stored. |

- | | |
|-----------------------------------|------------------------------------|
| A). a-iv, b-i, c-iii, d-ii | B). a-ii, b-iii, c-iv, d- i |
| C).a-iii, b-ii, c-i, d-iv | D). a-iii, b-iv, c-ii, d-i. |



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 44.

Concept: kidney

LEARNING OUTCOMES:

The learner...

1. Explains the external and internal structure of human kidney.
2. Identifies the different parts of kidney.
3. Conducts the experiment to observe the got/sheep kidney.
4. Draws the labelled diagram of L. S. of kidney.

CONCEPT PRESENTATION:

Kidneys are the important excretory organs in human beings.

Observe the external structure of kidney in the following figures:



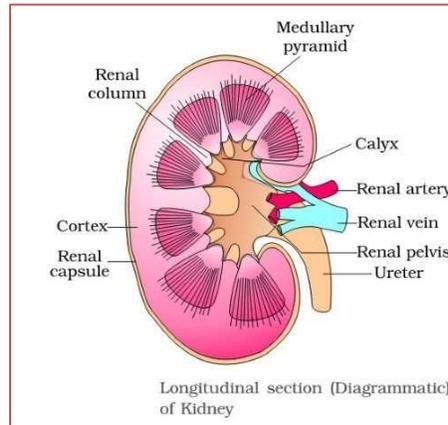
- What is the colour of the kidney?
- Describe the external structure of the kidney.

Kidneys are reddish brown coloured bean shaped structures present in the abdominal cavity to the dorsal body wall on either side of the back bone. The size of the kidney is 10 cms. in length, 5-6 cms. in breadth and 4 cms. in thickness. Each kidney is convex on the outer side and concave on the inner side. The inner side of each kidney has fissure (or) hilus for the entry of renal artery and exit of renal vein and ureter.

- How can the internal structure of kidney be observed?

To observe the internal structure of kidney, we need freshly collected goat or sheep kidneys from the butcher, sharp blade, scalpel, tray and jug of water. Wash the kidney thoroughly with water,

so that blood is completely drained from it. Place the kidney in the tray and observe it carefully. With the help of a sharp blade, cut the kidney to observe the internal structure.



Internal structure of Kidney

- What is the colour of outer part in L.S. of kidney?
- How many tubes are coming out from the kidney's fissure/ hilus?

The internal structure of kidney shows two distinct zones. The dark coloured outer zone is called cortex and pale inner zone is called medulla.. Each kidney is made up of approximately one million (1.3 to 1.8 million) nephrons.

- What are the functions of renal artery and renal vein?

Renal artery brings oxygenated blood loaded with waste products and renal vein carries deoxygenated blood. The waste products generated in various organs of the body are filtered and removed by the kidneys.

SELF EVALUATION:

- 1. Explain the internal structure of kidney with the help of a diagram.**
- 2. What are the precautions you should take while observing the goat kidney in the laboratory?**
- 3. What equipment is required to observe the kidney in the laboratory?**
- 4. Explain the external structure of the kidney.**
- 5. The shape of the kidney is** []
 A. Round B. Bean shaped C. Cylindrical D. Biconvex
- 6. Identify the correct statement.** []
 A). Renal vein collects oxygenated blood.
 B). Renal vein collects deoxygenated blood.
 C). Deoxygenated blood reaches the kidney through renal artery.
 D). Deoxygenated blood reaches the kidney through renal vein.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 45.

Concept: Nephron

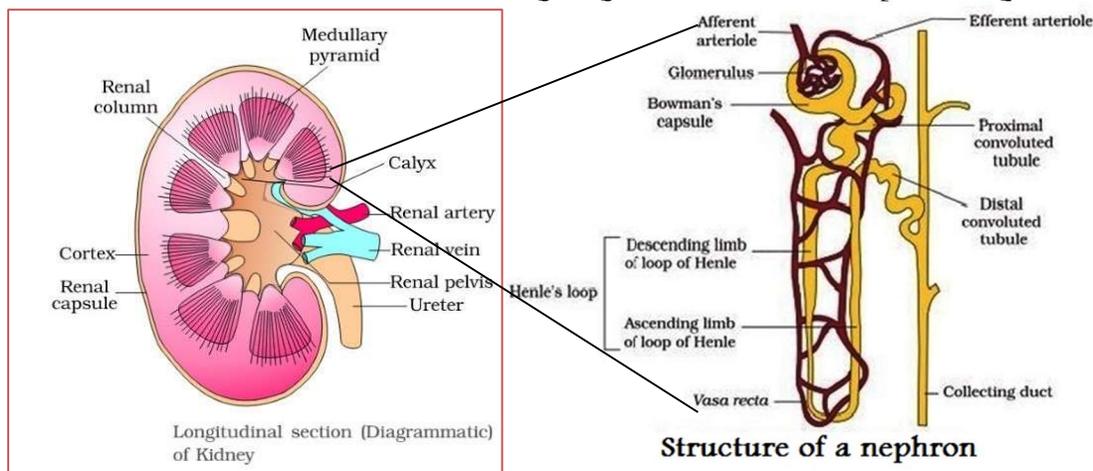
LEARNING OUTCOMES:

The learner...

1. Explains the structure of nephron with the help of a diagram.
2. Identifies the parts of Malpighian tubule.
3. Gives the reasons why nephron is considered as structural and functional unit of kidney

CONCEPT PRESENTATION:

Each kidney consists of microscopic and thin tubular functional units called nephrons (or) uriniferous tubules. Observe the following diagram and answer the questions given below:



Each nephron has basically two parts: they are 1). Malpighian body 2). Renal tubule. Blind cup shaped boarder end of nephron is called 'Bowman's capsule' and bunch of fine blood capillaries called glomerulus. Glomerulus develops from renal afferent arteriole. It gives rise to an efferent arteriole. Bowman's capsule and glomerulus together called Malpighian body.

- What are podocytes? What is their function?
Bowman's capsule which accommodates one glomerulus, is lined by a layer of Squamose epithelial cells called podocyte cells. There are fine pores between podocyte cells to allow passage of materials filtered out of glomerulus.
- What are the parts present in renal tubules?



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 46.

Concept: Process of urine formation

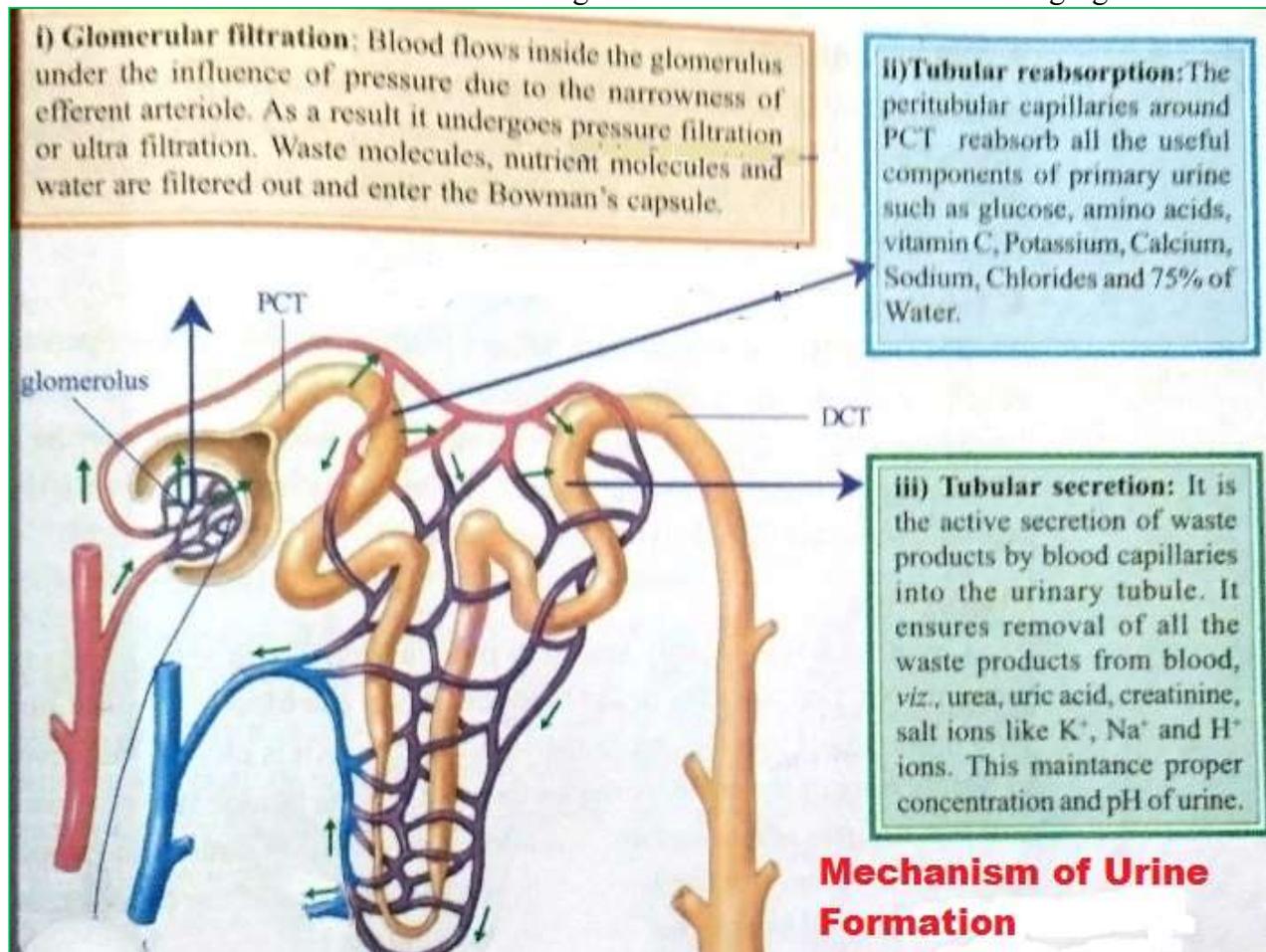
LEARNING OUTCOMES:

The learner...

