Biology

UNIT-1
LIFE PROCESSES


CBSE - International
"Let Noble Thoughts come to us from every side"

Biology

LIFE PROCESSES

Syllabus Coverage

SYLLABUS	Core	Extension
	What are life processes? Nutrition - Autotrophic and heterotrophic Photosynthesis and cellular respiration Exchange of gases Nutrition in animals and human beings Mechanism of breathing Transportation of materials in human beings Transportation of materials in plants Excretion in plants, animals and human beings	Sources of mineral elements for plants Water cultures Effect of smoking Osmoregulation and homeostasis Renal failure and Technology for survival

SCOPE DOCUMENT

UNIT 1: Life Processes

Students will understand how and why new varieties of plant and animal life are created. An introduction to genetic engineering would be given and will highlight on the fact that in spite of being controversial it offers possible solutions to food shortages and environmental problems. The applications are almost limitless. Research has been done to design plants that are resistant to disease, kill insects and weeds. Plants may be engineered to be more nutritious, more responsive to fertilizers and easier to pack and transport.

Learning outcomes - Foundation

At the end of this unit, students should be able to :

- Understand the basis of classifying objects as living and non-living.
- Explain what are life processes
- Define the term nutrition and describe various modes of nutrition in living beings.
- Describe the importance of photosynthesis to living organisms.
- Construct the generalized equation of photosynthesis and list the raw materials required for photosynthesis
- Comprehend the various effects of external factors on rate of photosynthesis
- List various parts of the alimentary canal in humans
- Describe the process of digestion, absorption and assimilation of food across various parts of alimentary canal in humans.
- Explain the role of pancreas and liver in digestion
- Describe the major steps of respiration in animals and plants
- List various organs of respiratory system in humans and the role they play in respiration
- Describe the mechanism of transportation of materials in plants
- List various tissues concerned with transportation of food materials in plants
- Describe the composition, physical characteristics and functions of blood

- Describe the cardiac cycle
- Describe the nature of excretory wastes produced in our body.
- Identify the different parts of the excretory system and describe their functions.
- Explain the physiology of urine formation

Learning outcomes - Extension

At the end of this unit students should be able to :

- List the various sources of mineral elements required for plant growth
- Demonstrate the importance of various mineral elements by growing plants in water cultures
- Effects of smoking on the lungs and circulatory system
- Describe the mechanism of water balance and osmoregulation.
- Comprehend that the kidneys, lung, liver and skin all help to keep the blood composition the same (homeostasis)
- Understand how the failure of kidneys require immediate medical intervention

Cross curricular links- Life processes

History:

- Evolutionary aspect of organs; their development.
- Case History in Human Physiology

Geography:

- Affect of Climate on Physiology - Body response to cold.
- Genetic factors- hair, eye color

Math:

- Calculation of heart rate/ cardiac output.
- Graph on pH of enzyme.
- Fibonacci Series

Music:

- Rap/ Songs on Digestion and Circulation

Physical Education

- Relay race to show the flow of blood in the body (Circulation)
- Exercises to show aerobic and anaerobic respiration.

Art:

- Clay modeling/ craft work on models of Digestion, Respiration, Circulation, Excretion

Lesson Template

Steps to be followed	Teacher's Activity	Student's Activity
Warming up **Life Processes in our Body** **Importance of Life processes**	The teacher will put up questions before students: What do you understand by the term 'life processes'? What are the life processes of our body? The teacher would, then, introduce the important processes which make us living and give an easy way to remember various processes of life with the help of **Mrs NERG** **Activity 1: Life Processes**	Students will try to list the various body systems. The students will identify the life process shown in the diagram given in the Worksheet 1. **Worksheet 1** Students will also find out how do these life processes perform the maintenance job and what enables them to do so?
Pre Content **Autotrophic and Heterotrophic Nutrition**	The teacher would try to connect students with the fact that for doing any kind of work the fundamental requirement is energy and which is obtained from the food we eat. The teacher would also have a discussion on the word 'auto' and hetero' leading to the concept of autotrophic and heterotrophic nutrition. **Activity 2: Autotrophic and Heterotrophic modes of nutrition**	The students will answer questions based on uni-directional flow of energy (given to them by their teacher). **Worksheet 2**

Content **Process of photosynthesis**	The teacher will explain that all organisms use different source of energy which need to be then converted to a source usable by the body. The teacher would discuss the utilization of energy of Sun by green plants and our incapability to do so. Teacher may ask: How do the plants trap Sun's energy in order to convert it to a usable form? **Activity 3a : Autotrophic nutrition** Teacher would explain the significance of photosynthesis	Students will discuss other forms of autotrophic mode of nutrition present n certain bacteria Students will list down the significance of photosynthesis and essential raw materials for photosynthesis. **Worksheet 3**
Raw materials for photosynthesis	The teacher would ask about the sources of the raw materials that are necessary for the process of photosynthesis **Activity 4 : Production of starch as the direct evidence for photosynthesis.**	The students will answer questions based on raw materials and products of photosynthesis Worksheet 4

Exchange of gases	The teacher would then link the process of photosynthesis to exchange of gases in plants. She would also correlate the process of respiration and photosynthesis. Next she would illustrate the exchange of gases between the atmosphere and the plant. Also explain the role of stomata in exchange of gases. The teacher would assist students in the preparation of a temporary mount of stomata and make them understand the function of stomata. **Activity 5 : Gaseous exchange in plants**	Students may compare the distribution of stomata in upper and lower epidermis of the leaf and may give their reason. They will also discuss the adaptations of leaves for the process of photosynthesis. They will also analyze how green plants are able to make all the materials they need from carbon dioxide, water and salts. **Worksheet 5**
Heterotrophic Nutrition	After having discussed the autotrophic mode of nutrition, the teacher would focus the attention of students nutrition habits of other organisms. The teacher might also give some examples of organisms and ask the students about how those organisms feed? **Activity 6a : Heterotrophic mode of nutrition** The teacher would ask the students about the procurement of food by lower organisms like protozoans and talk about their body organization and organ system **Activity 6b: Nutrition in lower organisms**	The students will use their previous knowledge and mention various modes of nutrition in the assignment given to them by their teacher. **Worksheet 6a** The students will together do a research and find out about the procurement methods of lower organisms. They will explore nutrition in paramecium and higher multicellular organisms. **Worksheet 6b**

Nutrition in humans	The teacher in her next class would explain that in multi-cellular organisms, like humans, food is taken up one part of the body. discusses the mechanical and chemical digestion and ask students what happens in the mouth? Which macromolecule's digestion begins in the mouth? **Activity 7 : Nutrition in humans**	The students may talk about mechanical digestion and role of tongue and teeth in mechanical digestion **Worksheet 7**
Human Digestive System	In order to explain the process of digestion, the teacher would make the students understand about the various parts of human digestive system. The teacher would discuss the roles of various enzymes which are involved in the process of digestion. She would also recall that all enzymes are made up of proteins. The teacher may pose questions: a) Are enzymes specific? b) What activates enzyme in our stomach? c) What are ulcers? An activity can be designed where students will make organs out of cardboard and would place them together in groups of digestion. **Activity 8a : Digestion of food in human body** The teacher may demonstrate washing oiled or greased hands with and without soap and ask the students reason behind it.	The students will identify the sites foreach of the macromolecular digestion in the Human Alimentary canal. **Worksheet 8a** The students will discuss the concept of emulsification **Worksheet 8b**

	The teacher would then introduce the concept of emulsification **Activity 8b**	
Circulatory system assists in transport of materials in animals	The teacher would try to correlate the process of digestion with circulation and how the molecules of glucose are transported by blood She would explain 'In human beings a rapid supply of nutrients, O_2 and hormones to various tissues and the disposal of waste products is an essential requirement. She would explain how this function is efficiently done by our circulatory system. The teacher would next show a model of Heart and explain the representation of colors as red and blue **Activity 9a :Structure of Heart** The teacher would ask the students to draw a heart and to make a story about the transportation of blood to and fro from the heart. Students may relate the transportation to a train ride with different stations. The students might also play a relay race to show the flow of blood through the heart. She would next enlighten students with the story of life and death of RBCs. The teacher would discuss pulmonary and systemic circulation. **Activity 9b : Pulmonary and Systemic Circulation**	The students shall try to understand the flow of oxygenated and deoxygenated blood through the heart. **Worksheet 9a** The students will also discuss the composition and function of blood and solve a related worksheet **Worksheet 9b** **Worksheet 9c** The students will have a discussion on the similar process of transportation that occurs in plants

Transportation in plants	Teacher would explain the process of transportation of nutrients in plants **Activity 10 : Transportation in plants**	Students will explore more information for 'how are mineral nutrients transported in plants. They will find answers to how guard cells in stomata control the transpiration rate.
Structure and working of Respiratory system	The teacher would begin this session by reminding students about what they had learnt in their earlier classes about harnessing solar energy by plants in the form of food that we eat and how that energy is extracted by the organisms. She would relate the process to respiratory system also. The teacher would demonstrate a model of Lungs to show the structure and function of respiratory system **Activity 11 : Model of the respiratory system**	The students will label the Respiratory system **Worksheet-11A** The students will recapitulate by fill up the blanks based on respiration **Worksheet-11 B**
Basic functions of respiration	The teacher would instruct her students to perform following series of experiments to demonstrate the basic functions of respiration. • there is oxygen in the air we breathe • the processes of inhalation / exhalation • the volume of air exhaled show the movement of diaphragm during respiration	Students will compare the process of breathing and respiration. They will also list down various functions of various structures of human respiratory system. Students will try to answer the question in the provided worksheet

	• that carbon dioxide is exhaled from the body. **Activity 12 : Functions of respiratory system**	**Worksheet 12 A** To reinforce the students would answer the MCQS **Worksheet 12 B**
Types of respiration : **Aerobic and Anaerobic**	The teacher would guide students to display information Graphically **Activity 13 a : Make a Concept Map of the Aerobic & Anaerobic Pathways** The teacher will make students perform a physical activity, such as running and sprinting and help them identify/analyse aerobic and Anaerobic respiration **Activity 13b: Differentiate between Aerobic & Anaerobic Respiration**	The students will fill up a Cellular respiration concept map **Worksheet 13a** Students will answer **Worksheet-13b** based on their understanding of : Anaerobic and aerobic respiration
Importance of excretion : **Excretion in different animals**	To help students understand the structural and functional importance of excretory system,the teacher would give them assignment to explore and understand. **Activity 14a : Why is excretion essential for life?** In order to help students compare and contrast excretion in different animals, teacher would give some assignments to explore **Activity 14b: Excretion in different animals**	Students will search the websites and answer the questions and fill up the table with appropriate answers. **Worksheet 14 a** Students might also answer the questions on the basis of knowledge they have and fill up the table given. **Worksheet 14 b**

Structure of human excretory system	Teacher will guide students to carry out an activity to demonstrate the role of kidney in maintaining homeostasis **Activity 15 : Excretion in humans**	The students would label nephron and write about the process of formation of urine. **Worksheet 15 A** **Worksheet 15 B** **Worksheet 15 C**
Role of kidney in maintaining homeostasis	Guided discovery and information giving. Discussion and field work **Activity 16 : Kidneys Regulate the Composition of Blood**	Students will solve the worksheets given to them. **Worksheet 16 A** **Worksheet 16 B**
Excretion in plants	The teacher would explain (i) The plant waste products (ii) The role of stomata in getting rid of water vapour and carbon dioxide. (iii) How plants get rid of other waste products. (iv) How some waste products of plants are useful to humans. She would also name some waste products which are harmful to humans and other animals **Activity 17 : excretion in plants**	Encouraged by the two student activities performed in the day, the students will solve a questionnaire and try to discuss in their next class. **Worksheet 17**

Post-Content **Water cultures**	The teacher would emphasize the importance of the various mineral elements by growing plants. She would explain this taking an example of plants in water cultures. A full water culture is a solution containing the salts which provide all the necessary elements for healthy growth of a plant. **Activity 18 a : Water cultures** She would next explain the role of these macro nutrients for the growth of plants. **Activity 18 b : Importance of macro elements in plants**	Using the technical guide provided to them, students will prepare an album of role of micro and macro nutrients in the growth of plants. They might like to show the collected information to their teacher as well.
Effect of smoking	The teacher would explain the harmful effect of smoking. **Actvity-19A** Audio-video activity bio-x-1-cbse-i.docx http://www.youtube.com/watch?v=TaAvhG2SInM&NR=1 **Actvity-19B** With the help of interactive web ,teacher will explain How does smoke affects each organ.	Students will discuss the harmful health effects of smoking cigarettes and present in the form of a list and highlight the long term side effects of smoking. They might also gather information for Quitting smoking makes sense for many reasons but simply put: smoking is bad for health.
Waste or Wealth	In order to make students aware of environmental concerns, teacher will guide them to carry out series of activities **Activity 20 : Waste or wealth**	Students would answer MCQs and some structured questions to reinforce what they have learnt. **Worksheet-20A** **Worksheet-20B**

Warm up Activity

Activity 1: Life Processes

Learning Outcome:

The students would be able to identify the life processes.

Content :

Anything that is 'living' is said to have life and is 'alive'. Things which are alive are called 'Living Things'. All others are non-living things. Various functions are going inside our body and inside the body of all living organisms. These functions are necessary to maintain the living being. The maintenance functions of living organisms must go on even when they are not doing anything particular. These maintenance functions are considered to be life processes.

Following functions comprise the life processes:

1. Nutrition
2. Respiration
3. Excretion
4. Growth & Repair
5. Reproduction
6. Movement
7. Sensitivity

Student activity:

I. Students would enact each life processes showing its importance in being alive. They may show how the absence of one life process would affect life.

II. Students may give examples of five organisms relating with their life processes.

An Easy way to remember

Move

Reproduce

Sensitive

Nutrition

Excrete

Respire

Grow

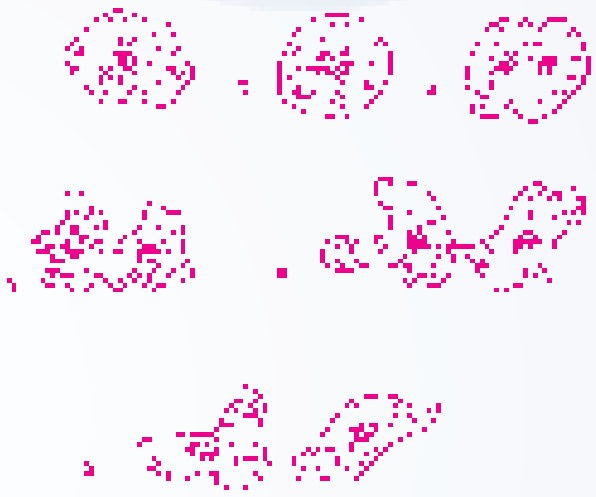
They spell MRS NERG

Worksheet 1

1. Match the following:

(Moving parts of the body)	Nutrition
(Producing offspring)	Excretion
(responding and reaching)	Sensitivity
(Getting food to stay alive)	Movement
(Getting rid of waste)	Reproduction
(Turning food into energy)	Growth
(Getting to adult size)	Respiration

2. Label the diagrams and indicate the life process that is depicted in the diagram below? Give its significance



Activity 2: Nutrition

Learning Outcome:

The students would be able to understand the concept of autotrophic and heterotrophic nutrition

Content

The general requirement for energy and materials is common in all organisms, but it is fulfilled in different ways. Some organisms use simple food material obtained from inorganic sources in the form of carbon dioxide and water. These organisms, the autotrophs, include green plants and some bacteria. Other organisms utilize complex substances. These complex substances have to be broken down into simpler ones before they can be used for the upkeep and growth of the body.

An autotroph is an organism that produces complex organic compound s from simple inorganic molecule s using energy from light (by photosynthesis) or inorganic chemical reactions. Autotrophs are the producers in a food chain, such as plant s on land or algae in water.

'Hetero' refers to other or different and 'trophic' refers to food. Thus, those organisms which obtain their food from other organisms are called heterotrophic and the process of obtaining the food from other organisms is called heterotrophic nutrition. All the heterotrophs depend directly or indirectly on the autotrophic organisms for their food and energy requirements. Heterotrophs include most of the bacteria, fungi and all animals.

Activity:

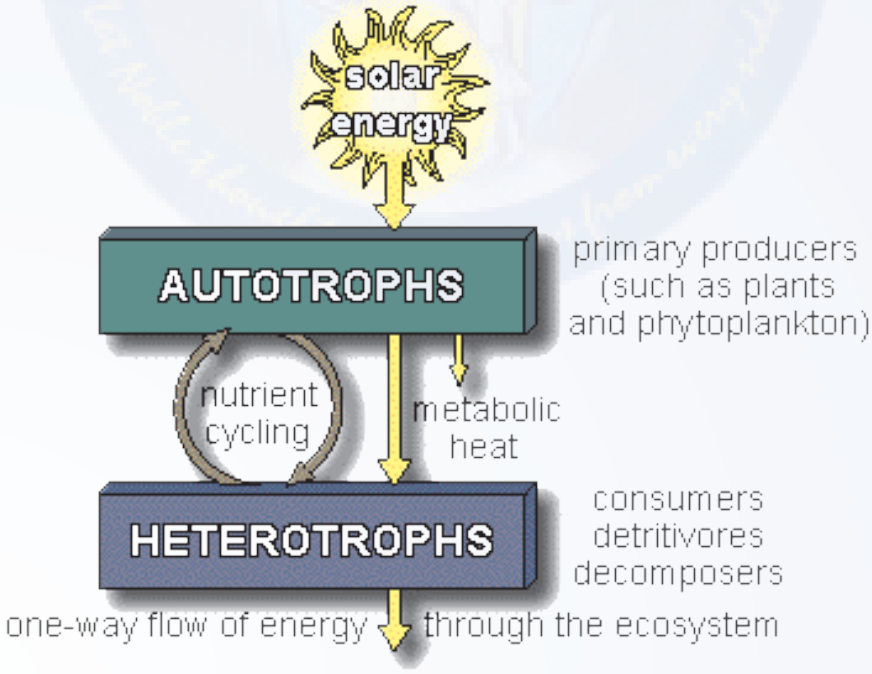
1. Divide the class into two groups.
2. Explain the concept of 'auto' and 'hetero'
3. Each group would represent autotrophs and heterotrophs
4. Each group would show their energy source, energy utilization and passing of energy

Previous knowledge of Food chain is required.

