

SCIENCE
STANDARD EIGHT
TERM III

Note to the teacher...

As we present this revised edition of the Science Textbook, we would like to express our deepest gratitude to the learners and the teaching community for their enthusiastic responses.

In science some concepts could be subject to change from time to time as new theories and principles are constantly being evolved.

We have tried to present facts and concepts of science (both concrete and abstract) in a visually appealing manner without detracting from the content.

Activity based learning is now accepted as the basis of science education. These activities should be regarded as a means for open-ended investigation rather than for verification of principles/content given in the textbook has been designed to facilitate low-cost activities and experiments using locally available materials. With a view to streamlining the activities, we have now segregated them into three groups:

- I Do** - activities to be done by an individual learner.
- We Do** - activities to be done by a group of learners. and
- We Observe** - activities to be demonstrated by the teacher.

The third group of activities have a higher degree of difficulty or require careful handling as it may involve dealing with chemicals, electricity etc.,

The “**More to know**” snippets in the text represents some unusual and interesting facts or information *in which the students need not be examined*.

The evaluation section is nothing but another space for learning in a different manner. As the focus is on understanding, rote learning is to be discouraged thoroughly. Application of learnt ideas, problem solving skills and critical thinking is to be encouraged. There could be scope for more than one answer to a question, which should be acknowledged always.

To facilitate further reference, books and websites have been suggested at the end of each lesson. Suggestions and constructive criticism are most welcome. Valuable suggestions will be duly incorporated.

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1. DIVERSITY IN LIVING ORGANISMS

Look at some of the plants and animals around you. Do they have the same shape and size? No, they differ in their size, shape and structure.

Our world is filled with many varieties of living organisms. Animals vary in size from the tiny amoeba to the huge blue whale. However, their bodies can adapt to their living condition.

1.1. CELL AS A FUNDAMENTAL UNIT OF LIFE

Cell is the structural and functional unit of all living organisms. Cell was discovered by Robert Hooke in 1665.

Theodor Schwann and Matthias Jacob Schleiden postulated the cell theory in 1839. The two important postulates of the cell theory are:

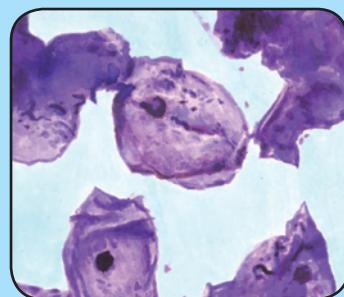
1. All living organisms are made up of cells.
2. New cells are formed only from the pre-existing cells.

1.1.1. Types of Human Cells Related to Function

Based on the function, the size and the shape of the cells differ. Generally, cells are round, spherical or elongated. Some cells are long and pointed at both ends. They are spindle shaped. Cells, sometimes, are quite long. Some are branched

ACTIVITY 1.1 WE OBSERVE

- ◆ We observe the microscopic slides of an epithelium cell through a compound microscope with the help of our teacher.
- ◆ We record the observations and draw the diagram.



Human cheek Cells

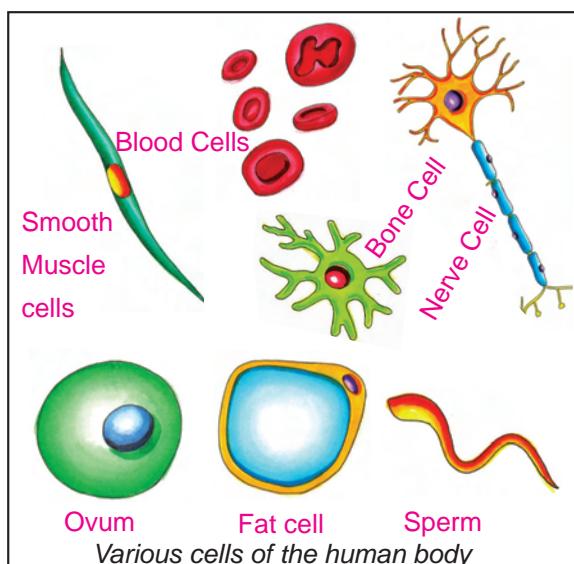
like the nerve cell or a neuron. The following table shows the various types of cells and their shape.