1. Identifies the different stages in urine formation.
2. Gives the reasons for diabetes insipidus.
3. Explains the process of micturition.

CONCEPT PRESENTATION:

Nephrons filter impurities present in the blood. The impurities which are filtered from blood transform into urine. Observe the different stages of urine formation in the following figure:



- What are the different stages of urine formation?

Formation of urine involves four stages: i). Glomerular filtration, ii). Tubular Re-absorption, iii). Tubular secretion, iv). Formation of hypertonic urine.

- What happens in Glomerular filtration?

Blood flows inside the glomerulus under the influence of pressure due to the narrowness of efferent arteriole. As a result it undergoes pressure filtration (or) ultra filtration. Waste materials, Nutrients and water are filtered out and enter the Bowman's capsule. The filtered substances formed as a result of glomerular filtration is called 'primary urine'.

- What happens in tubular selective re-absorption?

The primary urine which is formed by glomerular filtration chemically equal to blood, but the primary urine does not contain blood cells. The peritubular capillaries around PCT of Henle's loop, reabsorbs all the useful components of primary urine such as glucose, amino acids, vitamins, chlorides of K, Ca, Na and large amount of water.

- What happens in tubular secretion?

It is the active secretion of waste products by blood capillaries into the urinary tubule. i.e. urea, uric acid, creatine, salt ions like K^+ , Na^+ , H^+ ions. This maintains proper concentration and pH of urine.

- How the concentrated urine is formed?

75% of water content of nephric filtrate is reabsorbed in the region of PCT. 10% of water passes out of filtrate through osmosis in the area of loop of Henle. Further concentration of urine takes place in the area of collecting tubes in the presence of hormone called vasopressin. The hormone is secreted only when concentrated urine is to be passed out.

- What is the role of vasopressin in diabetes insipidus?

Absence of vasopressin hormone produces dilute urine. Hormone action maintains osmotic concentration of body fluids. Deficiency of vasopressin causes excessive, repeated, dilute urination called diabetes insipidus.

- How does micturition occur?

The urine is temporarily stored in urinary bladder. Urge of micturition occurs when urinary bladder is filled with urine. The stretched bladder stimulates nerve endings to develop the reflex. At this time the urge becomes painful and leads to voluntary micturition. Due to the contraction of urinary bladder the urine is passed out. This is called micturition.

SELF EVALUATION:

1. Describe the different stages of urine formation.

2. Explain the process of micturition.

3. What happens, if re-absorption of water does not takes place from primary urine?

4. What would happen if secretion vasopressin hormone decreases? []

- A). Concentrated urine will be excreted. B). Primary urine will be excreted.
C). Dilute urine will be excreted. D). Unfiltered materials will be excreted.

5. Identify the correct sequential order of stages in urine formation from the following.

- A. Glomerular filtration ► Tubular secretion ► Tubular Re-absorption ► Concentrated urine.
B. Glomerular filtration ► Tubular Re-absorption ► Tubular secretion ► Concentrated urine.
C. Glomerular filtration ► Concentrated urine. ► Tubular Re-absorption ► Tubular secretion
D. Concentrated urine ► Tubular Re-absorption ► Tubular secretion ► Glomerular filtration.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 47.

Concept: Composition of Urine

LEARNING OUTCOMES:

The learner...

1. Identifies the different components of urine.
2. Gives reasons for the yellow colour of urine.
3. Identifies the symptoms of ESRD

CONCEPT PRESENTATION:

Total amount of urine excreted per day is about 1.6 – 1.8 liters. Urine consists of variety of substances. Observe the composition of urine in the following table:

S. No.	Components in Urine	Percentage (%)
1	Water	96%
2	Organic Substances (Urea, uric acid, creatine, creatinine, water soluble vitamins, hormones and oxalates.)	2.5%
3	Inorganic Substances (Sodium, chloride, phosphate, sulphate, magnesium, calcium, iodine.)	1.5%

- Which component is maximum in urine?
- What is the percentage of organic and inorganic substances in urine?
- Why the urine is yellow in colour?

Urine contains 96% of water, 2.5% of organic substances like Urea, uric acid, creatine, vitamins and 1.5% of inorganic substances like Sodium, chloride, phosphate, sulphate, magnesium, calcium, iodine.

- What is the colour and nature of urine?

It is acidic in the beginning but becomes alkaline on standing due to decomposition of urea to form ammonia. The proteins in the diet get de-aminated in the liver with subsequent

formation of urea. Haemoglobin present in blood (RBC) breaks down to form urochrome due to which urine is pale yellow in colour.

- What happens if both the kidneys fail completely?

Complete and irreversible kidney failure is called End Stage Renal Disease (ESRD). If kidneys stop working completely, our body is filled with extra water and waste products. This condition is called 'Uremia'. Our hands and feet may swell. We feel tired and weak because of our body needs clean blood to function properly.

- Is there any relation between the food which we take and composition of urine?

There is a relationship between the food which we eat and the composition of urine. Those who eat food with more proteins, their urine contains more urea. As a part of protein digestion deamination occur in the liver, as a result more quantity of urea is formed. Those who eat more carbohydrates, their urine contains more sugars. Those who drinks more liquids or water will have more water in their blood, hence they urinate frequently.

SELF EVALUATION:

- 1. Write the symptoms of uremia.**
- 2. What happen if both the kidneys fail to function completely?**
- 3. What is the composition of the urine?**
- 4. Why urine is in pale yellow colour?**
- 5. what is relation between the food which we take and composition of urine?**

6. Match the following

()

- | | | |
|-----------------------------------|-----|------------------------------------|
| a. Organic substance | () | i. Urochrome. |
| b. Inorganic substance | () | ii. De-amination. |
| c. Haemoglobin | () | iii. Uric acid. |
| d. Urea | () | iv. Sodium chloride. |
| A). a-iii, b-iv, c-i, d-ii | | B). a-ii, b-ii, c-i, d- iv |
| C).a-i, b-ii, c-iii, d-iv | | D). a-iv, b-ii, c-i, d-iii. |



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 48.

Concept: Dialysis

LEARNING OUTCOMES:

The learner...

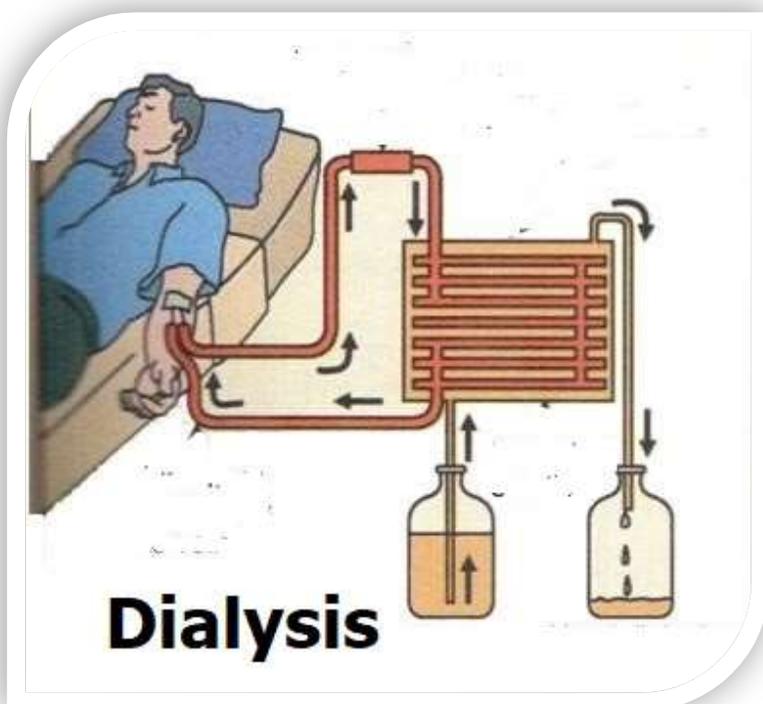
1. Explains the process of haemodialysis.
2. Identifies the difference between dialysis and kidney transplantation.
3. Creates awareness on organ donation.

CONCEPT PRESENTATION:

Kidneys are vital organs for our survival. Because of several factors like infection, injury, low/high BP etc., kidneys fail to function properly. This leads to accumulation of poisonous wastes in the body and leads to death.

- Which process is followed in kidneys failure patient to eliminate the waste materials?

Observe the following figure:



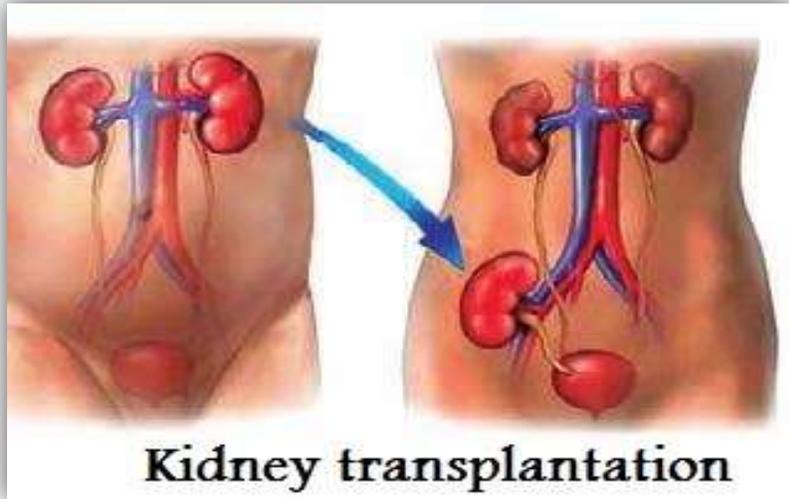
- What is dialysis?
- How is dialysis performed?