Resource: http://alaska.fws.gov/fire/role/unit1/images/I-6.jpg

Worksheet 2

Answer the following questions on the basis of the diagram given below:



1. What does A, B and C represent?
2. What do you understand by nutrient recycling?
3. What is metabolic heat?
4. What would happen if there were no autotrophs?
5. Why are autotrophs called primary producers?

Activity 3: Autotrophic Nutrition - Photosynthesis

Learning Outcome:

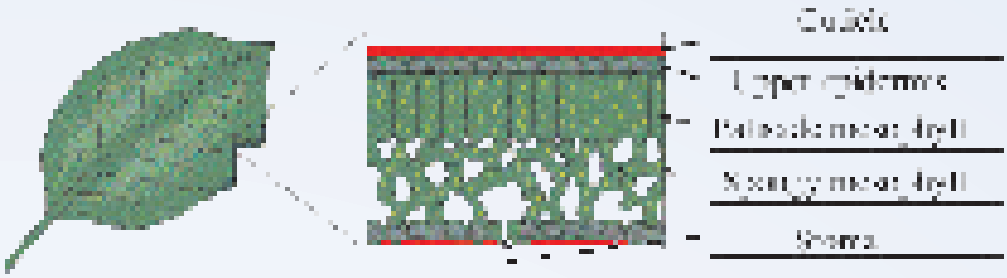
The students would be able to understand the process involved in autotrophic nutrition

Content :

Autotrophic Nutrition is the type of nutrition in which organisms use simple food materials obtained from inorganic sources in the form of CO_2 and H_2O. These organisms are independent and prepare their food on their own. Nutrtion in plants is defined by a special term - Photosynthesis. Photosynthesis is the process used not only by all green plants, but also by blue-green algae (Cyanophyta) and certain bacteria. It is the synthesis of organic compounds primarily sugars from carbon dioxide and water (or other hydrogen [electron] donors) using sunlight as the source of energy and chlorophyll (or some other closely related pigment) for trapping the light energy.

Student Activity I: Photosynthesis in plants

1. Students would enact as different cells of leaf.
2. They can be represented as pigments and enact energy transfer within cells.
3. They may show the distribution of chloroplast in different cells.
4. Students may extend this activity further - one of them can become sun and other sunlight and follow the process of photosynthesis.



5. Others students can act as O_2, CO_2, water, minerals from the soil and glucose to the plant tissues.

Student Activity II: Model of leaf

Make a model of leaf and show the distribution of chloroplast in different cells

Worksheet 3

1. What do you understand by 'auto', 'trophic'?
2. The presence of _____ pigment enables plants to become autotrophic.
   a) What does the blank indicate?
   b) Name the organelle it is present in.
   c) What other pigments help in the process?
3. Name two raw materials necessary for photosynthesis.
4. What is the byproduct of photosynthesis?
5. How does the byproduct of photosynthesis important for us?
6. What would happen if plants could not trap sun's energy?

Activity 4 : Production of Starch - an evidence of photosynthesis

Learning Outcome: The students would be able to understand:

1. How plants make their food by the process of photosynthesis
2. The need of different raw materials that are required for photosynthesis.
3. O_2 is produced during photosynthesis.

Content :

Plants provide a renewable source of food energy for many forms of life. Green plants utilize the sun's energy and the gases in the atmosphere to produce food through photosynthesis and exchange gases in the atmosphere in the associated process of transpiration. Students can be made to work on a working hypothesis of photosynthesis. The chemical equation for photosynthesis would be:

$$6CO_2 + 6H_2O \xrightarrow[\text{Energy}]{\text{Light}} C_6H_{12}O_6 + 6O_2$$

If photosynthesis is going on in a plant, then the leaves should be producing sugars. It is also known that in many leaves, sugar is turned into starch as soon as it is produced. Since it is easier to test for starch than for the sugar, we may regard the production of starch in a leaf as evidence that photosynthesis has taken place.

Student Activity I : Role play

- Give each pair or small group of 3-4 students a plant. Have them cut out of the black construction paper 4 square or oval pieces. Cover up 2 leaves on the healthy green plant with the black construction paper pieces, one on top of the leaf and one piece on the bottom of the leaf. Secure the papers on the leaf with paper clips.
- Have students look at their leaves to make sure that the entire leaf area on top and on the bottom is covered up and won't be able to get any sunlight.
- After a week, remove the paper clips and pieces of black construction paper. What do the leaves look like? What color are they? What do you think happened?
- Leave the plants on the windowsill or table top for another week. Water the plants when needed. Watch the leaves and see what happens to them when they are able to get sunlight again. What causes them to turn green again?

Student Activity II :

Students may be encouraged to find an activity to test the presence of starch

Worksheet 4

1. What is the sun's role in photosynthesis?
2. How do plants absorb carbon dioxide?
3. What is chlorophyll, and what does it do?
4. How is glucose created?
5. Why do plants release oxygen?

Activity 5

Learning Outcome:

The students would be able to prepare slides to view stomata and understand its role in photosynthesis.

Student Activity:

- Pick a fresh geranium leaf from a plant.
- Turn the leaf so the lower side is up.
- Using tweezers, tear a small section of a thin layer of tissue from the underside of the leaf.
- Carefully lay the tissue in a drop of water on the slide.
- Add a cover slip and view through the low power of the microscope.
- Point out the stomata, guard cells, and epidermal cells on the monitor, from the slide you have already prepared.
- Students are requires to view and draw the stomata they find.
- Label the stomata, guard cells and epidermal cells.
- Each team should find the average number of stomata on their section of tissue by counting stomata then moving the slide until new stomata come into view. Each student in the team can do this, get a count, then the team can average the four numbers.

EXTENSION:

Students can come up with hypotheses about different types of leaves versus number of stomata. They can test their hypotheses by designing a performing a similar experiment.

The students would be able to view the stomata as shown in the diagram on the right

Worksheet 5

1. What are the factors on which opening and closing of stomata depend on?

_____

_____

2. What do you understand by sunken stomata?

_____

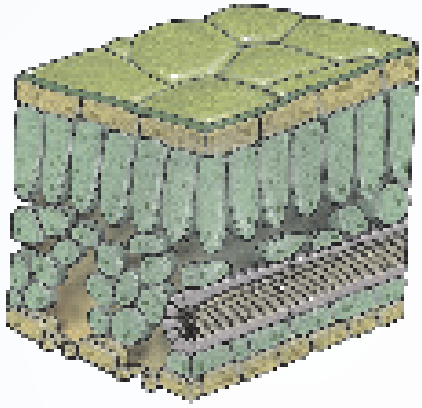
_____

3. What makes cells turgid and flaccid?

_____

_____

4. Label the Stomata in the diagram given below and give its function



_____

_____

_____

_____

Activity 6a : Heterotrophic mode of nutrition

Learning Outcome:

The students would be able to classify heterotrophic mode of nutrition

Content :

Heterotrophic organisms can be classified into 4 basic groups---> I) Saprophytic, II) Parasitic III) Commensalism and IV)Mutualism

Saprophytic nutrition:

Mainly decomposers belong to this group. Saprophytes obtain their food from dead and decaying organisms. So known as dead eaters. They have extracellular enzymes for digestion of parts of dead and decaying living beings. These enzymes help to break down complex organic substances(decaying) into simpler form for absorption. Mostly fungi and some bacteria are saprophytic in nature.

Parasitic nutrition:

In this type of nutrition organisms live inside the body of the host and obtain food hampering the metabolism of the host, sometimes leading to death of the host.

Commensals:

In this type of heterotrophic nutrition, one of the member of the relationship is benefitted from the other member without effecting it. In this relation one of the member remains uneffected. This relationship is difficult to demonstrate than other nutritional relationships. Example- spiders present in plants. Spiders use plants for transportation without any effect. Commensals mainly use uneffected partner for either housing or transportation.

Mutualism:

Mutualism is a type of relationship in which both the members of the relationship of different species is benefited. Different plants and animals form mutual relationship with each other. Example of plant mutual relationship is Mycorrhiza. Mycorrhiza is mutual assosiation between fungi and gymosperm, mainly pinus.

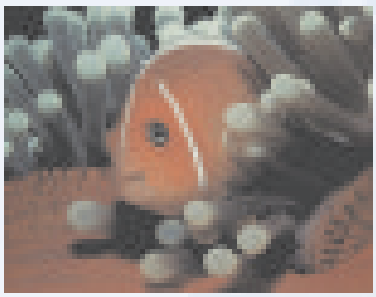
Jig Saw Puzzle Activity: The students would prepare a Jig saw Puzzle to show the various relationships among animals and how they influence each other.

Charts: Students prepare charts and models to show types of nutrition

Walk Through: Students may be taken on eco0tour to look for relationship among animals in nature.

Worksheet 6a

Identify the relationship among organisms and comment on their feeding process.



Leech

Louse

Activity 6b : Nutrition in lower organisms

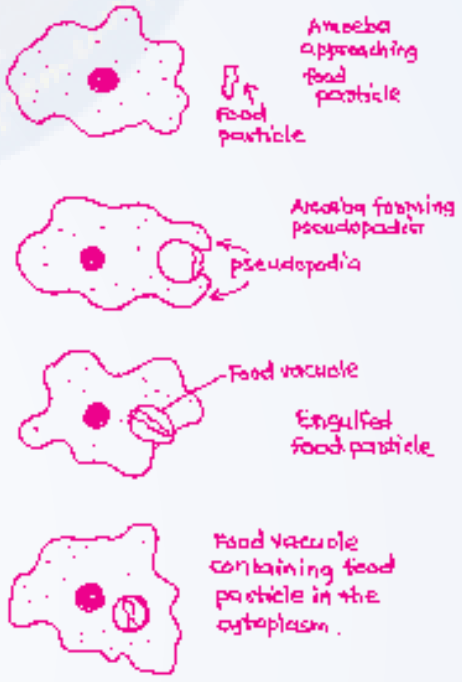
Learning Outcome:

The students would be able to understand digestion in lower organisms.

- Ingestion of food in amoeba is by pseudopodia
- When the food is completely encircled, the tips of pseudopodia touch each other which lead to the dissolution of the membrane at the point of contact.
- The food is en-captured into the bag like structure called food vacuole.
- The ingested food is digested by digestive enzymes inside the food vacuole
- Assimilation of the digested food occurs through the mechanism of diffusion. The digested food in the food vacuole diffuses into the cytoplasm and is utilized by the cell.
- The undigested food present in the food vacuole is ejected out of the body through the process called egestion. Egestion in amoeba is through exocytosis. During locomotion egestion occurs from any part of the amoeba as there is no specific point in amoeba from which egestion can occur.

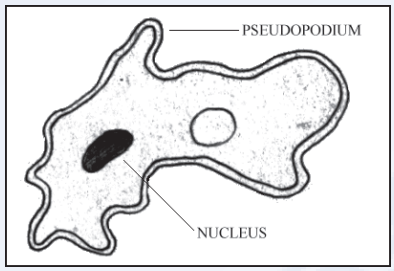
Student Activity 1:

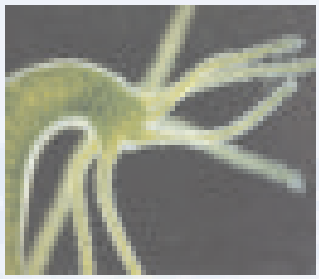
- Students would have a pair share activity of unicellular and multicellular organisms and enact the means of procuring food.
- Students will prepare a cartoon strip to show how lower organisms feed.
- Story writing: 'What if we did not have organs of digestion'

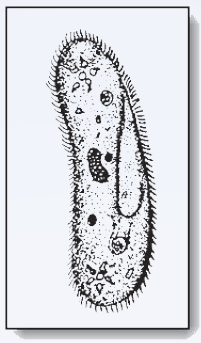


Worksheet 6b

1. Identify the organisms and name their structures responsible for procuring food.







_____ _____ _____

_____ _____

2. Show the diagrammatic representation of paramecium procuring food.

3. What do you think is the difference between intracellular and extra cellular digestion?

Activity 7 : Nutrition in humans

Learning Outcome:

The students would be able to understand nutrition and Carbohydrate digestion

Content :

Nutritional science investigates the metabolic and physiological responses of the body to diet. With advances in the fields of molecular biology, biochemistry, and genetics, the study of nutrition is increasingly concerned with metabolism and metabolic pathways: the sequences of biochemical steps through which substances in living things change from one form to another.

The human body contains chemical compounds, such as water, carbohydrates (sugar, starch, and fiber), amino acids (in proteins), fatty acids (in lipids), and nucleic acids (DNA and RNA). These compounds in turn consist of elements such as carbon, hydrogen, oxygen, nitrogen, phosphorus, calcium, iron, zinc, magnesium, manganese, and so on. All of these chemical compounds and elements occur in various forms and combinations (e.g. hormones, vitamins, phospholipids, hydroxyapatite), both in the human body and in the plant and animal organisms that humans eat.

The human body consists of elements and compounds ingested, digested, absorbed, and circulated through the bloodstream to feed the cells of the body. Except in the unborn fetus, the digestive system is the first system involved. In a typical adult, about seven liters of digestive juices enter the lumen of the digestive tract. These break chemical bonds in ingested molecules, and modulate their conformations and energy states. Though some molecules are absorbed into the bloodstream unchanged, digestive processes release them from the matrix of foods. Unabsorbed matter, along with some waste products of metabolism, is eliminated from the body in the feces.

Studies of nutritional status must take into account the state of the body before and after experiments, as well as the chemical composition of the whole diet and of all material excreted and eliminated from the body (in urine and feces). Comparing the food to the waste can help determine the specific compounds and elements absorbed and metabolized in the body. The effects of nutrients may only be discernible over an extended period, during which all food and waste must be analyzed. The number of variables involved in such experiments is high, making nutritional studies time-consuming and expensive, which explains why the science of human nutrition is still slowly evolving.

In general, eating a wide variety of fresh, whole (unprocessed), foods has proven favorable compared to monotonous diets based on processed foods. In particular, the consumption of whole-plant foods slows digestion and allows better absorption, and a more favorable balance of essential nutrients per Calorie, resulting in better management of cell growth, maintenance, and mitosis (cell division), as well as better regulation of appetite and blood sugar.

There are seven major classes of nutrients: carbohydrates, fats, dietary fibre, minerals, protein, vitamin, and water.

These nutrient classes can be categorized as either macronutrients (needed in relatively large amounts) or micronutrients (needed in smaller quantities). The macronutrients are

carbohydrates, fats, fibre, proteins, and water. The micronutrients are minerals and vitamins.

The macronutrients (excluding fibre and water) provide structural material (amino acids from which proteins are built, and lipids from which cell membranes and some signaling molecules are built), energy. Some of the structural material can be used to generate energy internally, and in either case it is measured in Joules or kilocalories (often called "Calories" and written with a capital C to distinguish them from little 'c' calories). Carbohydrates and proteins provide 17 kJ approximately (4 kcal) of energy per gram, while fats provide 37 kJ (9 kcal) per gram, though the net energy from either depends on such factors as absorption and digestive effort, which vary substantially from instance to instance. Vitamins, minerals, fiber, and water do not provide energy, but are required for other reasons. A third class dietary material, fiber (i.e., non-digestible material such as cellulose), seems also to be required, for both mechanical and biochemical reasons, though the exact reasons remain unclear.

Molecules of carbohydrates and fats consist of carbon, hydrogen, and oxygen atoms. Carbohydrates range from simple monosaccharides (glucose, fructose, galactose) to complex polysaccharides (starch). Fats are triglycerides, made of assorted fatty acid monomers bound to glycerol backbone. Some fatty acids, but not all, are essential in the diet: they cannot be synthesized in the body. Protein molecules contain nitrogen atoms in addition to carbon, oxygen, and hydrogen. The fundamental components of protein are nitrogen-containing amino acids, some of which are essential in the sense that humans cannot make them internally. Some of the amino acids are convertible (with the expenditure of energy) to glucose and can be used for energy production just as ordinary glucose. By breaking down existing protein, some glucose can be produced internally; the remaining amino acids are discarded, primarily as urea in urine. This occurs naturally when atrophy takes place, or during periods of starvation.

Other micronutrients include antioxidants and phytochemicals which are said to influence (or protect) some body systems. Their necessity is not as well established as in the case of, for instance, vitamins.

Most foods contain a mix of some or all of the nutrient classes, together with other substances such as toxins or various sorts. Some nutrients can be stored internally (e.g., the fat soluble vitamins), while others are required more or less continuously. Poor health can be caused by a lack of required nutrients or, in extreme cases, too much of a required

nutrient. For example, both salt and water (both absolutely required) will cause illness or even death in too large amounts.

Carbohydrates

Grain products: rich sources of complex and simple carbohydrates

Carbohydrates may be classified as monosaccharides, disaccharides, or polysaccharides depending on the number of monomer (sugar) units they contain. They constitute a large part of foods such as rice, noodles, bread, and other grain-based products.

Monosaccharides contain one sugar unit, disaccharides two, and polysaccharides three or more. Polysaccharides are often referred to as complex carbohydrates because they are typically long multiple branched chains of sugar units. The difference is that complex carbohydrates take longer to digest and absorb since their sugar units must be separated from the chain before absorption. The spike in blood glucose levels after ingestion of simple sugars is thought to be related to some of the heart and vascular diseases which have become more frequent in recent times. Simple sugars form a greater part of modern diets than formerly, perhaps leading to more cardiovascular disease. The degree of causation is still not clear, however.