Dialysis machine is used to filter the blood of a person when both the kidneys are damaged. The process is called 'Haemodialysis'. In this process blood is taken out from the main artery, mixed with an anticoagulant, such as heparin, and then pumped into the apparatus called dialyzer. In this apparatus blood flows through channels (or) tubes. The membrane separates the blood flowing inside the tube and dialyzing fluid. As nitrogenous wastes are absent in dialyzing

fluids, these waste substances from the blood move out freely, there by cleaning the blood of its wastes. This process is called 'Dialysis'. It is a short-term solution for kidney failures.

- What is the best long term solution for kidney failures?

Observe the following diagram:



- Who has to donate the kidney for kidney transplantation?

The best long term solution for kidney failure is kidney transplantation. A functioning kidney is used in transplantation from a donor preferably a close relative. The kidney that is received by a recipient must be a good match to his body. Organs are collected from a person who has been medically diagnosed

as 'dead' and transplanted to those in need. This is called 'organ donation'. Many NGO's are creating awareness on organ donation.

SELF EVALUATION:

1. Explain the permanent solution for those, whose kidneys are not working.
2. Explain the process of dialysis.
3. Write the activities to be taken up to create awareness on organ donation.

4. Write any two slogans for an awareness campaign on organ donation.

5. The anticoagulant used in dialysis machine is, []

- A). Haemoglobin B). Urea C).Heparin D). Creatine

6. The artificial process used to filter wastes from blood is, []

- A). Chemotherapy B). Radiotherapy
C).Kidney transplantation D). Haemodialysis.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 49.

Concept: Accessory Excretory organs.

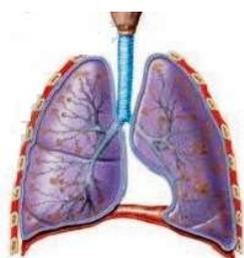
LEARNING OUTCOMES:

The learner...

1. Identifies the accessory excretory organs in our body
2. Explains the functions of accessory excretory organs.
3. Draws the diagrams of accessory excretory organs.

CONCEPT PRESENTATION:

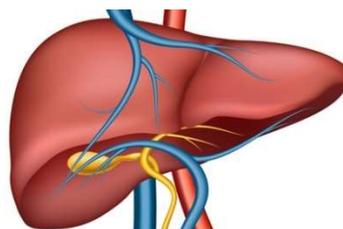
The most important excretory organs of our body are kidneys. Apart from kidneys, some other organs also carry out excretory function in our body called accessory excretory organs. Observe the following accessory excretory organs shown in the following figures:



1. LUNGS



2. SKIN



3. LIVER



4. Large intestine

- What are the excretory materials excreted by lungs?
- Why skin is considered as excretory organ?
- What are the products excreted by liver?
- How does large intestine work as an excretory organ?

In our body lungs, skin and liver have their own specific functions, but carry out excretion as a secondary function.

- **Lungs:** Lungs remove CO_2 and H_2O which are formed in respiratory process.
- **Skin:** Sweat glands present in the skin are richly supplied with blood capillaries from which they extract sweat and metabolic wastes. Sebaceous glands in the skin secrete sebum which contain wax, bilirubin from hemoglobin, starch, hydrocarbons and fatty acids.

- **Liver:** When RBC's break down in the liver after 120 days of their life span, liver produces bile pigments i.e. bilirubin, biliverdin and urochrome. which are the metabolic wastes of hemoglobin of dead RBC's. Urochrome is eliminated through urine. Bilirubin and biliverdin (bile pigments) are stored gall bladder. Later, bile along with cholesterol and derivatives of steroid hormones, vitamins and alkaline salts are excreted out.
- **Large intestine:** Excess salts of Ca., Mg. and Fe. are excreted by epithelial cells of colon for elimination along with the Faeces.

SELF EVALUATION:

1. **What are accessory excretory organs? Give examples for accessory excretory organs in humans.**
2. **Explain the functions of skin.**
3. **Draw the diagrams of accessory excretory organs.**
4. **How can the liver said to be an accessory excretory organ?**

5. Match the following.

[]

- | | | |
|-----------------------------------|----------|--|
| a. Liver | () | i. CO ₂ and H ₂ O. |
| b. Large intestine | () | ii. Sweat. |
| c. Skin | () | iii. Faeces. |
| d. Lungs | () | iv. Urochrome. |
| A). a-iv, b-iii, c-ii, d-i | | B). a-ii, b-iii, c-iv, d- i |
| C).a-iv, b-iii, c-i, d-ii | | D). a-ii, b-iii, c-i, d-iv. |

6. The organ which secrete sebum.

[]

- | | | | |
|----------|----------|--------------------|---------|
| A. Lungs | B. Liver | C. Large intestine | D. Skin |
|----------|----------|--------------------|---------|



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 50.

Concept: Excretion in different organisms.

LEARNING OUTCOMES:

The learner...

1. Identifies the excretory organs in different organisms.
2. Explains the process of excretion in organisms belonging to protozoa.
3. Explains the structural and functional complexity of excretory organs in different organisms with suitable examples.

CONCEPT PRESENTATION:

Different organisms use varied strategies in excretion. Specific organs are absent in unicellular organisms. Structural and functional complexity of excretory organs increase from sponges to humans. Observe the excretory organs/systems in different organisms/phyla shown in following table:

Name of the phylum/organism	Excretory organs/system
Protozoa	Simple diffusion from the body surface in to the surrounding water
Porifera and coelenterates	Water bathes almost all their cells
Platyhelminthes	Flame cells
Nematoda	Renette cells
Annelids	Nephridia
Arthropoda	Green glands, Malpighian tubules
Mollusca	Meta nephridia
Echinodermata	Water vascular system
Reptiles, Aves and Mammals	Kidneys

Excretory organs/systems in difeerent animals

- How excretion takes place in protozoans?
- How excretion takes place in sponges and coelenterates?

Special excretory organs are absent in unicellular organisms like Amoeba. These organisms expel the waste products from the body surface by diffusion process into the surrounding water. Contractile vacuoles excrete excess water and waste materials from the body. Mainly excretion takes place through body surface by osmosis process. Sponges and Coelenterates do not have specific excretory organs as water bathes almost all their cells.

- In which group of organisms did the excretory organs first develop?
- How excretion takes place in Echinodermata?
- What are the excretory organs in cockroach and prawn?
- What are the excretory organs in earthworm?

Excretory structures appear for the first time in Platyhelminthes (tape worms). These are known as 'Flame cells'. In earthworms which belongs to Annelida, excretion takes place through nephridia. Cockroach and Prawns are belonging to Arthropoda. In these excretion takes place through Malpighian tubules and green glands respectively. In Snail excretion takes place through metanephridia, which belongs to Mollusca. Star fish belongs to Echinodermata, in which water vascular system helps in excretion.

In multicellular, highly developed animals like Reptiles, Birds and Mammals excretory organs are kidneys.

SELF EVALUATION:

1. Write the excretory organs in different organisms.

2. Explain the process of excretion in Amoeba.

3. Identify the phylum in which excretory structures appear for the first time. []

- A. Platyhelminthes B. Nematelminths C. Arthropoda D. Mollusca

4. The organisms of which phylum have green glands as an excretory organs. []

- A. Protozoa B. Annelida C. Arthropoda D. Echinodermata

5. Match the following []

- | | | |
|---------------|----------|----------------------------|
| a. Flat worm | () | i. Nephridia. |
| b. Earth worm | () | ii. Kidney. |
| c. Star fish | () | iii. Flame cells. |
| d. Pigeon | () | iv. Water vascular system. |

A). a-iv, b-iii, c-ii, d-i

B). a-ii, b-ii, c -iv, d- i

C).a-iii, b-i, c-iv, d-ii

D). a-ii, b-iii, c-i, d-iv.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 51.

Concept: Excretion in Plants.

LEARNING OUTCOMES:

The learner...

1. Compares the process of excretion in plants with excretion in animals.
2. Explains how plants excrete waste materials.
3. Gives the examples for primary metabolites.

CONCEPT PRESENTATION:

Varieties of end products are formed during metabolism and out of these, nitrogenous wastes are important. Plants do not have specific organs to excrete these wastes like animals. Accumulation and breaking down of wastes is much slower in plants compared to animals.

- How the plants manage or excrete these waste substances?
- Name the waste materials released by plants during respiration.
- How the products are removed in plants which are formed during the process of photosynthesis?

During respiration plants excrete CO_2 and water as waste materials and O_2 is formed as by-product during photosynthesis. They are released into the atmosphere through stomata present on the leaves and lenticels present on the stem.

- How do the plants manage or send out waste products from their body?
- ❖ Plants get rid of excess water by the processes like transpiration and Guttation.
- ❖ Waste products may be stored in leaves, bark and fruits. When these dead leaves bark and ripe fruits fall from the tree, then the waste products in them are get rid of.
- ❖ In some plants waste get stored in the fruits in the form of solid bodies called Raphides.
- ❖ Several compounds are synthesized by the plants for their own use especially for defence.
- ❖ Some plants convert waste products into toxins and store them in roots, leaves, and seeds and use them to protect themselves from herbivores. Therefore those plants are not eaten by animals.

- ❖ Some plants secrete chemicals when injured. The chemicals thus secreted, help them in healing wounds.
- ❖ Some of the plants release attractants, which help the plants for pollination, seed dispersal.
- How many types of biochemical substances are produced in plants? What are they?