Simple carbohydrates are absorbed quickly, and therefore raise blood-sugar levels more rapidly than other nutrients. However, the most important plant carbohydrate nutrient, starch, varies in its absorption. Gelatinized starch (starch heated for a few minutes in the

presence of water) is far more digestible than plain starch. And starch which has been divided into fine particles is also more absorbable during digestion. The increased effort and decreased availability reduces the available energy from starchy foods substantially and can be seen experimentally in rats and anecdotally in humans. Additionally, up to a third of dietary starch may be unavailable due to mechanical or chemical difficulty.

Fat

A molecule of dietary fat typically consists of several fatty acids (containing long chains of carbon and hydrogen atoms), bonded to a glycerol. They are typically found as triglycerides (three fatty acids attached to one glycerol backbone). Fats may be classified as saturated or unsaturated depending on the detailed structure of the fatty acids involved. Saturated fats have all of the carbon atoms in their fatty acid chains bonded to hydrogen atoms, whereas unsaturated fats have some of these carbon atoms double-bonded, so their molecules have relatively fewer hydrogen atoms than a saturated fatty acid of the same length. Unsaturated fats may be further classified as monounsaturated (one double-bond) or polyunsaturated (many double-bonds). Furthermore, depending on the location of the double-bond in the fatty acid chain, unsaturated fatty acids are classified as omega-3 or omega-6 fatty acids. Trans fats are a type of unsaturated fat with trans-isomer bonds; these are rare in nature and in foods from natural sources; they are typically created in an industrial process called (partial) hydrogenation.

Many studies have shown that unsaturated fats, particularly monounsaturated fats, are best in the human diet. Saturated fats, typically from animal sources, are next, while trans fats are to be avoided. Saturated and some trans fats are typically solid at room temperature (such as butter or lard), while unsaturated fats are typically liquids (such as olive oil or flaxseed oil). Trans fats are very rare in nature, but have properties useful in the food processing industry, such as rancid resistance.

Student Activity I: Carbohydrate Digestion

a) Have the students chew bread for two minutes without swallowing.

b) They would share the experience of the taste of bread before and after chewing.

c) They would then be conducting a test on:

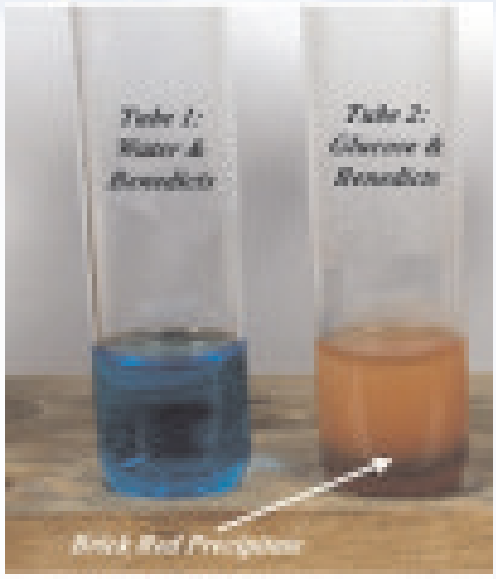
Student Activity 2: Laboratory Tests

1. Starch- Iodine Test on bread

Add Iodine-KI reagent to a solution or directly on a bread. A blue-black color results if starch is present. If starch amylose is not present, then the color will stay orange or yellow.

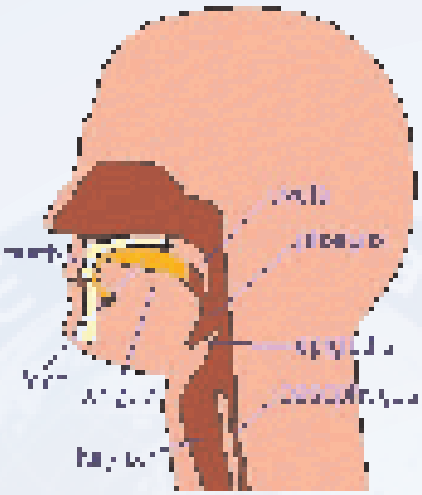
2. Benedict's Test for Presence of sugar

Benedict's reagent is a solution of copper sulfate, sodium hydroxide, and tartaric acid. Aqueous glucose is mixed with Benedict's reagent and heated. The reaction reduces the blue copper (II) ion to form a brick red precipitate of copper (I) oxide



Worksheet 7

1. Comment on the mechanical and chemical digestion that takes place in the mouth.



2. Name the enzyme present in the mouth.
3. At what pH does the enzyme work in the mouth?
4. What causes the change of pH?
5. What names is given to the food which after chewing moves down the oesophagus?

Activity 8a : Digestion of food in Human Body

Learning Outcome:

The students would be able to understand digestion of carbohydrates, fats and proteins.

Stomach:

Muscles in the wall of the stomach help to move the food and acid around making sure that they mix thoroughly. Stomach acid helps to break down the food further into smaller, easier to digest fragments. The acid also kills bacteria contained in the swallowed food or saliva.

Small Intestines:

Digestion of fats, proteins and carbohydrates contained in the foods you consume, is completed within the small intestine.

The resulting nutrients produced are absorbed through the lining of the small intestine and transferred to the bloodstream.

a) **Duodenum:** The duodenum receives the thick liquid mixture of partly-digested food and acid from the stomach. This acid is quickly neutralised in the alkaline environment of the duodenum.

The duodenum also receives bile from the gallbladder, and other digestive enzymes from the pancreas. These enter the duodenum through small ducts or tubes.

Other glands produce mucus that coats the digestive mixture to help ease its passage.

The food mixes with bile, mucus, and pancreatic and other digestive enzymes.

The bulk of the digestion of proteins, fats and carbohydrates takes place in the duodenum before the material travels further into the small intestine.

b) **Jejunum and Ileum :**

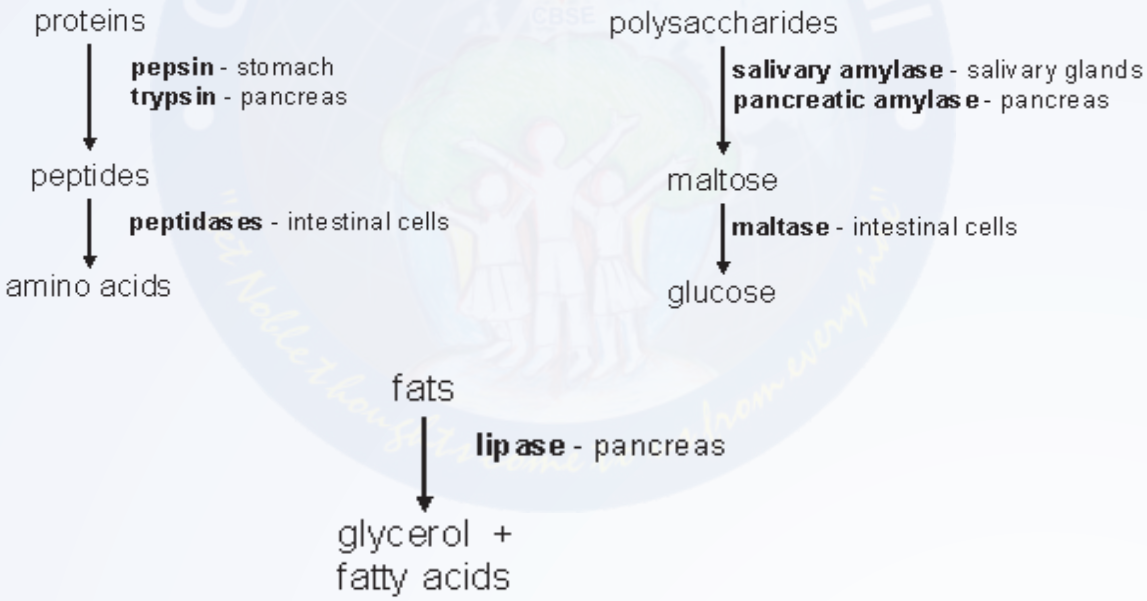
The inner linings of the jejunum and ileum contain very small finger-like bumps called 'villi'. The presence of these tiny bumps on the inside of the small intestine means that the surface area is much larger than if the lining were just a flat

surface. This increased surface area improves the small intestine's ability to absorb nutrients.

The final stages of digestion are completed in this portion of the small intestine, where foods and liquids are fully broken down into their nutrient components

Student Activity 1:

1. Students will make organs out of cardboard and would place them together in group.
2. The students would enact as carbohydrate, protein and fat molecule and trace their fate as they move down the alimentary canal.
3. A model can be make to show the basic units of carbohydrates, proteins and fats as glucose, amino acids, fatty acids and glycerol respectively.



Worksheet 8a

1. Proteins are digested in the stomach and small intestine.

   Which type of enzyme breaks down proteins? How do these enzymes get activated?

   1. State how the conditions necessary for the digestion of proteins in the stomach are different from those in the small intestine. Mention the pH

2. Where are the extra carbohydrate stored and in what form?

3. Label the following in the diagram of Alimentary canal and the associated organs.

6. Site of Protein digestion (A)

7. Site of bile production (B)

8. Site of bile storage (C)

9. Site of production of bolus(D)

10. Process of peristalsis (E)

Activity 10 : Digestion of fats

Learning Outcome: The students would be able to understand digestion of fats

Fat digestion and absorption requires that the complex fat molecules be broken down into smaller more manageable molecules. This is done by mixing the fat with the **digestive enzyme lipase,** which **enters the duodenum from the pancreas** - the main source of enzymes for digesting fats and proteins.

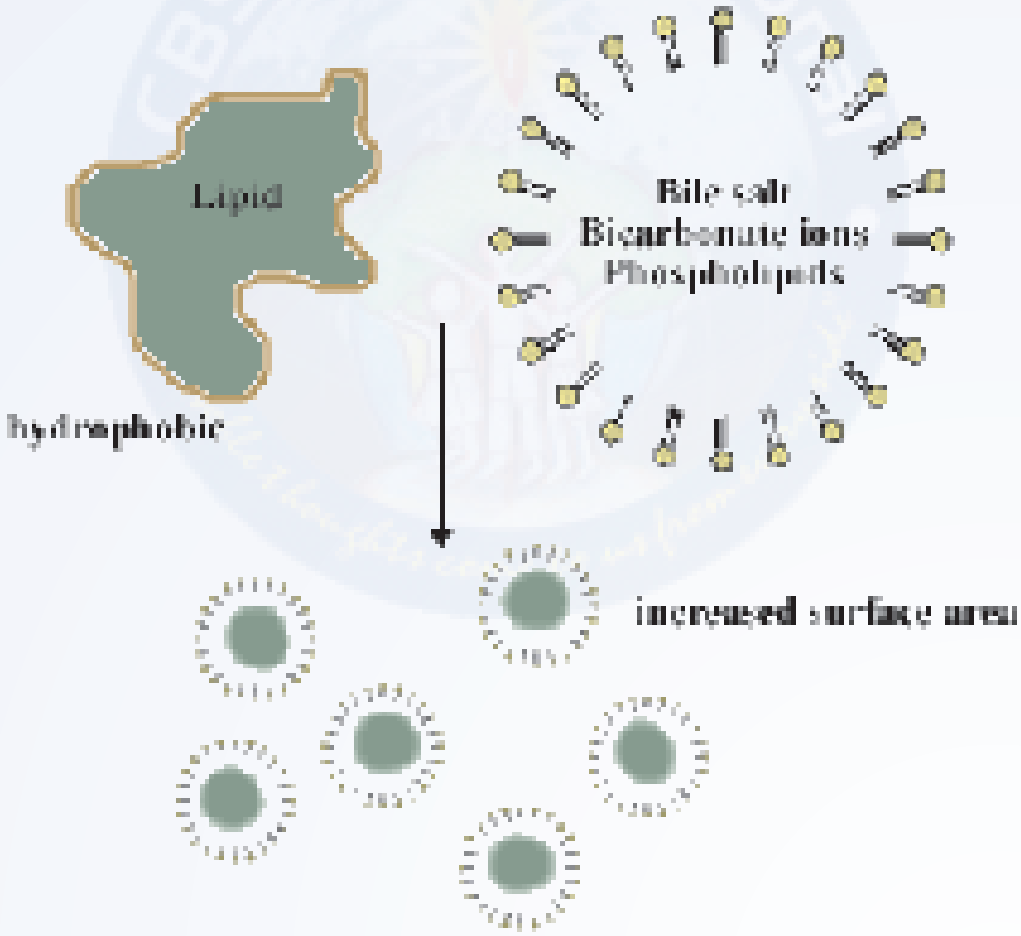
Lipase chops up lipid molecules into fatty acid molecules and glycerol molecules. However, because fat does not dissolve in water, the fat molecules enter the duodenum in a congealed mass, which makes it impossible for the pancreatic lipase enzymes to attack them, since lipase is a water soluble enzyme and can only attack the surface of the fat molecules. To overcome this problem the digestive system uses a substance called bile, produced in the liver but stored in the gallbladder, which enters the duodenum via the bile duct. Bile emulsifies fats - meaning, it disperses them into small droplets which then become suspended in the watery contents of the digestive tract. Emulsification allows lipase to gain easier access to the fat molecules and thus accelerates their breakdown and digestion.

Student Activity 1:

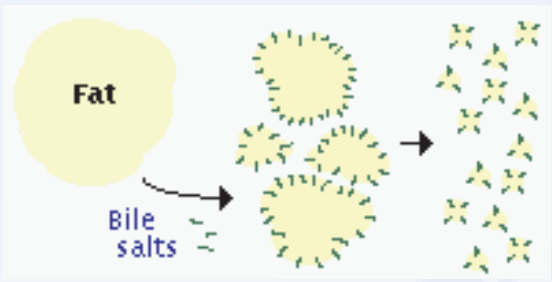
- The teacher would ask students to oil their hands and try washing them without soap.
- They would then use soap to show the emulsifying action of bile.

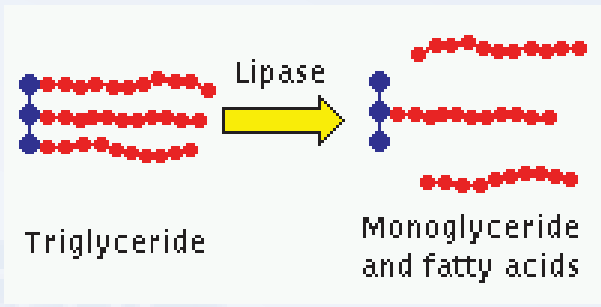
Student Activity 2:

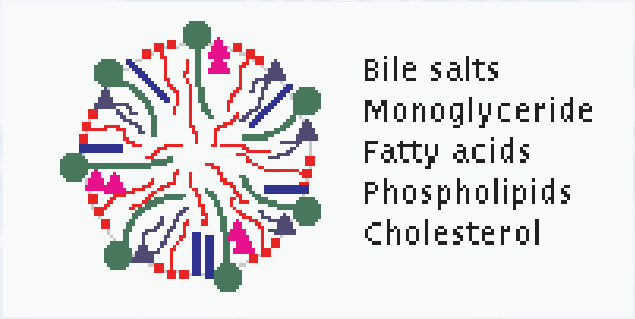
The students would use different size thermocol balls to represent lipids and its subunits. They may use a coating to show emulsification.



Worksheet 8b







1. What do the figures A, B and C represent?
2. Explain the process of emulsification.
3. What are bile salts?

Activity 9a : Structure of Heart

Learning Outcome: The students would be able to understand the structure of heart.

The heart is a muscular cone-shaped organ about the size of a clenched fist of the same person.

It is located in the upper body (chest area) between the lungs, and with its pointed end (called the apex) downwards, forwards, and pointing towards the left.

The main purpose of the heart is to pump blood around the body.

The Heart is divided into separate right and left sections by the interventricular septum, or "septum" when the context is clearly that of the heart. Each of these (right and left) sections is also divided into upper and lower compartments known as atria and ventricles, respectively.

Activity:

I. Draw a love heart and a diagram of a heart on the board. Ask students to chose which heart shape is in their body? On chart paper, sketch the shape of human heart, with no valves or chambers.

II. Ask children the color of a healthy heart,-- most should respond with the color red. Sketch two more hearts on the chart paper beside each other. Take two shades of red, one bright red and one that is a darker red. Ask students which is the healthier heart color? Color one heart bright red and the other a darker red. Label the bright red healthy and the darker red unhealthy. Ask children why there is a difference in color for a healthy and unhealthy heart?

III. Ask students to draw a heart and to make a story about the transportation of blood from and to the heart. Students may relate the transportation to a train ride with different stations. Students will research the different valves and chambers in the heart that allows the blood to pump freely throughout the body.

IV. Distribute one unlabeled Heart Diagram to each student. Inform students that they are responsible for labeling all fifteen parts numbered on their diagrams. Each student already has one filled-in label. They are to circulate among the other students to find the remaining fourteen labels. They have ten minutes to complete the diagram.

Reference: Cardiovascular Lesson Plan: Structure and Function of the Human Heart

Worksheet 9a

1. Label the parts of the heart.

2. Which chamber of the heart has thickest wall and why?

3. What is the function of valves in the heart?

4. Name the chambers and blood vessels shown in the diagram that carry deoxygenated blood

Worksheet 9b

Find these words hidden in the word search, and then use them to complete the sentences below.

H	V	T	E	E	S	I	C	R	E	X	E	heart
E	E	I	C	H	I	G	H	E	R	F	N	minute
A	N	E	O	K	G	U	V	O	L	H	O	contraction
R	T	T	N	U	Z	F	L	O	B	G	R	lower
T	R	U	T	I	V	E	W	S	R	Y	M	relaxation
M	I	N	R	M	Q	E	N	E	A	E	A	seventy
M	C	I	A	T	R	B	E	A	T	Q	L	higher
X	L	M	C	N	G	E	S	D	E	Z	W	ventricles
W	E	V	T	E	V	R	M	J	P	I	R	beat
M	S	S	I	S	U	K	F	A	R	M	V	exercise
L	D	N	O	I	T	A	X	A	L	E	R	rate
T	Y	T	N	E	V	E	S	V	E	F	C	

A heart beat is one _____ followed by one _____ of the heart. Each _____ _____ can be heard from outside the body as two soft 'thumps'. The first is the atria contacting and forcing blood down into the ventricles. The second is the _____ contracting forcing blood out of the heart and round the body.