The biochemical substances produced in plants are of two types; they are
 1. Primary metabolites 2. Secondary metabolites. Substances like carbohydrates, fats and proteins are primary metabolites. These substances are useful for normal growth and development of plants. The substances which are not required for normal growth and development are secondary metabolites. Eg.: Alkaloids, Tannins, Resins, Gums, Latex.

SELF EVALUATION:

1. Explain how the plants excrete or manage their waste materials.

2. What are the differences between primary and secondary metabolites?

3. What are the end products formed in photosynthesis and respiration?

4. Identify the primary metabolite. []

- A. Resins B. Tannins C. Proteins D. Alkaloids

5. Identify the incorrect statement about excretion in plants. []

- A. In plants special excretory organs are present to remove the waste materials
 B. In plants accumulation of waste materials is much slower when compared to animals.
 C. The water is removed by transpiration in plants.
 D. The waste product formed during photosynthesis is oxygen



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 52.

Concept: Secondary Metabolites.

LEARNING OUTCOMES:

The learner...

1. Identifies secondary metabolites formed in plants.
2. Gives the examples for secondary metabolites.
3. Explains how the secondary metabolites are used in daily life.
4. Identifies the difference between alkaloids and tannins.

CONCEPT PRESENTATION:

The materials which are not required for normal growth and development of the plants are secondary metabolites.

- What are the different secondary metabolites that are formed in plants?

Alkaloids	Tannins	Resins	Gums	Latex
-----------	---------	--------	------	-------

- Write the different types of alkaloids, plant parts from which they are obtained and mention their uses.

Alkaloids: Alkaloids are nitrogenous by-products and are poisonous.

Observe the following table:

ALKALOID	PLANT	PART	USES
Quinine	<i>Cinchona officinalis</i> (Cinchona)	Bark	Antimalarial drug
Nicotine	<i>Nicotiana tobacum</i> (Tobacco)	Leaves	Insecticide, stimulant
Morphine, Cocaine	<i>Papaver somniferum</i> (Opium)	Fruit	Pain killer
Reserpine	<i>Rauwolfia serpentina</i> (Snake root)	Root	Medicine for Snake bite, High BP
Caffeine	<i>Coffea arabica</i> (Coffee plant)	Seed	Central nervous system Stimulant
Nimbin	<i>Azadirachta indica</i> (neem)	Seeds, Barks, Leaves.	Antiseptic
Scopolamine	<i>Datura stramonium</i>	Fruit, flower	Sedative
Pyrethroids	<i>Chrysanthemum sps</i>	Flower	Insecticides

- Name the alkaloid which are harmful to us.

- Which alkaloid is used to cure malaria?
- Which part of the plant mentioned in the above table is used as insecticide?

Observe the following figures. Name the alkaloids present in them:



Observe the following figures. Name the secondary metabolites present in them:



The plants shown in the figures are *Cassia* and *Acacia*. In these plants, tannins are produced as secondary metabolites.

Tannins: Tannins are carbon compounds. They are stored in different parts of the plants. They are dark brown in colour. They are used in leather industry and in medicines.

Observe the following figures. Name the secondary metabolite present in it:



- From which plants are resins obtained?

What is their use?

The plant shown in the figure is *Pinus*. Secondary metabolites called resins are obtained from this plant.

Resins: Resins are secreted mostly by Gymnosperms in specialized passages called resin passages and are used in varnishes.

- Generally, from which plants are gums obtained?

Observe the following figures. Name the secondary metabolites present in them:



Neem



Acacia

Gums: Gum is obtained from neem and acacia. They are used as adhesives, binding agents, medicines and in food preparations.

Observe the following figures. Name the secondary metabolites present in them:



Jatropha



Rubber plant

Latex: Latex is a sticky, mostly milky white substance. It is stored in latex cells or latex vessels. From the latex of *Hevea brasiliensis* (Rubber plant) rubber is prepared. Latex of *Jatropha* is the source of bio-diesel.

SELF EVALUATION:

1. Write the names of various secondary metabolites and mention the names of plants from which they are obtained?

2. Write the names of some alkaloids which are useful in our daily life.

3. What are the differences between alkaloids and tannins?

4. Write the uses of gums.

5. Collect and analyze the detailed information of plants from your surroundings, which yield secondary metabolites.

6. Identify the part of the plant from which alkaloid reserpine is extracted. []

A. Root B. Stem C. Leaf D. Flower

7. Identify the alkaloid which is used as antiseptic. []

A. Caffeine B. Reserpine C. Nimbin D. Quinine

7. Match the following. []

a. Alkaloids	()	i. Used in leather industry.
b. Tannins	()	ii. Nitrogenous by-products.
c. Resins	()	iii. Used in the preparation of rubber.
d. Latex	()	iv. Used in varnishes.

A). a-iv, b-i, c-iii, d-ii

B). a-ii, b-iii, c-iv, d- i

C).a-i, b-ii, c-iii, d-iv

D). a-iii, b-iv, c-ii, d-i.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING
TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: ENGLISH

Subject: Biology

Chapter: 4. Excretion

Work sheet No: 53.

Concept: Excretion - Secretion.

LEARNING OUTCOMES:

The learner...

1. Identifies the difference between excretion and secretion.
2. Explains the excretion and secretion with suitable examples.

CONCEPT PRESENTATION:

In plants, accumulation and break down of wastes much slower. The wastes which are formed in plants get accumulated at different parts or get rid of these wastes by shedding those parts. Sometimes wastes exit out side either by excretion or by secretion.

- What are the differences between excretion and secretion?

Excretion and secretion are the same in nature. Excretion is the removal of materials from living being, while secretion is movement of materials from one point to the other point. So secretion is active while excretion is passive in nature.

For example humans excrete materials such as tears, urine, CO₂, and sweat, while secretions include enzymes, hormones and saliva.

- How do plants excrete waste materials?
- What are the substances secreted in plants?

In plants, we find excretion through roots into surroundings, shedding of leaves and bark. Secretion occurs in the plant body in the form of latex, resins, gums etc.

SELF EVALUATION:

1. Write the differences between excretion and secretion in tabular form.

2. Why do we get peculiar smell when we shift potted plants?

3. The part in which the latex is stored. []

A). Resin canals B) Latex vessels

C) Tracheids D) Trachea

4. Identify the incorrect statement. []

A. Plants excrete waste substances through root, stem and leaves.

B. Removal of wastes in plants is done through excretion only.

C. Movement of wastes from one place to another place is called secretion

D. Latex, resins, gums are excretory materials in plants.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.54

CONCEPTS: 1.Stimuli; 2.Respond

LEARNING OUTCOMES:

The Learner...

1. Identifies the relation between response and stimuli.
2. Explains the process of response to stimuli.

CONCEPT PRESENTATION:

Every day we will do so many works. Whenever we do some basic functions, such as movement, balance and coordination work together in performing motions of body parts.

Observe the following picture.

- How we prove response to stimuli?



Take a long scale or stick at least around half meter. Keep your fingers in holding position as shown in the above picture. Ask your friend to hold the stick/scale near the end and let the other end be suspended between your fingers (point A). Let there be a very small gap around a centimeter between your thumb and stick/scale and fore finger. Now let your friend allow it to fall. Try to hold it.

Mark the point where you caught the stick (point B).

- Could you hold it exactly at the point where it was suspended between your fingers?
- How far up/down was this point from the end suspended between your fingers?
- Why did this happen?

Responses are brought about by rapid changes in some muscles and such changes are usually related to changing stimuli. Rapidly of response indicates an efficient communication system linking those parts that pick up stimuli to those that trigger a response.

This activity explains the coordination between the eyes and fingers.

Observe the following incidents related to response to stimuli.

1. Move to a side of the road when we hear or see a car approaching.
2. The cat may be running because it saw a mouse.

3. Plants grow towards the sunlight.
4. We start sweating when it is hot and humid.
 - Identify the stimuli and respond from the above incidents.

Incident	Stimuli	Response
1.		
2.		
3.		
4.		

- Write some more incidents and mention stimuli and response in those incidents.

- Write the sequence of events that brings response to stimuli.

The ability to react to particular stimulus in a particular situation must be of great importance in ensuring the survival of the organism. There is a sequence of events that brings about responses. They start from detecting a stimuli, then transmission of the information, processing of the same and execution of the appropriate action.

SELF EVALUATION:

1. What are the sequences of events present in response to stimuli?

2. Write the responses to different stimuli in your daily life.

3. Explain the experiment showing response to stimuli.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.55

CONCEPTS: 1. Nerve cell; 2. Synapse

LEARNING OUTCOMES:

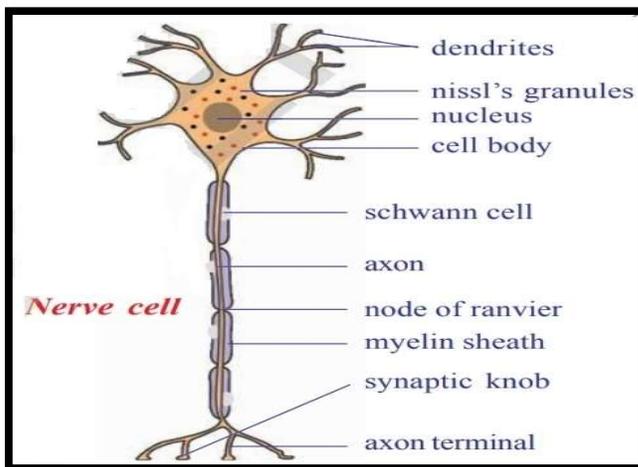
The Learner...