When at rest the heart beats about _____ times every _____. During _____ the demand for oxygenated blood increases and the heart _____ is _____. During sleep the heart rate can be _____ than seventy beats per minute.

Activity 9b : Pulmonary and systemic circulation

Learning Outcome:

The students would be able to understand the pulmonary and systemic circulation

Student Activity 1 : Relay Race:

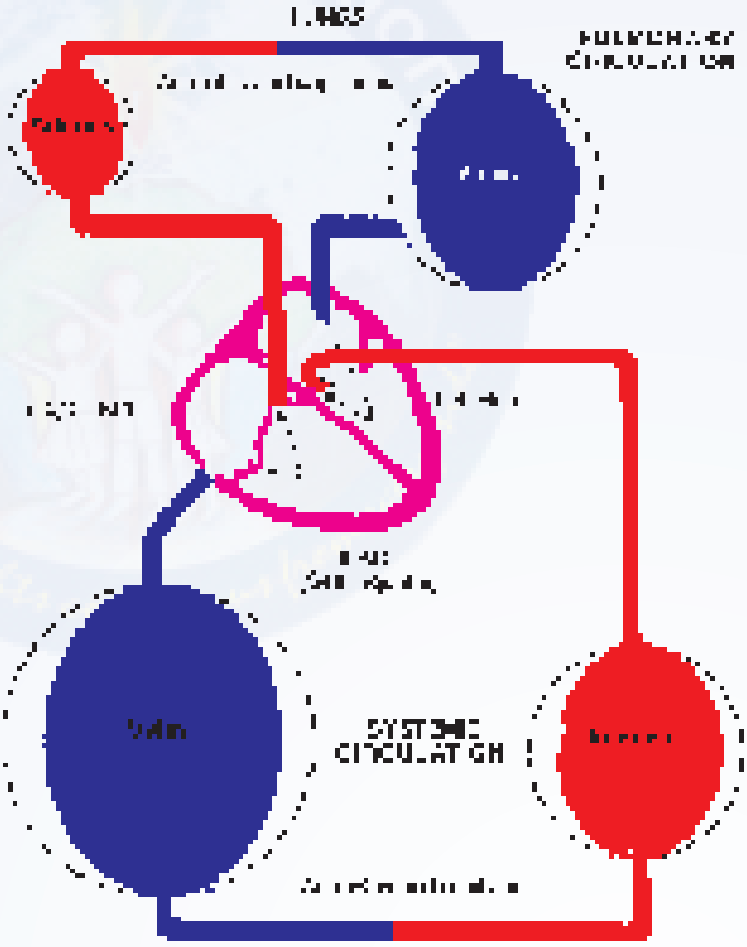
Students will form two teams- oxygenated and deoxygenated blood.

Blue and red batons will be made by students.

Each team has to show the passage of blood through heart and rest of the body correctly.

They will keep in mind to change the baton in lungs showing exchange of gases.

The team which shows the correct flow and reaches first will be the winner.

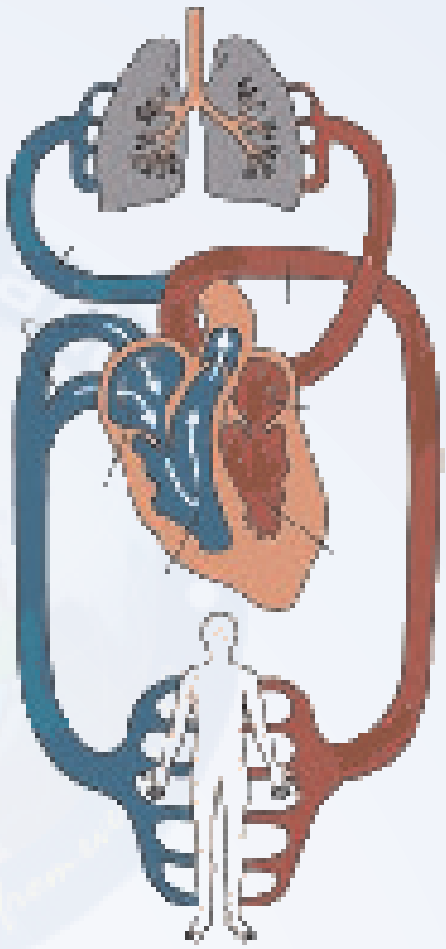


Student Activity II

Students will draw a model of alveoli and show the exchange of gases in it.

Worksheet 9c

Label the diagram and explain the passage of blood shown.



Activity 10 : Transportation in plants

Learning Outcomes : The students will be able to learn-

- Transport system in plants
- Role of plant vascular systems

Content : PLANTS VASCULAR SYSTEMS

Xylem and **phloem** make up the big transportation system of vascular plants. As you get bigger, it is more difficult to transport nutrients, water, and sugars around your body. You

have a circulatory system if you want to keep growing. As plants evolved to be larger, they also developed their own kind of circulatory systems. The main parts you will hear a lot about are called xylem and phloem.

It all starts with a top and a bottom. Logically, it makes sense. Trees and other **vascular plants** have a top and a bottom. The top has a trunk, branches, leaves, or needles. The bottom is a system of roots. Each needs the other to survive. The roots hold the plant steady and grab moisture and nutrients from the soil. The top is in the light, conducting photosynthesis and helping the plant reproduce. You have to connect the two parts. That's where xylem and phloem come in.

ZIPPY XYLEM

The xylem of a plant is the system of tubes and transport cells that circulates water and dissolved minerals. As a plant, you have roots to help you absorb water. If your leaves need water and they are 100 feet above the ground, it is time to put the xylem into action! Xylem is made of vessels that are connected end to end for the maximum speed to move water around. They also have a secondary function of support. When someone cuts an old tree down, they reveal a set of rings. Those rings are the remains of old xylem tissue, one ring for every year the tree was alive.

PHLOEM FUN

The fun never stops in the plant's circulatory system. Most plants have green leaves, where the photosynthesis happens. When those sugars are made, they need to be given to every cell in the plant for energy. Enter phloem. The phloem cells are laid out end-to-end throughout the entire plant, transporting the sugars and other molecules created by the plant. Phloem is always alive. Xylem tissue dies after one year and then develops anew (rings in the tree trunk). What is the best way to think about phloem? Think about sap coming out of a tree. That dripping sap usually comes from the phloem.

Student Activity:

Students would be encouraged to role play the functions of plant vascular system.

Activity-11 : Model of the Respiratory System

Content:

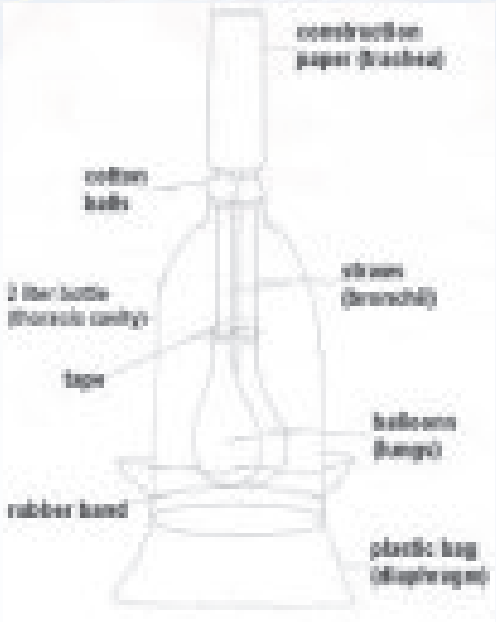
The respiratory system is one of many working systems in the human body and is composed of various parts and organs, each with its own function

Learning outcomes: After completing the unit the student will be able to

1. Label parts of the human respiratory system to include the trachea, bronchi, lungs, thoracic cavity, and diaphragm in a given unlabeled diagram of the respiratory system,:
2. Explain the function of the diaphragm in respiration including the terms "expand", "contract", "inhale", and "exhale" as they relate to the diaphragm and the lungs during respiration.

Materials:

(specified colors are optional), overhead transparency or plastic model of the human respiratory system, 6"x 4.5" (¼ sheet) piece of pink or gray construction paper (trachea), plastic 2-liter soda bottle with black bottom cut off (thoracic cavity), two round 9" or 12" pink balloons (lungs), two drinking straws (bronchi), medium-sized plastic bag large enough to fit over bottom end of bottle (diaphragm), 3 or 4 cotton balls transparent tape medium-size, thin rubber band



Prerequisite:

Students should be able to explain that the human body contains many "systems" that carry out unique functions necessary to sustain life, that the respiratory system is one of them, and that its function is that of breathing.

Instructional Procedure:

Step 1. Teacher presents model or transparency of the human respiratory system and explains that it is just one of many working systems in the human body.

Step 2. Follow the route of air as it enters and travels through the respiratory system, naming the parts and organs as well as their functions as the air passes through them. For example, teacher points to the trachea, names it, and says, "The trachea serves as the principal passage for conveying air to and from the lungs. Branching out from the trachea are the bronchi, which serve to carry the air to and from the individual lungs."

Step 3. Once the route of air is sufficiently traced and parts are named and defined, teacher recaps by retracing the route from start to finish uninterrupted.

Step 4. Once again, teacher points to parts and calls on individual students to name each part as the route is traced. Each time a part is named, teacher writes name on board.

Step 5. Teacher explains that students will now make their own models of the respiratory system and materials are distributed. Teacher may opt to display a previously made model as an example to which students may refer.

Step 6. Insert straws into balloons and tape together at top. These are bronchi and lungs.

Step 7. Insert these through open bottom of modified 2-liter soda bottle straw end first and bring ends of straws up through the neck of the bottle.

Step 8. Stuff neck of soda bottle with cotton balls around straws until spaces are plugged.

Step 9. Roll construction paper into a tube just round enough to fit over the tops of the straws. Tape closed and place over tops of two straws. This will be the trachea.

Step 10. Place plastic bag over bottom end of bottle and use the rubber band to hold it in place. This will serve as the diaphragm.

Step 11. Grasp bottom of plastic bag and pull down and push up. Watch as the "lungs" expand and contract as you do this. Students may even bend "trachea" and "bronchi" over so that the air supply is cut off and watch as nothing happens when the "diaphragm" is manipulated.

I. **Assessment:** Students will label the parts of the respiratory system on an activity sheet on which is depicted a cutaway view of the human respiratory system with blank spaces next to arrows pointing to parts. These parts will include the trachea, bronchi, lungs, thoracic cavity, and diaphragm. Students will also explain in a paragraph of no less than 4 sentences the function of the diaphragm in respiration and will include the terms expand, contract, inhale, and exhale (or variations of those terms) as they relate to the diaphragm and lungs. For example, when the diaphragm contracts, air is inhaled and the lungs expand with air. When the diaphragm expands, the lungs contract and the air is expelled or exhaled.

Helpful hints: It is better to use cotton balls made from genuine cotton rather than the polyester type because it grips the sides of the bottle better and more efficiently prevents air from passing through. Also, ask that the bottom of the bottle be cut off at home by the parents prior to student bringing it in.

Worksheet-11 A

Study the diagram below. Then label each of the numbered structures.

http://www.brianmac.co.uk/physiolr.htm

Worksheet-11 B

Complete the following sentences using the appropriate words.

1. The smallest tubes in the lungs are the _____.
2. The _____ prevents food from entering the larynx.
3. The pharynx is a passageway for _____ and _____.
4. The alveoli are surrounded by _____.
5. Air entering your body is first moistened and warmed in the _____.
6. The trachea is kept open by rings made of _____.

Put ( ) or (X)

_____ 1. Emphysema can result in the blood being low in hemoglobin.

_____ 2. The greatest contributing factor to lung cancer is inhaling the tar in cigarette smoke.

_____ 3. People who produce too much mucus in the bronchial tubes have a disease called emphysema.

_____ 4. A lung disorder often associated with allergies is called asthma.

_____ 5. The diaphragm is a muscle beneath the lungs.

_____ 6. The mucus lining of the trachea moves foreign particles to the esophagus.

_____ 7. When you inhale, your diaphragm relaxes.

http://www.teacherplanet.com/links/redirect.php?url=http://www.glencoe.com/sec/science/lep_science/life_science/tutor/content/pdf/masters/lsg24_1.pdf

Activity-12 : Functions of respiratory system

Learning Outcomes :

- There is oxygen in the air we breathe
- Explain the processes of inhalation/exhalation

- Determine the volume of air exhaled
- Demonstrate that carbon dioxide is exhaled from the body.

Student activity 1 : Objective: To confirm that there is oxygen in the air we breathe

Materials Needed:

1. Candle
2. Matches
3. Pan
4. Clear cup or glass
5. Water

Procedure: This experiment will be able to show that there is oxygen in the air we breathe.

1. Place a small amount of water in the bottom of the pan, enough to cover the bottom of the pan.
2. Light the candle and place in the water on the bottom of the pan.
3. Cover the lit candle with the glass and observe what happens to the water.

Student activity 2 : Objective: Explain the processes of inhalation/exhalation

Materials Needed:

1. 2-pieces of straw
2. 2-small balloons
3. rubber cement
4. 1-large balloon
5. rubber bands - 2 small, 1 large
6. tape

Procedure: This model will show the action of the diaphragm in human respiration.

Take a piece of straw about 2 inches in length and cut a small triangle in the centre, but don't go through to the opposite side. Fit one small balloon over each end of the straw

and secure it with a small rubber band. (Make sure that air will go into each balloon when blown from the top.)

Bend the straw in the middle of the hole.

Take a second piece of straw and cut a V-shape on the end. Fit the slanted points of the straw into each semi-circle of the hole of the bent straw.

Cement the two pieces of the straw together. Allow to dry or use tape to hold until dry.

5. Cut a hole in the bottom of the clear plastic cup using the diameter of the straw as a guide to the size. Push the open end of the straw into the hole of the plastic cup from the inside. Cement the straw into the hole.

6. Take the large balloon and cut the neck off. Carefully stretch the cut balloon over the opening of the cup. Do not crack the cup. Secure the edges with the large rubber band. Do not cement the sides of the cup. The model will only work if there are no leaks.

7. Then pull the bottom balloon gently and observe what happens to the small balloons.

Student Activity 3 : To demonstrate that carbon dioxide is exhaled from the body.

Materials Needed:

1. Lime powder
2. Water
3. Clear cup or glass
4. Straw

Procedure : This experiment will show that carbon dioxide is one of the major cellular metabolic waste products.

1. Place about a teaspoon of lime powder in a cup or glass of warm water and mix thoroughly. Cover the glass and let remain over night.

2. Next day drain the clear fluid off the top of the solution. This is the lime water for the experiment.

3. Place the straw in the lime water and blow into the straw. Observe what happens to the clear fluid.

Student Activity 4 : Lung Capacity - To determine lung capacity by measuring the amount of exhaled air.

MATERIALS:

- a large jug such as a water bottle from a water cooler,
- a graduated cylinder (1,000 ml)
- a grease pencil
- water
- tubing
- soda straws
- large pan for the jug to sit in upside down

PROCEDURES:

1. Use the graduated cylinder to measure out 1,000 ml of water and pour it into the large jug. Use the grease pencil to mark the water level and mark it 1,000.
2. Pour 500 ml more water into the jug and mark that line. Label it 1,500 ml.
3. Continue to add water to the jug and mark off the water level at each 500 ml.
4. Fill the pan with water.
5. Fill the jug with water. Hold your hand over the mouth of the jug and invert it so that its mouth is down in the pan.
6. Tilt the jug slightly so that one end of the tubing can fit into the mouth of the jug. Put a straw in the other end of the tube to be used as a mouthpiece.
7. Record the level of the water in the jug. Take a normal breath. Place your mouth on the straw and hold your nose. Exhale normally into the straw.
8. Record how far down the water level goes. The difference between the original number and the new one is the amount of lung capacity in a normal breath.
9. Repeat these steps but this time take the largest breath you can. This will bethe full capacity of your lungs.

OBSERVATIONS:

TRIAL	STARTING WATER LEVEL	END WATER LEVEL
NORMAL		
FULL		

Write your CONCLUSIONS:

Q. What is your full lung capacity?

Q. What is the difference between your two trials?

http://www.teacherplanet.com/links/redirect.php?url=http://video1.unitedstreaming.com/videos/The Respiratory System\521_BM.pdf

Worksheet-12 A

Students will be able to answer the following questions:

1. What are the chief functions of the respiratory system?
2. Why do we need to breathe?
3. What's in the air we breathe?
4. How do you know there is oxygen in the air we breathe?
5. What would happen if your oxygen ran out?
6. What do the small balloons represent?
7. What do the two ends of the straw to which the balloons are attached represent?
8. What does the longer piece of straw represent?
9. What do the sides of the cup represent?
10. What does the balloon sheet over the cup's opening represent?
11. What happened to the small balloons when you pulled down on the balloon sheet?
12. What happened to the small balloons when you push up on the balloon sheet?

13. What happens to the air once it's in the lungs?

14. What is cellular metabolic activity?

15. What is the primary gaseous waste product of cellular metabolic activity?

16. What's the stuff that comes out when you exhale?

17. What is lung capacity?

18. What happens in the plastic bottle as you exhale into the rubber tubing?

19. What effect does exercise have on the volume of air? Explain.

http://www.teacherplanet.com/links/redirect.php?url=http://www.iit.edu/~smile/bi9515.html

Worksheet-12B

Question 1: The process that enables cells of the body to burn food and release energy is called

a. circulation b. digestion

c. respiration d. excretion

Question 2: The throat leads to two separate paths. One path goes to the stomach. This path is called the

a. trachea b. esophagus

c. epiglottis d. mucus

Question 3: The other path from the throat leads to the lungs. It is called the

a. trachea b. esophagus

c. epiglottis d. mucus

Question 4: This flap covers up the path leading to the lungs so that during eating food doesn't "go down the wrong tube."

a. trachea b. esophagus

c. epiglottis d. mucus

Question 5: The exchange of gases inside the lungs actually occurs inside tiny sacs called

a. bronchi b. cilia

c. capillaries d. alveoli

Question 6: The brain sends electrical messages to the chest muscles and the _____ for breathing inand out to occur.

a. diaphragm b. bronchi

c. cilia d. alveoli

Question 7: The chemical in cigarettes that causes addiction is called

a. tar b. nicotine

c. carbon monoxide

Question 8: The gas that is most abundant in the earth's atmosphere is

a. oxygen b. carbon dioxide

c. sulfur d. nitrogen

Question 9: Insects have little holes along their abdomens to take in oxygen. These holes are called

a. gills b. lungs

c. bronchi d. spiracles

Question 10: The nose produces a continuous supply of _____ to put moisture in the air and catch dust and bacteria.

a. mucus b. bronchi

c. cilia d. oxygen

http://www.teacherplanet.com/links/redirect.php?url=http://video1.unitedstreaming.com/videos/The Respiratory System\521_BM.pdf

Activity-13a : Make a Concept Map of the Aerobic & Anaerobic Pathways

A concept map is a type of graphic organizer that can help to display the information of the aerobic and anaerobic pathways more clearly. Aerobic respiration is the process by which cells obtain energy using oxygen. Anaerobic respiration refers to the production of this energy in the absence of oxygen. In order to make a concept map of the aerobic and anaerobic pathways, create an outline, draw the structure for the concept map, and then fill in the information.

Instructions

1. Create an outline of the aerobic pathway. The aerobic pathway involves glycolysis, the Krebs cycle, the electron transport chain, and chemiosmosis. Glycolysis is the process by which pyruvic acid is formed. The Krebs cycle uses the pyruvic acid in order to form ATP, nicotinamide adenine dinucleotide (NADH), and flavin adenine dinucleotide (FADH). The electron transport chain transfers the protons from the inside to the outside of the mitochondria. Chemiosmosis is when the ATP is produced from the protons, phosphate ions, and ADP.

2 Make an outline of the anaerobic pathway. The anaerobic pathway consists of lactic acid fermentation for animal cells, and alcoholic fermantation for plant cells and fungi. The products of lactic acid fermentation are ATP, water, and lactate. The products of alcoholic fermentation are ATP, water, carbon dioxide, and ethanol.

3 Draw the structure for the concept map. In order to make a concept map of the aerobic and anaerobic pathways, you should draw the concept map. The concept map consists of circles, lines, and arrows. Each word or idea goes in a separate circle, and the lines with arrows connect the circles. Put one circle at the top, then put two lines with arrows under the circle, and draw one circle at the end of each arrow. Make a column of four lines and arrows, and circles under the circle at the left. Draw two lines with arrows and two circles under the circle at the right. Then, draw one line with an arrow and one circle under each of the circles at the right.

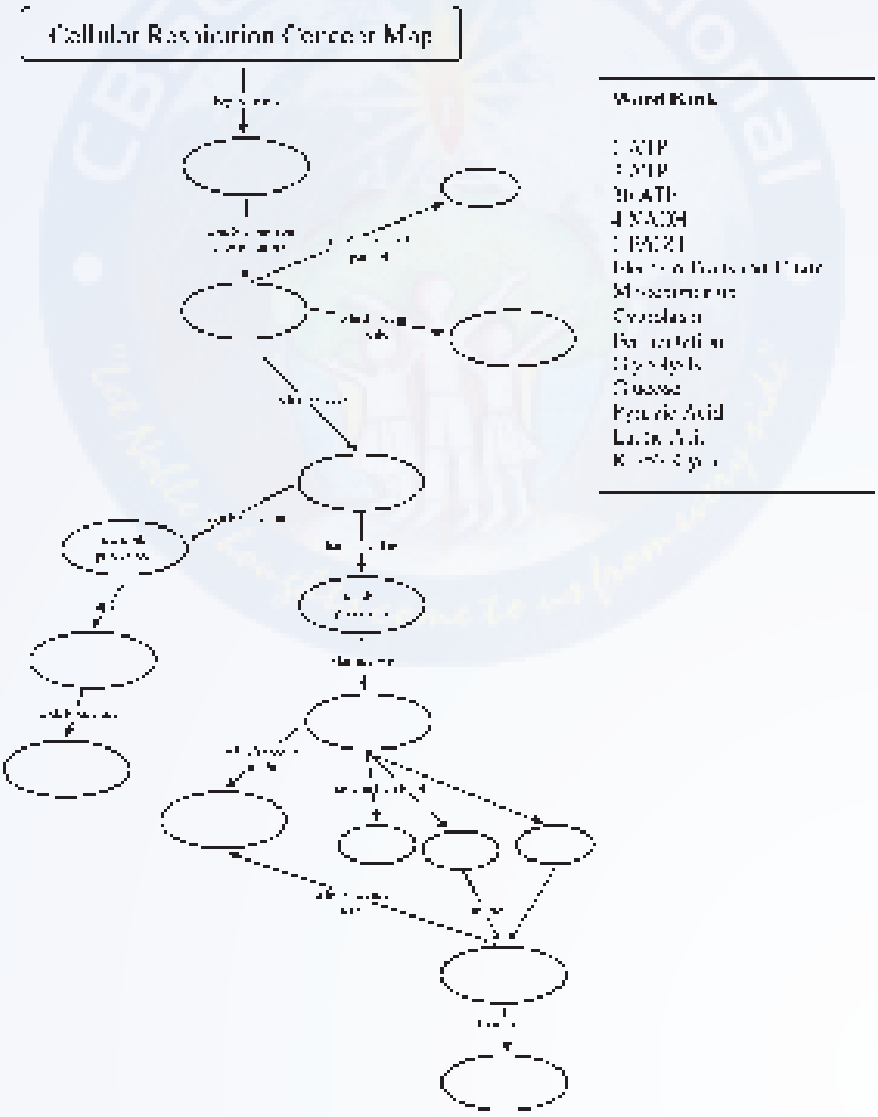
4 Put the information in the concept map. In the top circle, write Pathways. In upper left circle, write Aerobic Pathway. Underneath this circle, in the next one, write Glycolysis. In the next circle underneath, write Krebs Cycle. Under this circle, write Electron Transport Chain. In the circle under this, write Chemiosmosis. In the upper right circle, write Anaerobic Pathway. For the outer right circle underneath, write

Alcoholic Fermentation, and under this circle, write ATP, water, carbon dioxide, and ethanol. For the inner right circle, write Lactic acid fermentation, and under this circle, write ATP, water, and lactate.

http://www.ehow.com/how_6777249_make-map-aerobic-anaerobic-pathways.html

Worksheet-13a

Fill up the boxes with the help of the words given.



Activity-13b : Differentiate Between Aerobic & Anaerobic Respiration

A person running

http://www.consumersresearchcncl.org/Healthcare/top_podiatrists/podiatrist_chaps.htm

Aerobic and anaerobic respiration are two types of breathing that we use everyday. Aerobic respiration requires oxygen where anaerobic respiration does not. Aerobic respiration requires oxygen to feed human cells. Plants also use aerobic respiration to produce a biochemical energy by using the oxygen to break down cells and producing energy that releases electrons. Anaerobic respiration occurs when oxygen is not available. Humans use this type of respiration after a strenuous exercise routine which occurs in the muscles. Anaerobic bacteria use anaerobic cellular respiration as their main production of energy. Although both types of respiration are very different, they are both needed for the essential function of life. It is not difficult to differentiate between the two types of respiration if you know what to look for.

Instructions

1. Perform a physical activity, such as running.
2. Evaluate the way you are breathing while you are running. The way you are breathing is called aerobic respiration. This metabolic process converts one glucose

molecule to 38 ATP (energy) molecules. This is why you can continue running for long periods of time at a steady pace.

3. Increase your pace from running to sprinting. You should only be able to sprint for a short distance.

4. Evaluate the way you are breathing. They way you are breathing is called anaerobic respiration. This process is called lactate fermentation. Two molecules of ATP (energy) are produced for every one molecule of glucose used. Since you are producing less energy, your body begins to get tired.

5. Evaluate how your body feels. Once you started sprinting, your body started taking in less oxygen. When you don't take in enough oxygen, the oxygen cannot break down completely. When this occurs, lactic acid forms (lactate fermentation) and the muscles in your body begin to feel pain.

6. Steady your breathing to catch your breath. Once your oxygen levels increase, the lactic acid is no longer being formed and the oxygen is converted into more energy again.

http://www.ehow.com/how_6709215_differentiate-between-aerobic-anaerobic-respiration.html

Worksheet-13b

A. Anaerobic and Aerobic Respiration

Fermentation and respiration break down glucose, releasing energy and producing smaller chemical compounds. The figure below shows the main steps in each process. Compare and contrast the two processes by completing the statements that follow.

Anaerobic Respiration	**Aerobic Respiration**
(no oxygen present)	(oxygen present)
Glucose (1)	(1) Glucose
2 ATP	2 ATP
(2)	(2)
2 NADH	2 NADH

4 or 6 ATP(5)

2 Pyruvate (3) (3) 2 Pyruvate

6 O2 30 ATP (6)

(NADH used)

(4)

Products of Anaerobic respiration

Ethanol in yeast/Lactic acid in animals

6 CO2 6 H2O

1. Steps 1 through 3 are the same in both processes. The compound that enters **each** process is **Glucose**.
2. Energy is released from each process in the form of 2 molecules of **ATP**.
3. **Two** molecules of **NADP** are also produced in each process, but are used differently in later steps.
4. The end product of the common reactions in these processes is pyruvate.
5. Glucose contains **6** carbon atoms.
6. Pyruvate contains **3** carbon atoms.
7. For each molecule of glucose, **2** molecules of pyruvate are produced.
8. If no oxygen is present **anaerobic respiration** will occur.
9. If oxygen is present **aerobic respiration** will occur.
10. **Without oxygen,** the energy of **NADH** molecules is used to produce the products of anaerobic respiration shown in step 4.
11. If **oxygen is present**, the **NADH** produced in **step 2** can be **used** to produce **4** or **6** molecules of **ATP**.
12. The **net** energy released from one molecule of glucose in **anaerobic** respiration is **4** molecules of **ATP**.

13. The **net** energy released from one molecule of glucose in **aerobic** respiration is **36** or **38** molecules of ATP. This sum is derived from **2** molecules of ATP released at step **2, 4** or **6** molecules of ATP at step **5**, and **30** molecules of ATP at step **6**.

14. The chemical by-products of pyruvate breakdown using **oxygen** are 6 molecules of **CO2** and 6 molecules of **H2O.**

15. What **process** splits glucose into two 3-carbon products? **Glycolysis** In animal cells,

16. What is the end product of **anaerobic** respiration? **Lactic Acid**.

17. The **net** energy released from one molecule of glucose in **anaerobic** respiration is **4** molecules of **ATP**.

18. The **net** energy released from one molecule of glucose in **aerobic** respiration is **36** or **38** molecules of ATP. This sum is derived from 2 molecules of ATP released at step 2, **4** or 6 molecules of ATP at step 5, and 30 molecules of ATP at step 6.

19. The chemical by-products of pyruvate breakdown using **oxygen** are 6 molecules of **CO2** and 6 molecules of **H2O**.

20. The carbon pathway of **aerobic** respiration results in the production of **ATP**. This process is called the **cellular** respiration.

21. The hydrogen released from glucose is finally combined with **O2** to form **H2O**.

22. The electron transport system of **aerobic** respiration results in the production of **30 ATP**.

Note: Answers are in bold. Teacher may prepare worksheet after deleting these word/words

B. Food Pathway

Figure 5.10 in your textbook shows how pyruvate molecules produced by glycolysis enter the Krebs cycle.

Figure 5.11 shows the fate of the electrons and protons released from glycolysis. Using the text diagrams for reference, answer the following questions.

1. What co-enzyme is required to break down pyruvate? **CoA.**

2. What two by-products of the Krebs cycle and electron transport complete the cycle begun by photosynthesis? **CO2** and **H2O**.

3. What two substances **carry hydrogen** from the Krebs cycle to the **electron transport system (ETS)? NAD+** and **FAD**.

4. What is the carbon by-product of the Krebs cycle? **CO2**

5. Which **cell structures** contain the **enzymes** for the Krebs cycle and electron transport system? **Mitochondria.**

6. What product of the Krebs cycle **cannot** be recycled? ???

7. What is the **hydrogen by-product** of the electron transport system? **H2O.**

8. What energy-storage molecule is associated with the Krebs cycle and electron transport? **ATP**

9. What **process** splits glucose into two 3-carbon products? **Glycolysis**

10. In what stage of **aerobic** respiration is **most** of the ATP synthesized? **Electron Transport System**

11. What kind of cells would have a large number of mitochondria? **Cells with high energy demands like muscle cells.**

http://west.maine207.org/assets/4/news/NRGYinCellAnswer.pdf

Note: Answers are in bold. Teacher may prepare worksheet after deleting these word/words

Activity-14a : Why is Excretion Necessary for Life?

Topic: Excretion as a life function

Content:

The excretory system is important for many reasons. Similarly to your need to take out the garbage, to prevent nasty smells, clutter and invasions by other organisms the excretory is like taking out our garbage. Problems can develop from malfunctions of the excretory system. Some things we can do are: eating healthy foods, drinking lots of water and proper hygiene.

EXCRETION AND DEFECATION IN HUMANS

Excretion

1. Humans excrete.
2. Humans excrete to get rid of waste materials produced from the various activities of the body.
3. The waste materials are toxic.
4. The waste materials can poison the body if they are not removed.
5. Therefore humans need to get rid of the waste materials to stay healthy.

Products of Excretion

1. When humans excrete, they produce:
   (a) urine.
   (b) sweat.
   (c) water.
2. Urine, sweat and breathed out air contain substances, which are no longer needed by the body.
3. These substances are excess water, mineral salts and urea.
4. Water is also excreted through breathing, sweating and through the urine.
5. When humans exhale, they give out air containing water.
6. The water is in the form of water vapour.
7. The humans excretory organs are the lungs, kidneys and skin.

Organ	Excretory products
Lungs	Carbon dioxide and water vapour
Kidneys	Urine (Urea, water and mineral salts)
Skin	Urea, water and mineral salts

Defecation

1. Humans need to defecate at regularly (at least twice a week)
2. Humans defecate to remove the undigested food materials from the body.
3. Faeces are solid materials which cannot be digested by the body.
3. The remnants of undigested food in the body can cause diseases. If these materials are not removed from the body, they can turn toxic and harm the body, causing us to fill ill
4. Therefore humans need to get rid of the undigested food materials to stay healthy.

Products of Defecation

1. When humans defecate, they produce faeces.
2. Faeces is the food remnants which are not digested by the body.
3. Humans get rid the faeces through the anus.

Humans excrete and defecate

Learning Outcomes

At the end of the lesson students should be able to

- Describe the parts of the excretory system
- Explain the function of each part of the system
- Describe how the body uses the excretory system to maintain a balanced internal environment
- Identify the possible diseases and health problems of the excretory system.

Materials

1. Computers with Internet Access
2. Student Work sheet and Notebook

Do You Now

Students will be given 5 minutes to answer

1. What would happen if someone never threw out his or her garbage and leftover food?

2. How can sweating be seen as a good thing? When do you think it is most important to sweat?

Background

All organisms need to perform the life processes to prevent extinction, or dying out. Humans and most complex animals perform these life functions in order to maintain homeostasis. One of the life processes is excretion. Excretion is the removal of waste products by an organism. Some waste products are sweat, urine, and carbon dioxide. Without the excretory system many problems can develop in the body.

Student Activity

Have students work in groups of 2-3 (based on class size) and go to Trackstar website http://trackstar.4teachers.org (TRACK #98785), enlisting of five websites on the excretion system. Each group should share one computer. This site was created by Kim Swan.

Have students take 15-20 minutes to look at the websites and answer the questions on each website page in the assignment section. Each student is to hand in a paper with the answers to the questions and their student work sheet. To assist with time-you may have each group just look at one website and report their answers to the class.

Discussion: Teacher may conduct a discussion on the group responses.

After the discussion students would answer the following

- What other life functions are closely related to the excretory system?
- Done any research on any diseases of the excretory system (the causes, the effects and how it is treated).

http://www.scienceteacherprogram.org/biology/Zulema04.htm

Worksheet-14a

Excretory System

Fill in the boxes with appropriate answers

Body Part	Function	Waste Product Removed	Possible Problems (if known)

Activity-14b : Excretion in different animals

Learning Outcomes; By the end of the unit the learners should be able to;

i) Draw and label the parts of the excretory system of different animals

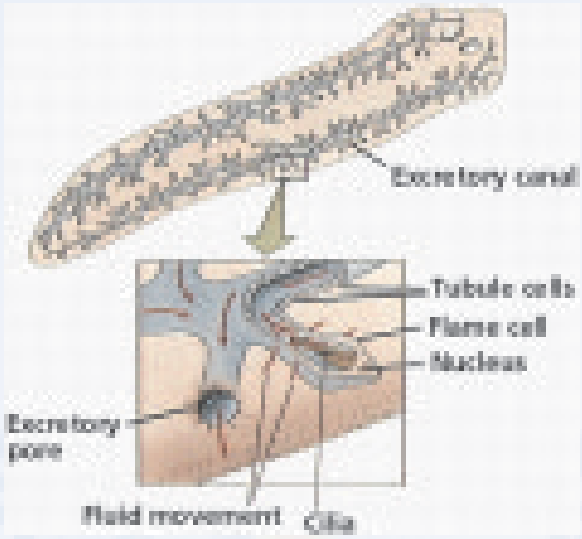
ii) Locate the position of the excretory organ in the given animal

iii) Describe the structure of excretory system of different animals

Content:

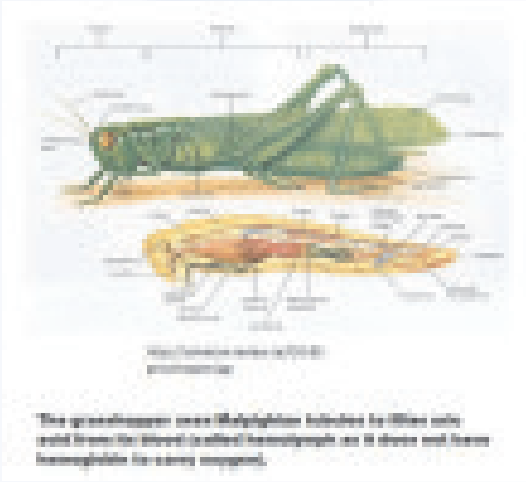
Excretory system of a flatworm.