1. Explains the structure of the nerve cell and synapse.
2. Draws and label the picture of nerve cell.

CONCEPT PRESENTATION:

The changes in the surroundings of the living organism are the reasons for the responses to stimuli. Different pathways are taken by nerves to bring about this coordinated activity.

Observe the following picture.



- What are the parts present in the nerve cell?

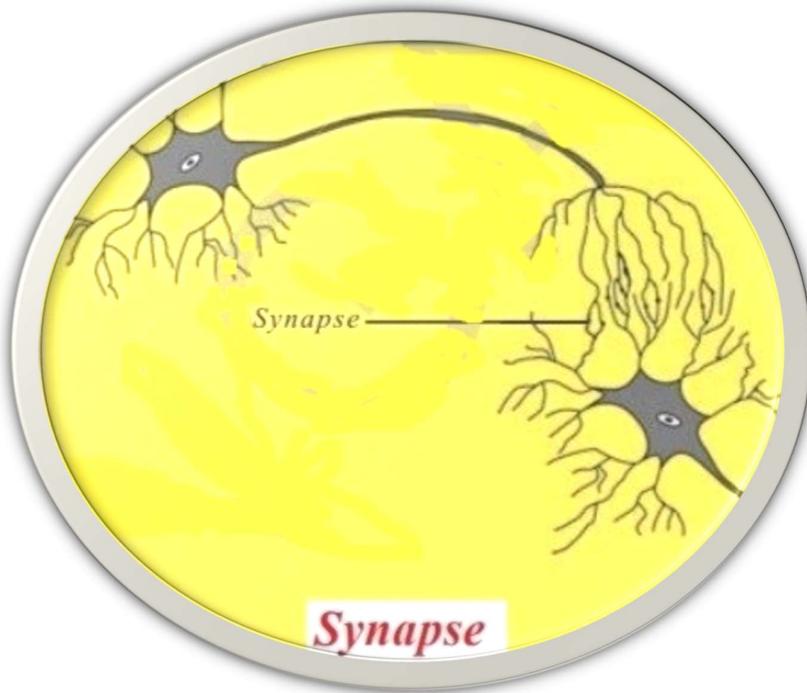
Nerve cell is the structural and functional unit of nervous system. Human nervous system consists of more than 100 billion nerve cells. Each nerve cell consists of a cell body with a prominent nucleus. There are fine projections mainly of two types extending from the cell body of the nerve cell. The small projections are dendrites while a long one

that extends to different parts of our body is called axon.

The axon is surrounded by a specialized insulator sheath called myelin sheath. This sheath is interrupted at regular intervals called nodes of Ranvier. The myelin sheath is made up of Schwann cells and chiefly consists of fatty material. Axons not having the sheath are non – myelinated fibers.

The covering also forms a partition between adjacent axons. The nerve cell body lies either in our brain or spinal cord or very close to the spinal cord in a region called dorsal or ventral root ganglion.

Observe the following picture.



- How the synapse will form? What is the function of synapse?

Dendrites of one nerve cell connect to the axons of the other nerve cell through connections called as a 'synapse'.

Synapse is the functional region of contact between two neurons, where information from one neuron is transmitted or relayed to another neuron. Though these are regions of minute gaps and essentially neurons do not have any protoplasmic connection between them yet

information is passed from one nerve cell to the other through these gaps either in the form of chemical or electrical signals or both. These synapses are mainly found usually in the brain, spinal cord and around the spinal cord. Beyond these areas the axon carries the signals to respective areas in our body.

SELF EVALUATION:

1. Draw the picture and explain the structure of nerve cell.
2. How synapse will form? What is its function?
3. What would happen if the myelin sheath is damaged in myelinated neurons?
4. Identify the INCORRECT sentence from the following.
 - A. myelin sheath is interrupted at regular intervals called nodes of Ranvier.
 - B. Axon extends to different parts of our body.
 - C. Information is passed from one nerve cell to the other through electrical signals.
 - D. Neurons have protoplasmic connection between them.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.56

CONCEPTS:

1. Afferent nerve (sensory nerve)
2. Efferent nerve (motor nerve)

LEARNING OUTCOMES:

The Learner...

1. Identifies the observations made by the Galen.
2. Compares the sensory and motor nerves.
3. Draws and explains about sensory and motor nerves.

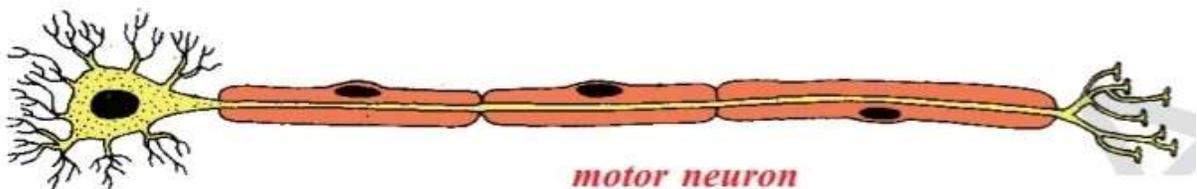
CONCEPT PRESENTATION:

The Greeks believed that all functions of the body were controlled by the brain. Galen, a Greek scientist made one observation having suffered a blow on the neck changed their opinion

- What are the observations made by the Galen?

Galen observed that the patient suffered a blow on the neck was loss of feeling in the arm still retaining normal muscular control of its movement. He thought that the blow in the neck had damaged the nerves of sensation but had not affected it's action. Galen concluded that nerves were of two kinds – those of sensation and those of action.

Observe the following picture.

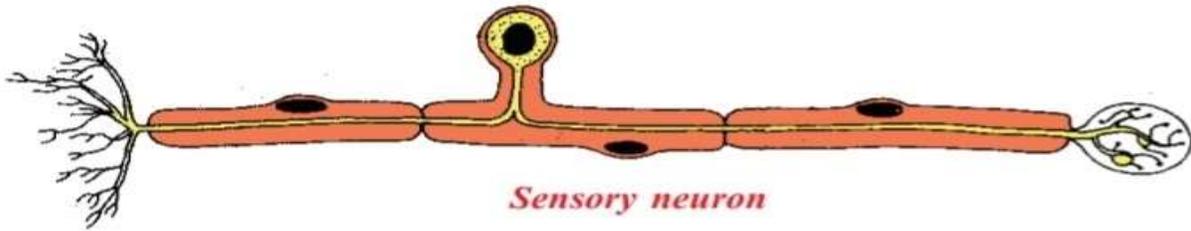


- What is the function of this nerve cell?

The above nerve cell is Afferent nerve (sensory nerve).

The Afferent nerves carry messages towards the central nervous system (spinal cord or brain) from nerve endings on the muscles of different sense organs. These are also called as sensory nerves.

Observe the following picture.



- What is the function of this nerve cell?

The above nerve cell is Efferent nerve (motor nerve).

The Efferent nerve carry messages from the central nervous system to body parts that shall carry out the response to effector muscles. These are also called as motor nerves.

Association nerves link together the afferent and efferent nerves.

SELF EVALUATION:

1. What are the observations made by the Galen?
2. Write the differences in function of sensory and motor nerves?
3. Draw the pictures of efferent and afferent nerves.
4. Write the structural differences between the sensory and motor nerves.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.57

CONCEPTS:

1. Reflex arc
2. Involuntary action
3. Voluntary action

LEARNING OUTCOMES:

The Learner...

1. Identifies voluntary and involuntary actions.
2. Explains about reflex arc.
3. Gives examples from daily life regarding reflex arc.

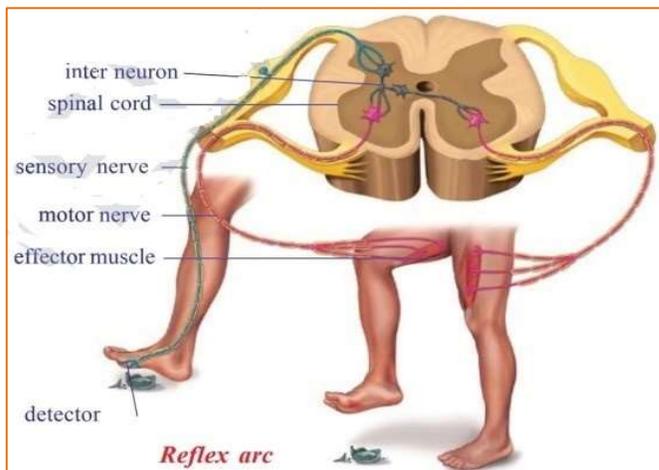
CONCEPT PRESENTATION:

Our body responses had control or it was voluntary in different situations. Our body would also need to respond to certain situations on which we may not have a control.

Complete the following table :

Responses controlled by us (Voluntary actions)	Responses not in our control (Involuntary actions)

Observe the following picture.



- What you have observed?

If you accidentally touch a sharp surface with your feet, such information reaches to spinal cord through sensory nerve and certain information from the spinal cord to effector muscle through motor nerve which cause the muscles of the leg to withdraw the feet.

- What is reflex arc?

Picking up information of a stimulus to generate a response involves a pathway from detectors to brain or spinal

cord or a set of nerve cell heads near spinal cord to the effectors. Such a single pathway going upto the spinal cord from detectors and returning to effectors is a reflex arc.

- Do this activity

Cross the legs, in a seated position, so that the lower half of the uppermost leg hangs freely over the other. Strike the area below the knee cap sharply, while firmly grasping the front part of the thigh with the other hand.

- What changes occur in the shape of the thigh muscles?

Although we are fully conscious, we cannot prevent the thigh muscles from contracting. Such a response to be involuntary.

- What are reflexes? What are the reasons for reflexes?

Our body would also need to respond to certain situations on which we may not have a control. Such responses are called reflexes.

During actions which are involuntary and have to be carried out in very short intervals of time, the pathway that nerves follow is a short one; it does not go up to the brain while voluntary pathways are usually longer passing through the brain.

Most actions of our body are actually controlled together by voluntary and involuntary pathways. The voluntary and involuntary actions in our body are controlled by nervous system as a whole.

SELF EVALUATION:

1. Draw and explain any one incident showing reflex arc.

2. What are involuntary actions?

3. What is the reason for involuntary actions?

4. Which system in our body controls the voluntary and involuntary actions?



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No. 58

CONCEPTS:

1. Central nervous system; 2. Brain; 3. Spinal cord

LEARNING OUTCOMES:

The Learner...

1. Identifies sections in the nervous system.
2. Explains the structure of brain.
3. Identifies the important parts in the brain.

CONCEPT PRESENTATION:

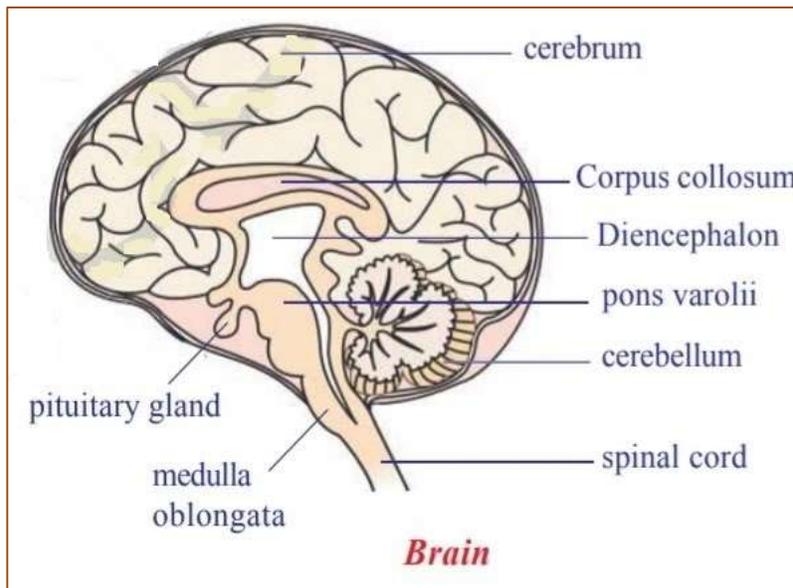
The voluntary and involuntary actions in our body are controlled by nervous system.

Human nervous system consists of two sections. They are:

1. Central nervous system
2. Peripheral nervous system

Central nervous system includes brain and spinal cord. It coordinates all neural functions.

Observe the following picture.



- Explain the structure of the brain.

The brain is present in the hard-bony box like structure called cranium. It is covered by three layers called the meninges. The meninges are continuous and cover the spinal cord as well. The space between the inner layers is filled with fluid called cerebro-spinal fluid. It serves as a shock absorbing medium and protects the brain against shocks along with the meninges and cranium.

Mainly the nerve cell bodies together with capillaries form a mass called grey matter while the myelinated axons are those covered by fatty sheaths form white matter. The grey matter is usually present on the periphery while white matter is present towards the center. When compare to body weight human brain quite large as compared to several other animals.

- How many divisions are present in the brain? What are they?

Brain in three divisions. They are:

1. Fore brain – cerebrum, diencephalon
2. Midbrain – optic lobes
3. Hind brain – cerebellum, medulla oblongata

Observe the following picture.



- Explain the structure of the spinal cord.

Spinal cord extends from the back of the hind brain to the back of the lumbar region, through the neural canal of the vertebral column. It is almost cylindrical in shape. The white matter is towards periphery while grey matter is towards the center of the spinal cord. The myelinated axons leave the spinal cord from both sides of the vertebral column.

- What are the observations made by Leonardo da Vinci and Stephen Hales?

Leonardo da Vinci and Stephen Hales both observed the survival of frogs whose brain had been destroyed. The animal still

produced muscular movements (response) if its skin was pinched (stimuli) or pricked. Both further observed that the animal died as soon as spinal cord was damaged by pushing a needle down it.

Such evidence suggested that the spinal cord was not simply a trunk road for instructions from the brain, but might be a control center in its own right.

SELF EVALUATION:

1. Explain the structure of brain with a neat labeled diagram.
2. What are the important parts in the brain?
3. What is a central nervous system?
4. What are the observations made by Leonardo da Vinci?
5. What is the reason behind survival of the animals even brain had been destroyed?
6. Why some of the parts in the brain are with grey matter and other white matter?
7. Identify the **INCORRECT** sentences from the following. []
 - A. Meninges protect the brain against shocks.
 - B. In the brain the grey matter is present in the periphery while white matter in the center.
 - C. In spinal cord the white matter is towards periphery while grey matter is towards the center.
 - D. Spinal cord might not be a control center.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.59

CONCEPTS:

1. Fore brain; 2. Mid brain; 3. Hind brain

LEARNING OUTCOMES:

The Learner...

1. Identifies the parts of the fore brain, mid brain and hind brain.
2. Explains the functions of the fore brain, mid brain and hind brain.

CONCEPT PRESENTATION:

Brain has mainly 3 divisions. They are: 1. Fore brain 2. Mid brain 3. Hind brain.

Fore brain mainly contains Olfactory lobes, Cerebrum and Diencephalon.

Observe the following table.

Part of the fore brain	Structure	Functions	Others
Olfactory lobes	<ul style="list-style-type: none">• Club shape	<ul style="list-style-type: none">• Sense of smell	<ul style="list-style-type: none">• Visible from the ventral surface
Cerebrum	<ul style="list-style-type: none">• Consists of two lobes called cerebral hemispheres.• Surface of the cerebrum has many folds.• They appear as elevation (Gyri) and depression (Sulci).• Sulci are very prominent and divide each hemisphere into four lobes.	Seat of mental abilities, controls thinking, memory, reasoning, perception, emotions and speech Interprets sensations and responds to cold, heat, pain and pressure.	<ul style="list-style-type: none">• Corpus collosum connects the two hemispheres
Diencephalon	<ul style="list-style-type: none">• Rhomboid shape.• It is divided into thalamus and hypothalamus	<ul style="list-style-type: none">• Relay Centre for sensory impulses such as pain, temperature and light ;• Reflex Centre for muscular activities;• Centre for certain emotions such as anger;• Centre for water balance, blood pressure, blood temperature, sleep and hunger;• Hypothalamus controls the pituitary gland	<ul style="list-style-type: none">• Visible from inferior surface of brain• Lies between cerebrum and midbrain

- What are the parts present in the fore brain?
- Explain the folds of cerebral hemispheres?
- Which part of the fore brain controls the emotions?
- Which part concerned with the sense of smell?

Observe the following table

Part of the mid brain	Structure	Functions	Others
Mid brain	<ul style="list-style-type: none"> • Small thick stalk like part 	<ul style="list-style-type: none"> • Relays motor impulses from the cerebral cortex to the spinal cord and relays sensory impulses from the spinal cord to the thalamus; • Reflexes for sight and hearing. 	<ul style="list-style-type: none"> • Connects fore brain with cerebellum and parts of hind brain

- What are the functions of mid brain?
- Which parts connects by the mid brain?

- Observe the following table.

Part of the hind brain	Structure	Functions	Others
cerebellum	<ul style="list-style-type: none"> • Consists of two large cerebellar hemispheres 	<ul style="list-style-type: none"> • Equilibrium of the body • Maintains posture, and muscle tone; • Coordinates voluntary movements initiated by cerebrum 	<ul style="list-style-type: none"> • Located below the cerebrum and above medulla oblongata
Medulla oblongata	<ul style="list-style-type: none"> • Triangular shape 	<ul style="list-style-type: none"> • Center for cardiac, respiratory and vasomotor activities; • Coordinates reflexes like swallowing, coughing, sneezing and vomiting 	<ul style="list-style-type: none"> • Extends from pons to spinal cord

- What are the parts present in hind brain?
- Which part controls the equilibrium of the body?
- Which part is responsible for involuntary responses?
- What is the shape of the medulla oblongata?
- What is the location of the cerebellum?



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.60

CONCEPTS:

1. Peripheral nervous system;
2. Autonomous nervous system
3. Sympathetic nervous system;
4. Parasympathetic nervous system

LEARNING OUTCOMES:

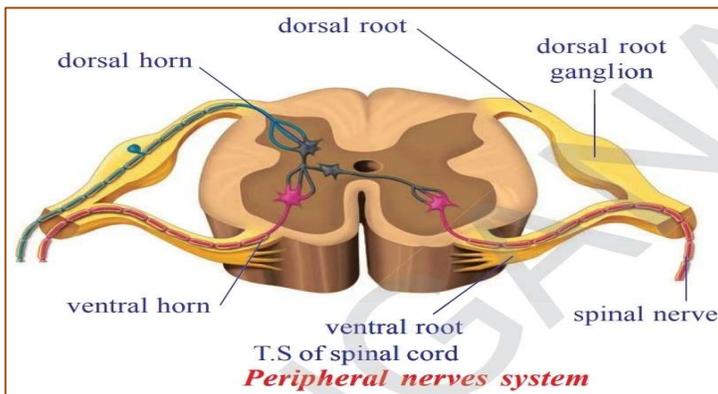
The Learner...

1. Relates dorsal and ventral roots of spinal cord with their functions,
2. Explains the autonomous nervous system.
3. Identifies the effect of sympathetic and parasympathetic nervous systems on the functions of organs.
4. Explains about the peripheral nervous system.

CONCEPT PRESENTATION:

Charles Bell and Francois Magendie discovered that dorsal and ventral roots of spinal cord have different functions.