Image from Purves et al., Life: The Science of Biology, 4th Edition, by Sinauer Associates (www.sinauer.com) and WH Freeman (www.whfreeman.com), used with permission.



www.emc.maricopa.edu/faculty/farabee/biobk/biobookexcret.html - Cached

The Hydra is an aquatic organism with two cell layers



Material required: Charts or clay models of excretory system of

- Hydra
- Earthworm
- Grasshopper/Cockroach
- Flat worm

Procedure: Teacher may divide students in to groups and ask each to search for information on excretory organs of any one of the following:

- Flat worm,
- Hydra,
- Earthworm,or
- Grasshopper/Cockroach

After collecting information each group may be asked to either make a clay model / a diagram on a chart paper or a power point presentation .

A discussion following the group presentation may be planned.

Worksheet: 14b

1. Name an animal mentioned in our presentation that is in the phylum Porifera.
2. Name an animal mentioned in our presentation that is in the phylum Annelida and is of the class Oligochaeta.
3. What are peroxisomes?
4. The Hydra is an aquatic organism with two cell layers. Explain why it is able to remove the nitrogenous waste ammonia through its individual cell membranes.
5. Complete the following chart with information on the nitrogenous excretorystructures and nitrogenous wastes of the earthworm and grasshopper.

Organism	Chief nitrogenous waste	Excretory Structure for Waste
Earthworm		
Grasshopper		
Flat worm		

Activity-15 : Excretion in humans

TIME REQUIRED : Minimum:60 minutes (i.e.2 periods)

Content and concepts to emphasise

Animals excrete water, excess salts, and nitrogenous wastes through the urinary system. The main nitrogenous waste excreted by animals is urea, although there are traces of uric acid and ammonia in their urine.

In this unit learners will be introduced to the structure of the urinary system. In addition they will learn about the role of the urinary system in removing waste products from the body;

- Components of the urinary system (kidneys,Nephrons)
- The structure and function of a mammalian kidney
- Excretion process of human beings

Learning Outcomes : By the end of the unit the learners should be able to;

1) Draw and label the parts of the urinary system

2) Locate the position of the kidneys in human beings

3) Describe the structure of mammalian kidneys

4) Describe the nephron as the functional unit of kidney

5) Explain how kidneys function in getting rid of waste products from the body

Materials required

1. A Chart showing;

   i. The urinary system

ii. The gross structure of the kidney

iii. The nephron

2. A Dissected small mammal (rabbit or rat) to show the urinary system

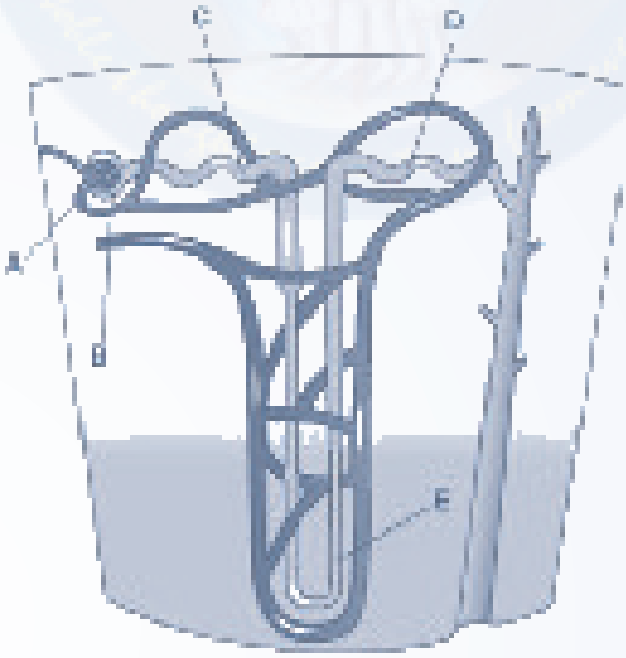
Procedure: Teacher would ask the students to :

- observe a chart to identify
  - parts of the urinary system (kidneys, ureters, the bladder and urethra).
  - parts of a nephron
- discuss parts of the urinary system and draw a labelled diagram.
- observe a dissected rat / rabbit to identify the parts of the urinary system, as an example.

www.elateafrica.org/elate/biology/homeostasisinanimals/teachersguide.doc

Worksheet: 15 A

Label the structures on the diagram above and state their chief function.



Letter	Name of Structure	Function
A		
B		
C		
D		
E		

Worksheet 15 B

Choose the answer which best completes each of the following statements or answers each of the following questions.

1. The _____ are the major blood vessels transporting blood to the kidneys.

   (1) pulmonary arteries (2) glomerulus (3) renal arteries

   (4) renal veins (5) venae cavae

2. The outer part of the kidney is the _____.

   (1) medulla (2) nephron (3) lacteal

   (4) cortex (5) Bowman's capsule

3. Which is the functional unit of a kidney?

   (1) neuron (2) villi (3) nephron

   (4) alveolus (5) osteoblast

4. The movement of substances out of the glomerulus and into Bowman's capsule is referred to as _____.

   (1) defecation (2) reabsorption (3) active transport

   (4) ion pumping (5) filtration

5. The movement of substances from the blood into the proximal tubule is known as _____.

(1) defecation (2) reabsorption (3) active transport

(4) ion pumping (5) filtration

6. Which of these is reabsorbed from filtrate?

(1) sodium chloride (2) glucose (3) water

(4) amino acids (5) all of these

7. As filtrate moves down the loop of Henle, the surrounding interstitial fluid becomes _____ concentrated than the filtrate, so _____ leaves the filtrate.

(1) more ... urea (2) less ... urea (3) more ... water

(4) less ... water (5) less ... water and urea

8. The most abundant solute in urine is _____.

(1) glucose (2) water (3) plasma proteins

(4) sodium chloride (5) urea (and other nitrogenous wastes)

9. Glucose is removed from filtrate by _____.

(1) secretion (2) diffusion (3) dialysis

(4) active transport (5) osmosis

10. Under the influence of antidiuretic hormone (ADH), _____ is produced.

(1) urine containing more glucose

(2) bloody urine

(3) urine containing a lower concentration of urea

(4) more concentrated urine

(5) less concentrated urine

11. Eating which of the following would make the kidney work the hardest to excrete nitrogenous wastes?

(1) beef sandwich (2) chocolate cookies (3) potato chips

(4) vegetable soup (5) oatmeal with lots of butter and maple syrup

12. Which would be LEAST likely to be present in the filtrate entering a mammalian nephron?

(1) glucose (2.) platelets (3) amino acids

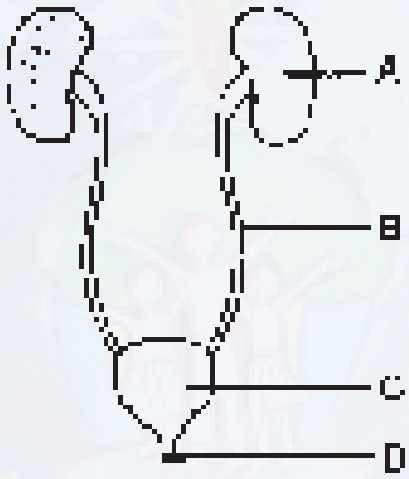
(4) urea (5) calcium ions

13. What metabolic waste is not removed during excretion?

(1) Nitrogenous Wastes (2) CO2 (3) H2O

(4) Urea (5) Blood

Human Excretory System



14. In the diagram of the human urinary system, which letter indicates a structure responsible for filtering urea out of the bloodstream?

(1) A (2) B

(3) C (4) D

15. What is the principal function of structure D represented in the diagram?

(1) filtration of cellular wastes from the blood

(2) storage of urine

(3) secretion of hormones

(4) transport of urine out of the body

16. Which structure carries urine from the kidney to the urinary bladder?

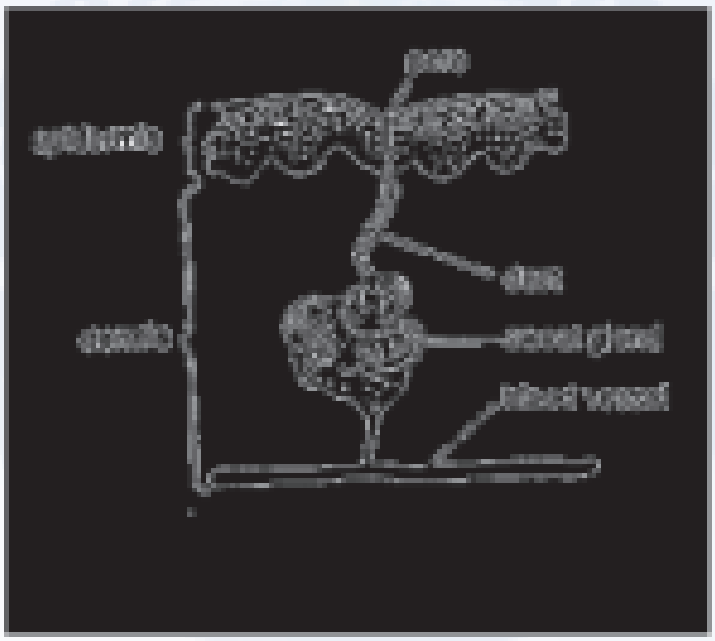
(1) A (2) B

(3) C (4) D

17. Which letter indicates the location of the nephrons (microscopic filtering units of the kidney) in the diagram?

(1) A (2) B

(3) C (4) D



18. What is the major function of the blood vessel in the above diagram?

(1) releasing carbon dioxide into the sweat gland

(2) filtering starch out of the sweat gland

(3) transporting wastes to the sweat gland

(4) transporting oxygen away from the sweat gland

19. State another function of the sweat gland which assists in homeostasis besides its work as an incidental organ of excretion. _____

_____

Worksheet 15 C

Correctly complete the following statements.

1. The tuft of capillaries inside the cup of the nephron is called the _____.
2. _____ is the chief filtering unit of the nephron.
3. _____ carry urine from the collecting tubules of the renal pelvis to the bladder.
4. The excretory structures of the grasshopper are called _____ tubules.
5. The chief excretory structures of the earthworm are the _____.
6. The chief nitrogenous waste excreted by the Cnidaria is _____.
7. The very twisted section of nephron tubule between the Bowman's capsule and Henle's Loop is specifically called the _____ _____ tubule.
8. The deamination of excess amino acids occurs in the _____ in humans.
9. The chief excretory waste of the Annelida is _____.
10. Most aquatic organisms release the nitrogenous waste _____.

http://www.docstoc.com/docs/70799773/Excretion-Worksheet

Activity 16: Kidneys Regulate the Composition of Blood

Content:

Your kidneys play a vital role in maintaining homeostasis. They excrete (remove) urea and other wastes, regulate the amount of water in the blood, and adjust the concentration of various substances in the blood. The substances removed from the blood form urine. The cleaned blood then travels to the heart and is pumped to the rest of the body.

As blood travels through the kidney, some blood components need to be:

- Kept in the blood because they are essential. Red blood cells, white blood cells, protein, glucose and amino acids should be kept in the blood. These components should not be present in urine.
- Removed from the blood and excreted in the urine because they are toxic (poisonous).

Urea is a toxic substance that should be removed from the blood.

- Balanced so they are present in the correct concentration in the blood. A certain amount of water and salt is needed by the body and will remain in the blood. If excess water and excess salt are present in the blood, they should be excreted in the urine.

Learning outcomes : The students would be able to :

- Understand role of kidney in maintaining homeostasis

Material required:

- Large and small coloured beads
- Cup
- screen (to represent the glomerulus)
- plastic bowl
- Water

Procedure

1. Remove the bag labeled "Blood Components" from your kit. The beads in this bag represent the blood entering the kidney. The key below indicates what blood components are represented by each type of bead.

KEY to BLOOD COMPONENTS in the bag

Large beads	RED	RBC
	WHITE	WBC
	GREEN	PROTEINS
Small beads	green	Aminoacid
	White	Glucose
	Blue	Salt
	Yellow	Urea

2. Blood enters the kidney through the renal artery. Add the contents of the bag labelled "Blood Components" to the cup labeled "Blood in the Renal Artery Entering the Kidney."

3. Blood also contains water. Add enough water to fill the cup containing the beads, about three quarters full of water.

4. Prepare a model of a glomerulus and a nephron by placing the screen (to represent the glomerulus) over the plastic bowl (to represent the nephron) See diagram on the right.

5. Model the process of **filtration** that occurs in the glomerulus. Pour the contents of the "Blood Components" cup onto the screen (the glomerulus) to form a single layer.

The materials trapped on top of the screen remain in the blood. Pour the materials that stay on top of the screen into the cup labeled "Blood in Renal Vein."

Note: some of the small beads may remain on top of the screen. This is OK. In fact, this actually occurs in the kidneys. Most, but not all, of theo

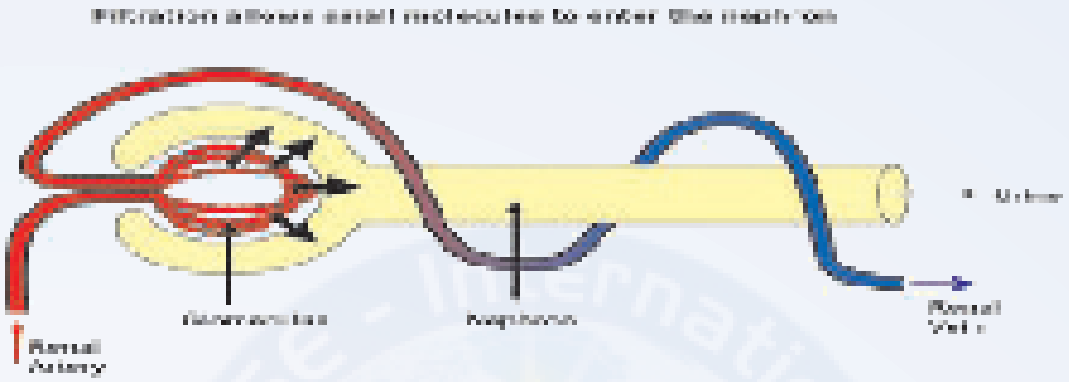
6. The blood needs to contain the proper amount of water. The "Blood in Renal Vein" cup should be about one-half full of water.

7. Pour enough of the water from the "Nephron" cup to fill the "Blood in Renal Vein" cup approximately one-half full. Leave the remaining (excess) water in the "Nephron" cup so that it can be excreted.

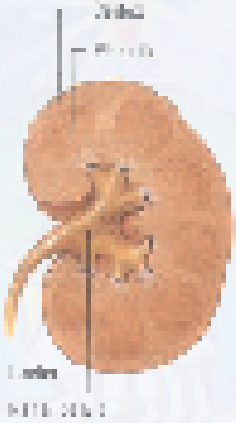
Discussion: Teacher may discuss following information with children

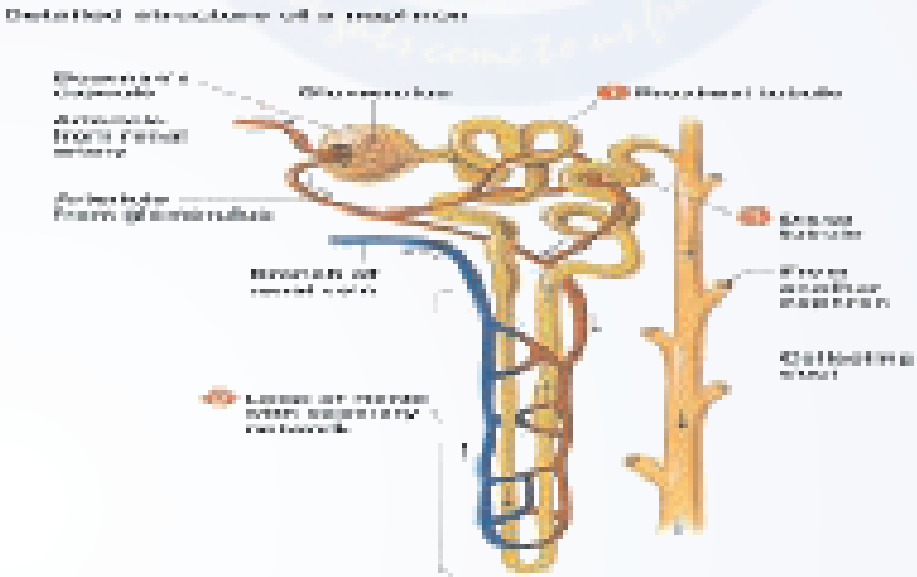
Each kidney contains over 1 million microscopic blood-cleaning units called nephrons. A nephron, shown in the diagram below, is a tiny tube with a cup-shaped structure on the end.