Observe the following picture.



- What are the connections or roots present in the spinal cord?

How they conduct their functions?

Spinal cord has two types of connections or roots - one to the back or dorsal side and other to front or the ventral side of cord. These two roots have different functions. Dorsal root carries messages of sensation inwards while the ventral pathway carries outwards the instruction for muscular contraction.

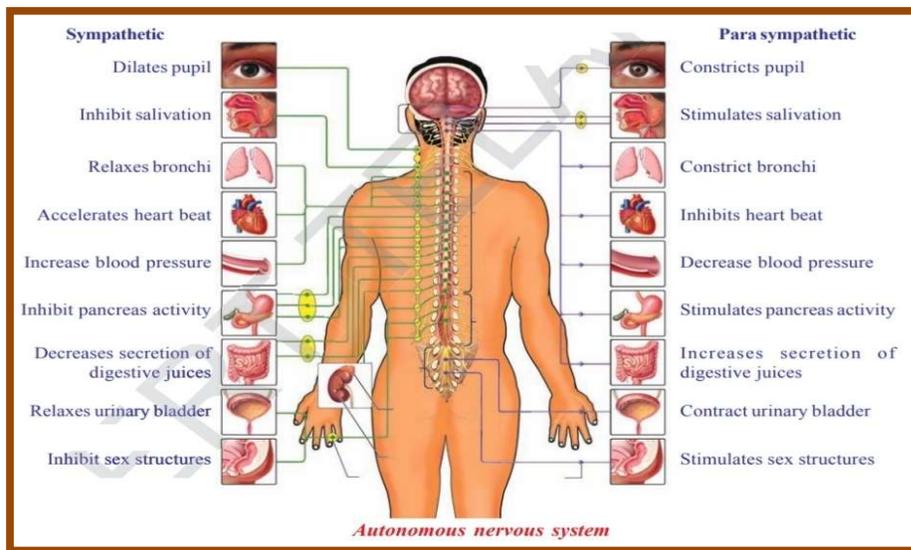
- What is a peripheral nervous system?

The peripheral nervous system is a vast system of the dorsal and ventral root nerve cell heads and the network of spinal and cranial nerves that are linked to the brain and the spinal cord on one end and muscles on the other.

- What is an autonomous nervous system?

The peripheral nervous system can involuntarily control several functions (Eg. Blood vessels, cardiac muscles), so it is called autonomous nervous system. It also has voluntary control (Eg. Skeletal muscle, muscles of some areas of skin). Normally involuntary activities take place by the coordinated efforts of the medulla oblongata and autonomous nervous system. These together constitute consisting of twelve pairs of cranial nerves and thirty one pairs of spinal nerves.

Observe the following picture.



- What are the effects shown by autonomous nervous system on different life processes?

When we enter a dark room we cannot see anything immediately. Slowly we are able to see the things around us in the room. This is because of increase in diameter of pupil, which allows more light in. when we come out of the dark room into broad day

light the diameter of the pupil decreases allowing less light to enter into the eyes. Both these functions occur under the influence of the autonomous nervous system.

Ganglia near the vertebral column are connected to the spinal cord by nerves. The sympathetic system is formed by the chain of ganglia on either side of the vertebral column and the associated nerves. The parasympathetic system is formed by the nerves arising from the ganglia of the brain and the posterior part of the spinal cord. These together constitute the autonomous nervous system. These are all belongs to peripheral nervous system.

On the basis of above picture complete the following table:

<i>Incident</i>	<i>Effect of sympathetic nervous system</i>	<i>Effect of parasympathetic nervous system</i>
• Seeing mango	• Inhibit salivation	• Stimulates salivation
•	•	•
•	•	•
•	•	•

SELF EVALUATION:

1. Peripheral nervous system consists of how many nerves? What is their nature type?
2. What are the observations made by Charles Bell and Magendie?
3. Which nervous system is called as autonomous nervous system?
4. Write some examples which shows the effect of the sympathetic and parasympathetic nervous system.
5. Draw the transverse section of spinal cord and write the functions of dorsal and ventral roots.
6. Which part coordinates with the autonomous nervous system to conduct involuntary actions?



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.61

CONCEPTS: 1. Endocrine glands 2. Hormones

LEARNING OUTCOMES:

The Learner...

1. Explains about endocrine glands and their secretions.
2. Compares the duct and ductless glands.
3. Gives examples for duct and ductless glands.

CONCEPT PRESENTATION:

Several functions in our body are controlled by nerves while many others are controlled by the secretions which flow in the blood. Starling had coined the term hormone (hormao – to impel) for that secretions. The glands secreting hormones were termed ductless glands.

- What are the difference between the duct and ductless glands?

Whose secretions pass down the ducts are called glands with ducts. Eg. Liver

Some glands have no tube or duct to carry their secretions, which pass straight in to the blood. These are called ductless glands. The secretions of the ductless glands (endocrine glands) are hormones.

Observe the following table.

Name of the endocrine gland	Location	Hormone secreted	Response of body to hormone
Pituitary	Floor of brain	1. Somatotropin	Growth of bones
		2. Thyrotropin	Activity of thyroid gland
		3. Gonadotropin	Activity of ovary and testis
		4. Adreno cortico trophic hormone	Stimulates secretion from adrenal cortex
		5. Luteinising hormone	In males - secretion of testosterone. In female - Ovulation, development of corpus luteum and secretion of progesterone.
		6. Follicle stimulating hormone	In male - spermatogenesis In female - growth of graafian follicles, estrogen secretion, milk production and secretion.
		7. Vasopressin	Regulate absorption of water from the kidney tubules
Thyroid	Neck	Thyroxine	General growth rate and metabolic activity
Ovary	Lower abdomen	Estrogen	Growth of the uterus and skeleton of the pelvis Control of the 28 days menstrual cycle in females.
		Progesteron	Development of uterus, implantation, development of mammary glands.
Testes	Scrotal sac	Testosterone	Growth of hair on face, muscular development, deepening of voice, normal sexual behavior and development of male sex organs.
Adrenal	Attached to kidneys	Adrenalin	Increase in heart-beat rate. Rise in blood sugar. Dilation of the coronary artery. Dilation of the pupil of the eye..
Pancreas	Near duodenum	1. Insulin	Decrease glucose percentage in blood
		2. Glucagon	Increase glucose percentage in blood

- What are the endocrine glands mentioned in the above table?
- Which hormones secreted by the pituitary gland shows impact on hormones of other ductless glands?
- What are the ductless glands present in men?
- What are the endocrine glands present only in women?
- Which hormone shows impact on emotions?

Pituitary gland, thyroid gland, ovary, testes, adrenal and pancreas glands are present in human beings. Hormones are secreted by these endocrine glands. These hormones shows different types of impacts on body. Pituitary gland is important gland which shows impact on other endocrine glands.

- What type of impact shown on life processes by hormones?

Hormones shows different types of impact on life processes. For Eg. What will you do if a dog follows you? Generally the first thing we do is running away from the place. When we are afraid, the rate of heart beat increases, the breathe rate will be faster, blood pressure increases, the hair on the body becomes erect, pupil dilation, skin becomes more sensitive and rarely the bladder and the rectum may be emptied. We come to normal state only after we reach a safe spot.

All these changes in the body are carried out under the influence of Adrenalin hormone, released by Adrenal gland which is an endocrine gland. The various actions of the body are controlled by hormones and coordinated by nervous system. But the impact of the nervous system is very little.

- List out some more incidences like above which you have faced in your daily life.

SELF EVALUATION:

1. Write the hormones released by the ovary and its effects.
2. Why pituitary gland is called as Masters gland?
3. Which gland secretes testosterone hormone? What is the impact of this hormone?
4. Which hormone is secreted when we are Scared/afraid? What is its impact?
5. Write the hormones secreted by the pancreas and their impact.

6. Match the following. ()

- | | | |
|----------------|-----|---------------------|
| a) Thyrotropin | () | i. Pancreas |
| b) Estrogen | () | ii. Ovary |
| c) Glucagon | () | iii. Thyroid |
| d) Thyroxin | () | iv. Pituitary gland |

A). a-iii, b-iv, c-i, d-ii

C). a-i, b-ii, c-iii, d-iv

B). a-ii, b-ii, c-i, d-iv

D). a-iv, b-ii, c-i, d-iii.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.62

CONCEPTS: 1. Insulin 2. Feedback mechanism

LEARNING OUTCOMES:

The Learner...

1. Explains about feedback mechanism.
2. Identifies the impact of insulin on levels of glucose.
3. Appreciates the observations of Paul Langerhans.

CONCEPT PRESENTATION:

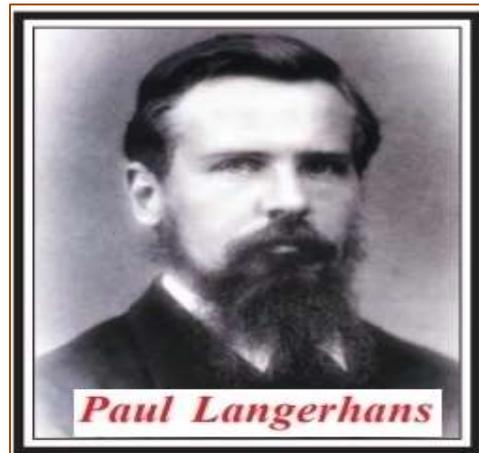
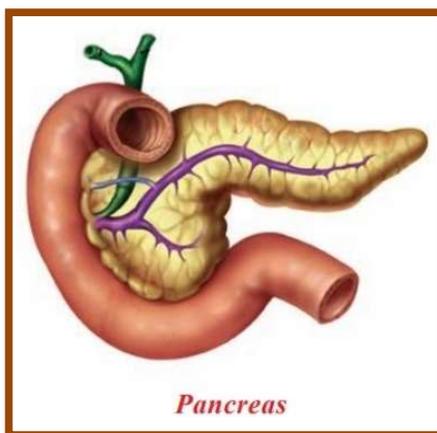
Several functions in our body are controlled by nerves while many others are controlled by other ways as well. Insulin is one of them.

- Why people having diabetes (sugar levels high in the blood) take insulin injections?

Insulin is a chemical compound. It controls the glucose levels in the blood. So the people suffering with diabetes take insulin injections.

- Where the production of insulin takes place? In what way insulin was discovered?

Observe the following picture



Insulin is secreted by the islets of Langerhans which present in the pancreas. Paul Langerhans observed certain patches of cells quite different in appearance from the normal tissue cells of the pancreas. He named these cells as islets of Langerhans. Afterwards scientists identified the relation between the sugar levels in the blood and insulin which secreted by the islets of pancreas. Insula means an island.

Scientists observed that when given by insulin injection to a dog with no pancreas, this substance kept it alive and healthy with a low level of blood sugar. Insulin is now used for the treatment of diabetes, administered by injection.

- What is feedback mechanism?

A feedback mechanism is a loop in which a product controls its own production. This means that there should be some mechanism to regulate the production and release of hormones in the body. The production of several hormones is controlled in this manner. The timing and amount of hormones released by endocrine glands is controlled by the feedback mechanism, which is inbuilt in our body. None of the systems, whether nervous or chemical are totally exclusive of each other.

Eg. A pituitary hormone 'prolactin' stimulates mammary gland to produce milk. As the baby sucks, more prolactin is produced enhancing milk production.

When the glucose level in blood rises above normal level pancreas respond by producing more amount of insulin hormone into the blood effectively lowering blood glucose levels. Lowering to normal level results in turning down the secretion of the insulin hormone. It is necessary that the hormones are secreted by the glands in our body in precise quantities which are required for the normal functioning of the body.

Observe the following picture and write your observations on it.



SELF EVALUATION:

1. Explain about feedback mechanism?
2. Give some examples for feedback mechanism from your daily life experiences.
3. What is the functions of insulin?
4. What are the observations of Langerhans?
5. Why insulin is given to diabetic persons?
6. Collect and analyze information about characteristics of disease from diabetes persons of your surroundings.



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.63

CONCEPTS:

1. Phytohormones; 2. Auxins

LEARNING OUTCOMES:

The Learner...

1. Identifies the phytohormones.
2. Explains the discovery of the auxins.
3. Explains the experiments conducted by Went and Charles Darwin.

CONCEPT PRESENTATION:

Higher animals respond to stimuli because they have a nervous system and an endocrine system. Plants do not have well defined nervous or endocrine system. They do have some mechanism of control by means of some chemicals or hormones. The hormones present in the plants called phytohormones (phyto - plants). Plant hormones are also called growth substances.

Observe the following table.

Hormones	Uses
Auxins	cell elongation and differentiation of shoots and roots
Cytokinins	promote cell division, promotion of sprouting of lateral buds, delaying the ageing in leaves, opening of stomata.
Gibberellins	germination of seeds and sprouting of buds; elongation of stems; stimulation of flowering; development of seedless fruits, breaking the dormancy in seeds and buds.
Absciscic acid	closing of stomata; seed dormancy, promoting aging of leaves.
Ethylene	ripening of fruit

Identify the effect of hormones on a specific part.

Eg. Cytokinins – opening of stomata

Absciscic acid – closing of stomata

- Which phytohormone helps in the growth of the plant?
- Which phytohormone helps in ripening of fruit?

Plants can sense the presence of stimuli like light, heat, water, touch, pressure, chemicals, gravity etc.

Observe the following picture.



- How will you prove the response shown by the plants towards light?

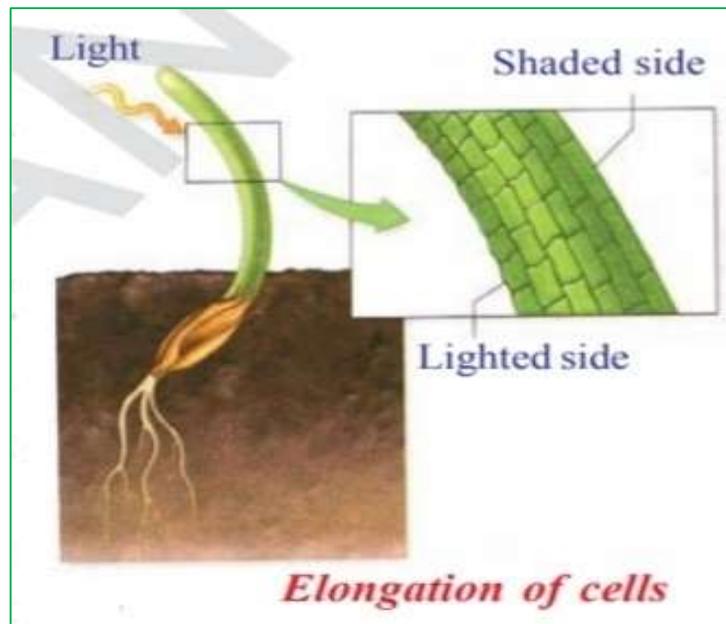
Take a glass jar and fill with soil. Sow a bean seed near the wall of the jar. This helps you to observe how root and shoot are growing. After 4 – 5 days you will notice seed germination. Keep the jar under the sun. observe how root and shoot grows. Then tilt the glass jar and keep the plant horizontally. Observe the direction of root and shoot growth for more than a week.

Observe the following picture.

- What type of changes are observed in the growth of the plant?

Even the glass jar is horizontal; plant grows towards the light bending of stem to show a response to the sunlight. More auxin collects on the shaded side of the stem. So cells on that side grow faster. On opposite side cells grow slow to make the stem bend.

- What are the observations made by the Charles Darwin conducting experiment on phototropism?



Charles Darwin performed some experiments on phototropism. He covered the terminal portion of the tip of stem (coleoptile) with a cylinder of metal foil. Exposed the plant to light coming from the side. The characteristic bending of the seedling did not occur. When, light was permitted to penetrate the cylinder bending occurred normally. He stated that when seedlings are freely exposed to a lateral light some 'influence' is transmitted from upper to the lower part causing the material to bend.

- Who and In what way discovered this "influence"?



STATE COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING TELANGANA, HYDERABAD.

ACADEMIC YEAR 2020-21

LEVEL - 2

Class: 10

Medium: English

Subject: Biology

Unit: CONTROL AND COORDINATION

Worksheet No.64

CONCEPTS:

1. Tropic movements
2. Nastic movements

LEARNING OUTCOMES:

The Learner...

1. Explains different types of tropic movements.
2. Differentiates the nastic and tropic movements.

CONCEPT PRESENTATION:

The movement of individual parts of plants is possible when they are subjected to external stimuli. Sometimes the direction of stimuli determines direction of movement. This type of response is called tropic movement. Sometimes the direction of movement may not be determined by direction of stimuli. This type of response is called nastic movement.

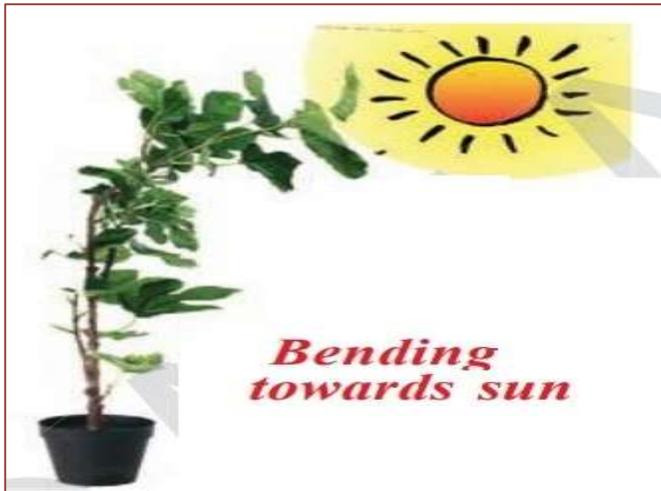
Observe the following pictures of Athipathi plant (Touch me not plant) .



- What happens if we touch the leaves of (Athipathi) *Mimosa pudica*?

When we touch the leaves of the Athipathi (touch me not plant) they get folded. This is called as nastic movement.

Observe the following picture.



The shoots of plants bend towards sunlight. Such type of response of a plant to light is called phototropism (photo – light; tropism – movement)

Observe the following picture.

- What type of movement are shown by tendrils of the plants?

In some plants, tendrils play a vital role to make the plant erect. Tendrils are thin thread like growths on the leaves or stems of climbing plant. They grow towards support and wind around them. This type of response to make contact or touch is called thigmotropism.



Tendrils

- What types of tropic movements are present in the plants?

Geotropism:

plant roots always grow downwards. plant respond positively for gravitational force. This is called geotropism.

Hydrotropism:

Plants which grow near a rock or wall side, that all roots are grow in one direction where water is available in the soil. This type of response to water is called hydrotropism.

Chemotropism:

The mature stigma secretes sweet sugary substance. This chemical substance stimulates the pollen grain which falls on the stigma. Pollen grain responds to this stimulus as pollen tubes grow to reach the ovule for fertilization. This type of response to chemicals is called chemotropism.

SELF EVALUATION:

1. Write the differences between nastic and tropic movements?
2. Explain the different types of tropic movements in the plants.
3. Give examples for thigmotropism.
4. Write different types of tropic movements with examples observed in your daily life.