The cup-shaped part of the nephron surrounds a tight ball of capillaries called a **glomerulus.**



Structure of the Human Kidney

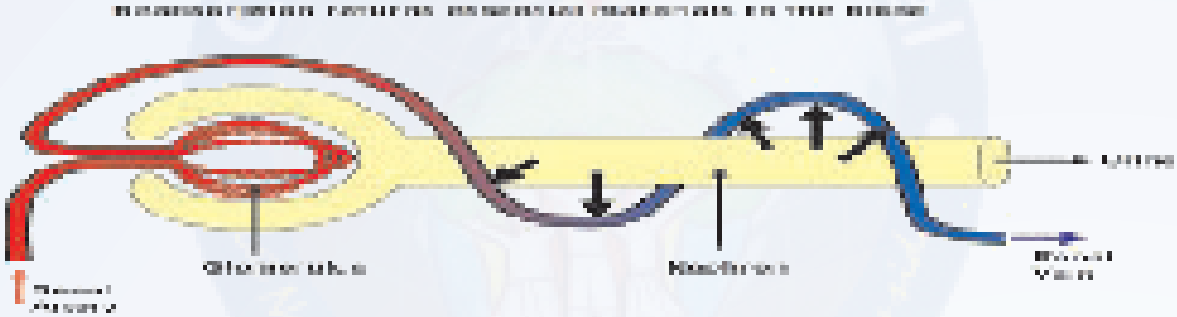




Blood enters the kidney through renal arteries. The renal arteries branch to supply blood to the tiny balls of capillaries called glomeruli. The walls of the **glomerulus** capillaries are porous. They act like filters to allow small molecules to move under pressure from the blood into a cuplike part of the nephron. The movement of materials out of the glomerulus capillaries and into the nephron is known as filtration. The fluid that collects in the nephron is called the **filtrate**.

Kidneys Reabsorb Needed Substances

Obviously you can't afford to lose large amounts of water, salt, glucose, and amino acids in your urine! So a second process, called **reabsorption**, moves essential materials from the nephron back into the blood. Reabsorption occurs when transport proteins molecules in the walls of the nephron return essential substances such as glucose, amino acids, water, and salt to the capillaries that surround the nephron.



Complete Re-absorption.

Some essential molecules, such as glucose and amino acids, are kept by being completely

reabsorbed. These molecules should be completely returned to the blood and should not end up in the urine produced by the kidney. Specific transport proteins in the nephron use energy to move these molecules from the nephron into the capillaries that surround the nephron.

Students may be asked to answer the following questions

1. What blood component should be completely removed from the blood as it passes through the kidney? What type of bead represents this component?
2. What five blood components should be kept in the blood as they pass through the kidney? What type of bead represents each of these components?

3. In addition to water, what blood component should be balanced so that they are present in the correct concentrations in the blood? What type of bead represents this component?

4. What three substances would you expect to find in urine that is excreted by the kidney?

5. Write the names of the three blood components that are kept in the blood because theyare too large to pass through the pores of the glomerulus.

6. The substances that pass through the screen and into the nephron form a fluid called the filtrate. What five substances form the filtrate?

7. What determines which blood components remain in the blood and which components end up in the filtrate in the nephron?

8. Does the process of filtration alone completely separate the wastes from the essential materials? Support your answer with observations of what is present in the nephron cup.

9. Which of the substances in the filtrate does your body need?

10. What two substances in the filtrate are essential and need to be completely reabsorbed?

http://www.ekcsk12.org/faculty/jbuckley/apbiolab/apbiokidneylab.pdf

Worksheet 16A

Multiple Choice questions

Select the best answer for each question

1. Urine is formed in the……..

   A. bladder

   B. kidney

   C. ureter

   D. urethra

2. The functional unit of a kidney is called a……

   A. cortex

   B. medulla

   C. nephron

   D. nephridium

3. Which of the following wastes is eliminated by the kidney?

   A. carbon dioxide

   B. salts

   C. water

   D. ammonia

4. The blood vessel that supplies blood to the kidney is the……

   A. aorta

   B. renal vein

   C. water

   D. hepatic artery

5. The outer most part of the kidney is called the……..

   A. medulla

   B. cortex

   C. pyramid

   D. pelvis

6. The main nitrogenous metabolic waste product eliminated by the kidney is……

   A. water

   B. carbon dioxide

   C. urea

   D. uric acid

7. What part of the urinary system stores urine?

   A. kidney

   B. bladder

   C. ureter

   D. urethra

8. On which part of the nephron is most of the water reabsorbed?

   A. distal convoluted tubule

   B. loop of Henle

   C. proximal convoluted tubule

   D. Bowman's capsule

www.elateafrica.org/elate/biology/homeostasisinanimals/teachersguide.doc

Worksheet-16B

Structured questions

Study the diagram below and answer the questions that follow

1. Label the parts marked A - E.

   A .....

B .....

C .....

D .....

E .....

2. State the functions of the following parts

A .....

B .....

C .....

D .....

E .....

Activity 17 : Excretion in plants

Learning Outcomes:

By the end of this unit the learners should be able to;

(v) Name plant waste products

(vi) Explain the role of stomata in getting rid of water vapour and carbon dioxide.

(vii) Describe how plants get rid of other waste products.

(viii) Explain how some waste products of plants are useful to humans.

(ix) Name some waste products which are harmful to humans and other animals.

Materials required

(i) Apparatus to show plants given off oxygen as by-product of photosynthesis.

(ii) Charts with list of other waste products and their uses.

(iii) Manila sheets for use by learners to write uses of waste products, to humans.

Content:

This unit explores excretion in plants by discussing the wastes of plants and how these are got rid of. In addition it shows how these plant waste products can be used in different ways to make useful products.

- Plant waste products: carbon dioxide (Co2), Oxygen (O2), water, resins, tannins, latex.
- Special methods of getting rid of waste products by plants.
- Useful plant waste products.
- Harmful waste products.

Plants excrete oxygen, carbon dioxide and water vapour. These gaseous waste products are got rid of by diffusion through the stomata and lenticels. The oxygen is a waste product of photosynthesis while carbon dioxide is produced in the process of respiration.

Other waste products of plants include: Tannins, alkaloids, resins, latexes, excess ions, nicotine, quinine, caffeine, morphine and gums.

The gums, resins and latexes once collected, have a wide range of industrial applications. From these plant waste products we get useful products such as turpentine, paints, varnishes, soaps, cosmetics, surgical goods, golf balls, bubble gum and rubber.

Excretion of plant wastes

- Some ions go into ageing leaves and flowers. These ions are excreted when ageing leaves fall off the plant.
- Some ions are stored as crystals in the cells' cytoplasm e.g. Oxalates the leaves of Oxalis.
- Other waste products are excreted into the roots, stems, bark, flowers and even fruits, but in a non-toxic form.

However, there are some waste products which are harmful e.g. there is a bitter variety of cassava, which contains toxic substances in its outer cover of the tubers. Tobacco plants contain Nicotine, a very dangerous drug. (Find details about useful and harmful waste products in the teacher's notes).

Plants do not have complex excretory organs because of the following reasons:

(i) The gaseous wastes are lost by diffusion through the stomata.

(ii) Some of the wastes are utilised e.g. oxygen is used for respiration and carbon dioxide for photosynthesis.

(iii) Plants have a low rate of metabolism; hence the waste products are produced at a low rate.

(iv) Some wastes are stored in a non-toxic form e.g. resins in barks of some trees.

Studnet Activity 1 : Plants give off oxygen (O2) as a by-product of photosynthesis

Materials Required

Beaker

Rain or tap water

Pond weed (Elodea) or spirogyra

Sodium hydrogen carbonate

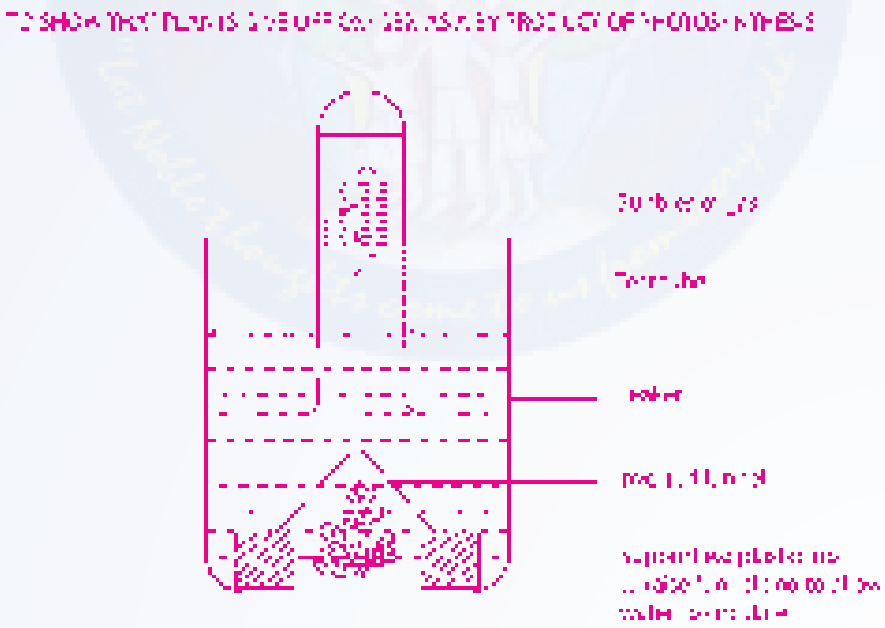
Glass filter funnel

Plasticine / wooden block

Test tubes

Wooden splint

Apparatus set up



Procedure :

Students form groups (5-10). The experiment is set up as shown in the diagram above. The following procedure should be followed.

1. To a beaker of rain water, (or tap water that has been standing to eliminate chlorine) add a pinch of sodium hydrogen carbonate to provide enough carbon dioxide. Place pond weed e.g. Elodea or Spirogyra into the water.
2. Cover the pond weed to the brim with an inverted funnel, resting it on wooden blocks or plasticine for support.
3. Fill a test tube to the brim with water, place a thumb over the mouth of the test tube under the water surface in the beaker and then remove your thumb making sure that little or no air enters the tube during the operation.
4. Move the test tube over the funnel stem and lower it gently to rest on the funnel as shown in the figure above.
5. Place the apparatus near a window so that it receives enough sunlight. Record your observations.
6. Leave the experiment undisturbed until the test tube is half full of the gas.
7. Carefully remove the test tube and ensure that the gas does not escape.
8. Insert a glowing wooden splint into the gas collected. Note what happens.

Student Activity 2 : Group activity

In groups of 5, students should find out other waste products by plants. They should visit the library and where possible visit botanical gardens to particularly see useful plants. Text books are another good source of information.

Students should visit research stations for example to see cinchona trees for quinine / other medicinal plants or appropriate places within the community.

- Students can visit factories or hardware shops of industrial implements made from rubber.
- They should record their findings while in the field.
- Back to the classroom, they should compile their findings and give feed back to the rest of class
- They should display the results on the notice board.

Worksheet 17

Multiple Choice questions

Select the best answer to each question:

1. Which one of the following is not an excretory product?
   - A. Carbon dioxide
   - B. Water
   - C. Faeces
   - D. Nitrogenous waste
2. Which of the following parts of a plant do not store excretory products?
   - A. Buds
   - B. Roots
   - C. Stems
   - D. Bark
3. A number of waste products of plants may be found in the following
   - A. Fruits, leaves and roots
   - B. Bark, flowers and Guard cells
   - C. Ovary, pollen tubes and ovules
   - D. Embryo sac, endosperm and ovary
4. Plants do not have specialised excretory organs like those of animals because:
   - A. Much of their waste passes out in solution into the soil
   - B. Much of their waste passes out in gaseous and non-toxic forms
   - C. Plants do not take in many chemicals which they do not need
   - D. Plants do not excrete waste products
5. The part of the flowering plants which carries out the main function of excretion of gaseous waste products is the:
   - A. Shoot system

B. Root system

C. Leaves

D. Flowers

6. Which of the following is a waste product of plants?

A. Urea

B. Carbon dioxide

C. Uric acid

D. Ammonia

7. Which of the following waste products from plants is dangerous to humans?

A. Rubber

B. Colchicines

C. Nicotine

D. Quinine

8. Which of the following waste products may be considered very useful to humans?

A. Nicotine

B. Papain

C. Cocaine

D. Cannabis

www.elateafrica.org/elate/biology/homeostasisinplants/teachersguide.doc

Activity 18 a : Importance of minerals for the growth of plants : Water cultures

Content:

It is possible to demonstrate the importance of the various mineral elements by growing plants in water cultures. A full water culture is a solution containing the salts which provide all the necessary elements for healthy growth, e.g.

- Potassium nitrate for potassium and nitrogen
- Magnesium sulphate for magnesium and sulphur
- Potassium phosphate for potassium and phosphorous
- Calcium nitrate for calcium and nitrogen

Learning Outcomes :

The student would be able to understand the importance of the various mineral elements by growing plants

Materials Required :

Wheat seedling, test tubes, cotton wool, culture solution (containg potassium nitrate - magnesium chloride-potassium phosphate-calcium nitrate : solution lacking sulphur), aluminium foil

Procedure :

Place wheat seedling in a test-tube containing water culture solution. Cover the tubes with aluminium foil to keep out light. These solutions having one of the essential elements missing. Leave the seedlings to grow in these solutions for a few weeks, keeping the tubes topped up with distilled water.

Let the students interpret the results.

Activity 18 b: Importance of macro elements in plants

Learning Outcomes :

This experiment can be used to develop knowledge and understanding of the importance of macro elements in plants

Content

- This experiment is inexpensive, easy to set up, reliable and generates plenty of quantitative results, suitable for analysis.
- However, it does require a light bank and the radish seed take 2-3 weeks to grow to a suitable size followed by 2-3 days to dry to a constant dry mass.
- The theory background to the experiment is straightforward and included in the Student Activity Guide.

Reference

Hewitson, J. and Price, R. (1994) Plant mineral nutrition in the classroom: the radish, Raphanus sativus L is a good plant for such studies. School Science Review, 76 (274), 45-55. This can be downloaded in pdf form here (605kb).

Student Activity 1 : Classroom management

- To obtain meaningful results, at least five radishes will have to be grown at each level of minerals chosen e.g. 0, 3, 6, 9 and 12 fertiliser pellets per container - black film cans are ideal. (i.e. 25 radishes in total).
- As cost is not a major factor in this experiment, students could either work in small groups (2-4) or as one large group and the class results pooled.
- The experiment should take about 30 minutes to set up initially. Using a light bank the radish should be ready to harvest 18-21 days later, having required the minimum of maintenance during this time. Harvesting should take about another 30 minutes. After 2-3 days drying to constant weight the plants will be weighed and the results pooled.

TECHNICAL GUIDE

Materials required

Materials required by each group:

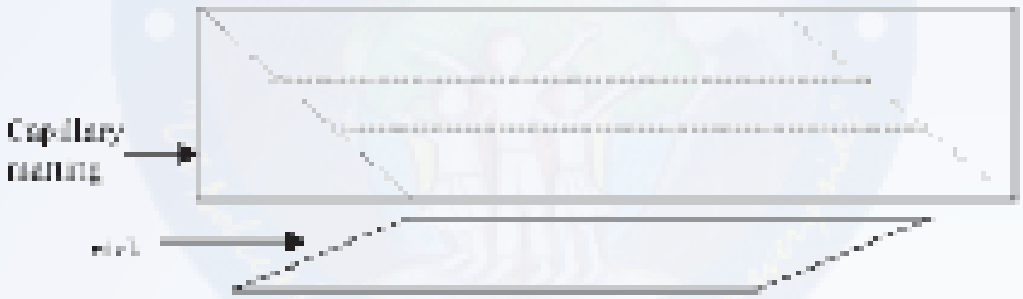
- 25 black film cans with a 4-5 mm hole in the base
- 25 wicks
- 50 radish seed
- NPK fertiliser pellets (slow release 14:14:14) (at least 150)
- 25 labels
- marker pen
- dropping bottle distilled water

Materials to be shared:

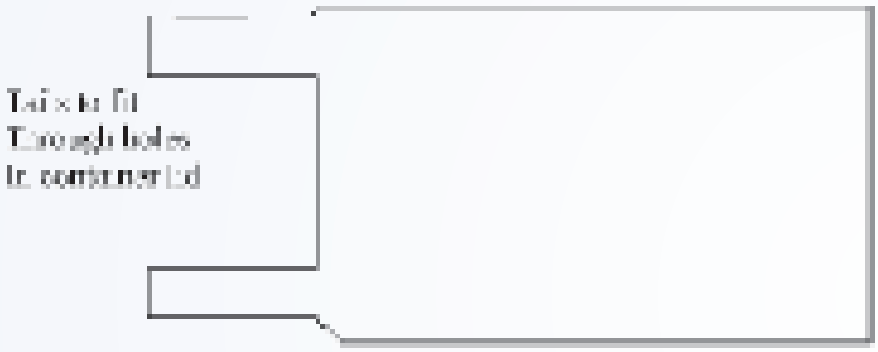
- light bank
- growing mix (equal parts peat and fine vermiculite mixed)
- water containers with lid and capillary matting

Preparation of materials

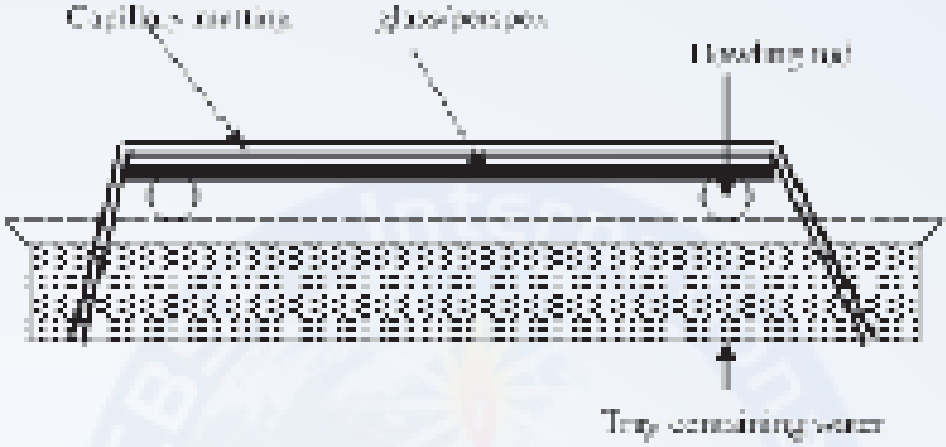
- Radish plants of a suitable size can be grown in film cans with a 4-5 mm hole in the bottom made with a sharp pair of scissors. Empty film cans can be obtained free of charge from a chemists/film processors.
- It is important the peat/vermiculite mix that the radish seed is sown in is low in nutrients. e.g. Philip Harris Growing Mix, Catalogue number H56720/0, 2 litres cost about £2. The most suitable slow release fertiliser pellets can also be obtained from Philip Harris, NPK slow-release fertiliser pellets, Catalogue number H56740/6, about £1.
- Radish seed, labels and capillary matting can all be obtained from a garden centre.
- To make wicks, cut pieces of capillary matting approximately 50x5 mm and taper at both ends.



The water containers can be empty ice cream or margarine containers with a couple of slits about 30x10 mm cut at one end of the lid. A piece of capillary matting is then cut to fit the lid. However the matting must have a couple of 'tails' to fit through the holes in the lid and reach the water in the container.



Alternatively, a tray (e.g. 300x100x40 mm) can have a piece of glass/perspex supported above it by two dowling rods. The capillary matting can then sit on the glass/perspex with either end dipping in the water in the tray.



In all set ups the plant containers will be placed on the capillary matting.

Supply of materials

It is not appropriate to provide all equipment and materials in e.g. a tray system for each student/group. Equipment and materials should be supplied in a way that students have to identify and obtain resources. Normal laboratory apparatus should not be made available in kits but should generally be available in the laboratory. Trays could be provided containing one type of specialist equipment or materials.

PREPARING FOR THE ACTIVITY

Read through the Student Activity Guide and consider the following questions.

Analysis of activity

1. What is the aim of the activity?
2. What is being varied in the activity?
3. What variables must be kept constant?
4. What measurements / observations are you going to make?

Getting organised for experimental work

1. Radish plants are being grown in film cans. You are going to vary the minerals available to the radish by adding different numbers of NPK pellets to the film can (e.g. 0, 3, 6, 9 and 12 pellets).
2. Decide how many plants your group is going to grow in total and the number of fertiliser pellets to be added to each film can.
3. You also need to decide if each group will work independently or if class results will be pooled. For Outcome 3 it is important that you play an active part in setting up the experiment and in collecting results.

Recording of data

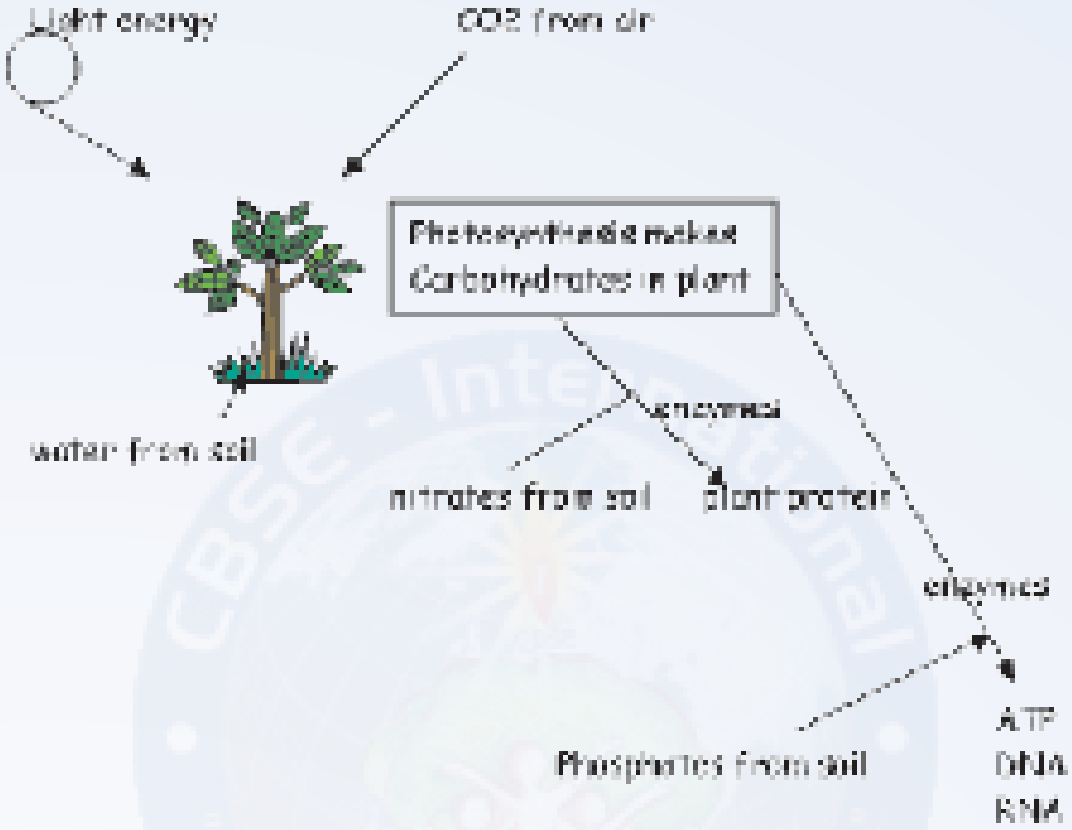
Prepare a table to record the results. You should use a ruler, correct headings and appropriate units.

Evaluation

1. Why can the radishes not be grown in soil or compost in this experiment?
2. Why must several radishes be grown at each level of minerals chosen?
3. Why is dry mass of radish used for the results?

Student Activity 2

Content : When they photosynthesise, plants make carbohydrates which are composed of the elements carbon (C), hydrogen (H) and oxygen (O). To convert these to proteins, the element nitrogen (N) must be added. Most plants obtain their nitrogen from the soil in the form of nitrates. Similarly, to convert carbohydrates to ATP or nucleic acids, the element phosphorous (P) must be added. This is obtained from the soil as phosphates. Potassium (K) and iron (Fe) solutions are also absorbed by plants from the soil for growth.



- Such substances (e.g. nitrates, phosphates, potassium salts and iron salts) are inorganic (i.e. not derived form living things) and are collectively known as mineral salts. The ones that plants need in the greatest quantities are known as the "macro-elements".

- You are going to sow radish seed in 'soil' containing different levels of 3 minerals - nitrates, phosphates and potassium. These minerals are present inside N:P:K fertiliser pellets which slowly release their contents to the surrounding soil. The 'soil' in which the seed is sown is a 50:50 mixture of peat and vermiculite. This has a very low mineral content and so the level of minerals can simply be controlled by varying the number of fertiliser pellets added to the 'soil'.

- After sowing, the radish seedlings are kept well watered, in a warm temperature under constant illumination. After 18-21 days they are harvested and dried. Measuring the dry mass of the plants at the different mineral levels is a reliable indicator of their overall growth (if the mass of water is included it can give misleading results as the percentage of water in living things is usually very large and often very variable).

Equipment and materials

Materials required by each group:

- 25 black film cans with a 4-5 mm hole in the base 25 labels
- 25 wicks marker pen
- 50 radish seed dropping bottle distilled water
- NPK fertiliser pellets (slow release 14:14:14) (at least 150)

Materials to be shared:

- light bank
- growing mix (equal parts peat and fine vermiculite mixed)
- water containers with lid and capillary matting

Procedures

You should already know how many radish plants you personally are growing and how many fertiliser pellets you are adding to each film can.

1. Collect the materials indicated above.
2. Insert the wick into the hole in the base of each film can.
3. Half-fill the can with growing radish seed mix and add the appropriate number of N:P:K fertiliser pellets.
4. Add more growing mix. Sow 2 radish seeds in each can and lightly cover with growing mix.
5. Write your initials, date and the number of pellets used on a label and insert it in the side of the wick can.
6. Add water until it drips from the wick, then place the can on capillary matting on a reservoir, under a light bank.

7. After 4-5 days thin to one healthy seedling per can.

After 18-21 days the radishes are ready to harvest.

1. Remove the radishes carefully from the film cans.
2. Wash in water. If the growing mix is difficult to remove from the fibrous (thin) roots then these should be removed with scissors.
3. Put radish plants on appropriately labelled filter papers in a warm oven (90-95°C). All water should evaporate within 24-48 hours leaving a constant dry mass.
4. Collect all the dried plants in your group/class that have been grown with no fertiliser pellets and weigh them.

5. Calculate the average mass of a plant grown this way.
6. Repeat with plants grown with each chosen number of fertiliser pellets.
7. Draw up a table of results. The table should have appropriate headings and units.
8. Present your results as a graph with suitable scales and axes labelled with quantities and units.

Activity-19 A: Effects of smoking

bio-x-1-cbse-i.docx

http://www.youtube.com/watch?v=TaAvhG2SInM&NR=1

Activity-19 B : The Effects of Smoking on the Human Body

Content :

Students will view an interactive Web animation that gives a 360-degree view of the organs in the human body and an explanation of how tobacco use affects each organ.

Learning Outcomes Students will be able to :

- ? Simulate/describe/estimate the impact of smoking on the lungs
- ? Identify the functions of major organs of the human body
- ? Identify the specific ways tobacco use affects these major organs
- Develop a persuasive presentation designed to discourage their peers from using Tobacco

Procedure: (10 minutes)

1. Ask students which organs in the body are affected by smoking.
2. List these one at a time, along with what the students know about:
   a. What that organ does?
   b. The effects of smoking on that organ

3. Most students will be aware of some the effects of smoking on the lungs. For example, they may be aware that smoking causes lung cancer, shortness of breath, and emphysema. Probe to discover what students know about other organs and what the effect of smoking is on each.

Students list on the board

Organ	Function	Effects of Smoking
Lungs	Bring air into body Get oxygen into blood	Lung cancer Shortness of breath Emphysema Bad colds (?)
Heart	Move blood through the body	Heart attack Stroke (?)
Tongue	Help eat food	Bad breath

http://www.bam.gov/teachers/activities/smoking.pdf

Now ask students to answer the following

1. Does tobacco smoke contain harmful chemicals?
2. What are some of the health problems caused by smoking?
3. What are the risks of tobacco smoke to nonsmokers?
4. Is smoking addictive?
5. How much nicotine is in cigarettes and cigars?
6. What are the immediate benefits of quitting smoking?
7. What are the long-term benefits of quitting smoking?
8. Does quitting smoking lower the risk of cancer?

Activity-20 : Wealth or waste

Content :

The fact that some wastes are "wealth" or useful. This will also help students develop the attitude to appreciate the need for proper disposal of waste (i.e. dangerous if poor disposed; e.g. spreading diseases; advantageous if properly disposed, e.g. enriching crop yields).

Learning Outcomes :

1) Describe how urine and other organic wastes can be used to improve crop yields

2) Describe the proper disposal of urine

3) State effects of poor disposal of wastes

Material required

1. Photographs / stories of activities in which the urine of humans and domestic animals is used as a fertiliser.

2. A Chart / story about diseases or any other effects of poor urine disposal.

Procedure:

Student Activity 1 : Project/field activity

1. In groups of 4-6 ask the learners to find out:

   i) If urine (for humans or domestic animals) is put to proper use in their community.

   ii) How urine and other organic wastes are used and the processes (steps) of putting it to use.

2. Let them record their findings on a flip chart

3. Accord each group some time to give feedback to the plenary

4. Let the class discuss the presentations of each group and the advantages of using urine and other organic wastes.

5. Display results on a notice board

6. Encourage learners to practice what they have learnt.

Student Activity 2 : Project/field activity

In groups of 4-6 ask the learners to prepare two small gardens at school and plant some crops. They should then prepare fertilisers from urine and apply it to one of the gardens.

Ask them to compare the yields of the gardens treated with urine fertilisers with those from untreated gardens.

Encourage the learners to practice what they have learnt and always try to monitor their projects.

Studnet Activity 2 : Preparation of fertilisers from Urine

Procedure

1. Collect urine in a jerrycan, bucket or any other suitable container.
2. Allow it to ferment for two weeks.
3. Dilute it with water in a ratio of 1:4 (urine to water)
4. You can enrich this fertiliser (which is rich in nitrates) further by adding ash to provide other nutrients such as potassium.
5. You can add hot pepper or chilli to the fertiliser to kill pests,

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Worksheet-20 A

Essay questions

(a) Define the term excretion.

(b) How is urine formed?

(c) What problems may arise from improper disposal of urine?

(d) In what ways is urine a useful waste?

Worksheet 20 B

Circle the correct answer.

1. What is meant by excretion?

   A. A process to get rid of faeces from the body

   B. A process to get rid of excess water from the body

   C. A process to get rid of waste materials from the body

   D. A process to get rid of carbon dioxide from the body.

2. Which of the following statements is true about excretion?

   A Only some living things excrete

   B Excretion in humans does not involve lungs

   C Humans excrete to get rid of waste materials from their bodies

   D There will be no effect on human health if they do not excrete

3. What is the gas that humans excrete during exhalation?

   A Oxygen

   B Carbon dioxide

   C Nitrogen

   D Helium

4. Which of the following are the products of human excretion?

   I Sweat

   II Urine

   III Water

   IV Faeces

   A I and II only

   B II and IV only

C I , II and III only

D I, II, III and IV

5. Why humans need to excrete and defecate?

A To loss weight

B To become slim.

C To get rid of water from their bodies.

D To get rid of waste materials from their bodies

6. Humans produce faeces through the process of

A reproduction.

B excretion.

C respiration.

D defecation

7. Which of the following are the excretory organs of a Human?

I Heart II Lungs III Skin

A I and II only

B I and III only

C II and III only

D I, II and I

8. The following are the waste products of humans :U rin e Sw eat W a te r

These waste products are eliminated from the body through the process of..

A. disposal

B. excretion

C. breathing

D. defecation

9 What is the waste material excreted by human's kidneys?

A Urine

B Sweat

C Oxygen

D Carbon dioxide

10. Excretory products are…

A the materials that are not digested.

B the materials that are needed by the body.

C the waste materials that are not needed by the body.

D the waste materials that are excreted through defecation.

11. Which of the following is not a product of excretion?

A Urine

B Water

C Sweat

D Faeces

12. What is the gas we excrete from our body during exhalation?

A Oxygen

B Carbon dioxide

C Nitrogen

D Helium

13. Which of the following is matched wrongly?

	Excretory organ	Excretory matters
A	Skin	Water vapour, urea
B	Lungs	Water vapour and carbon dioxide
C	Skin	Water.urea,mineral salt
D	kidneys	Water, mineral salt, urea

14 What is the waste material excreted by skin ?

A. Oxygen

B. Urine

C. Sweat

D. Carbon dioxide

15. When we breathe, we inhale gas X and exhale gas Y.

Identify gases X and Y.

	X	Y
A	Oxygen	Nitrogen
B	Nitrogen	Carbon dioxide
C	Oxygen	Carbon dioxide
D	Carbon dioxide	Oxygen

16. What is meant by excretion?

A. A process to get rid of faeces from the body

B. A process to get rid of excess water from the body

C. A process to get rid of waste materials from the body

D. A process to get rid of carbon dioxide from the body.

17. Which of the following statements is true about excretion?

A Only some living things excrete

B Excretion in humans does not involve lungs

C Humans excrete to get rid of waste materials from their bodies

D There will be no effect on human health if they do not excrete

http://www.scribd.com/doc/39189727/4-1-2-1-8-Excretion-and-Defecation-in-Human

Activity-21 : Artificial Kidney

bio-x-1-cbse-i.docx

http://www.yteach.co.uk/page.php/resources/view_all?id=plasma_homeostasis_capillaries_pituitary_gland_hemodialysis_transplantation_Antidiuretic_hormone_Reabsorption_nephron_kidney_excretory_system_ADH_filtration_process_page_9&from=search

Content:

Kidney transplantation is the best form of kidney-substitution treatment. Tissue rejection is the fundamental problem associated with organ transplantations. In this, the recipient's immune system recognizes the foreign organ and tries to destroy it. This is why certain examinations are necessary before transplantation. These examinations enable doctors to assess the immunological compatibility of the donor's and recipient's tissues. After transplantation of a kidney, the recipient is given medicines that suppress the activity of the immune system. However, this does not guarantee that the transplanted kidney will not be rejected. It takes a long time to find an appropriate donor. The kidney for transplantation can be taken from a living donor, ideally from a relative. This increases the chances of there being a high compatibility between donor and recipient, and thus improves the chances of successful transplantation. A transplanted kidney takes over all normal functions of the original organ. A person with a transplanted kidney can lead a normal life.

Worksheet-21

1. What is an artificial kidney machine ?
2. How does an artificial kidney separate waste product from the blood?
3. How artificial kidney works faster? .
4. Why is a salt solution, rather than pure water, used as the external solution for artificial kidney dialysis?
5. Are the pores formed by the cellulose fibers best suited for allowing the passage of polar or nonpolar molecules? Briefly, explain your answer in terms of the functional groups of the cellulose polymer.

http://wiki.answers.com/

http://www.chemistry.wustl.edu/~edudev/LabTutorials/Dialysis/Kidneys.html

Rubrics Of Assessment

Parameter Learner is able to	Beginning (1)	Approaching (2)	Meeting (3)	Exceeding (4)
1 Is able to understand the importance life processes				
2 Discuss the importance of digestion				
3 Try to explain the processes of digestion and circulation				
4 To recall the end products of various reactions.				
5 Explain the processes of respiration and excretion.				

CBSE-*i*

CENTRAL BOARD OF SECONDARY EDUCATION

Shiksha Kendra, 2, Community Centre, Preet Vihar,
Delhi-110 092 India