Example:-

Cells	Shape
Nerve cells	Star
Flame cells	Tubular
Gland cells	Cuboidal
Squamous epithelium	Polygonal
Columnar epithelium	Cylindrical
Egg cells	Oval
RBC	Round
Fibrous Muscle cells	Elongated

Let us learn about the cells and the functions of certain cells. A list is provided below :

Cells	Function
Squamous epithelium	Protective & give shape
Muscle cells	Contractile & Retractile
Fat cells	Storing more fat droplets
Nerve cells	Conduction of nerve impulses
Bone cells	Rigidity
Rods and cone cells	Vision & colour
Ear cochlear cells	Conduction of sound waves
Gland cells	Secretory



1.2. STRUCTURE AND FUNCTIONS OF CELL ORGANELLES

The cell organelles are present in the cytoplasmic matrix, which are the living structures of the cell. They have the properties of growth and multiplication at the time of necessity within the cell.

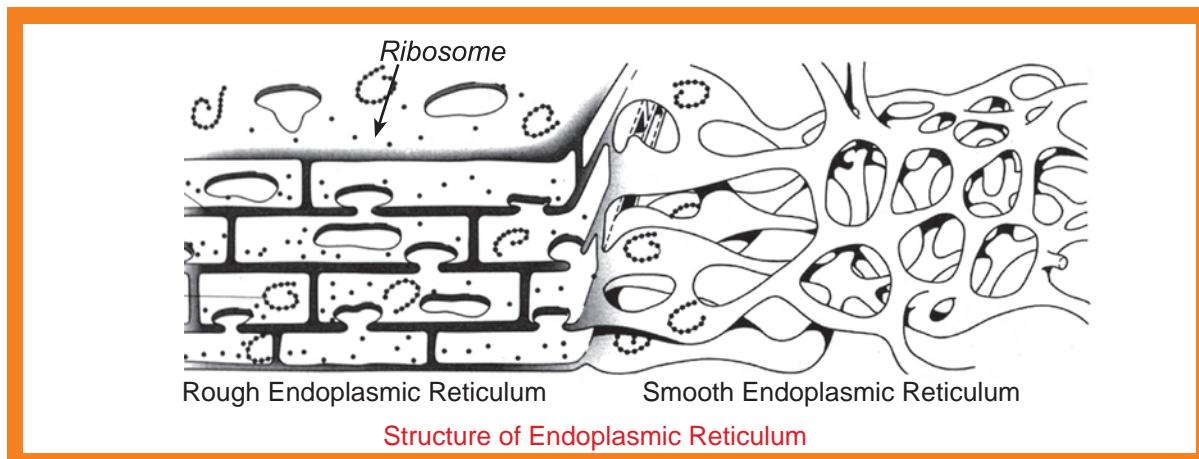
1.2.1. Cell Organelles and their Functions

The Cell Organelles are

1. Endoplasmic Reticulum
2. Ribosome
3. Golgi apparatus
4. Lysosomes
5. Mitochondria
6. Centrioles

1. Endoplasmic Reticulum

The electron microscopic study by Porter in 1945 revealed a network of membranous system with vacuoles in the endoplasm. This was named as endoplasmic reticulum by Porter in 1952. It is assumed that the endoplasmic reticulum originated by evagination of the nuclear membrane. Two types of endoplasmic reticulum have been observed. They are rough ER and smooth ER, based on the presence or absence of ribosome in the ER respectively.



Functions of the Endoplasmic Reticulum

1. The endoplasmic reticulum provides an ultra structural and skeletal framework to the cell.
2. The smooth endoplasmic reticulum helps in the synthesis of lipids and in the breaking down of glycogen.
3. During cell division, the endoplasmic reticulum membranes disappear and form a new nuclear envelope after each nuclear division.

2. Ribosome

Many minute spherical structures known as ribosomes remain attached with the membrane of endoplasmic reticulum and form the (granular) rough endoplasmic reticulum. The ribosomes are produced in the nucleolus. Each ribosome is composed of two structural units, one smaller

and the other a larger unit. The small sub-units occur on the larger unit and form a cap-like structure. The ribosome also may occur freely in the cytoplasm. They are the sites of protein synthesis.

MORE TO KNOW

Three researchers, who made the crystal structure of the ribosomes received the Nobel Prize for Chemistry in the year 2009 - **Venkatraman Ramakrishnan**, an Indian born U.S.A scientist, **Thomas Steitz** of U.S.A and **Ada Yoath** of Israel.

3. Golgi Apparatus

The electron microscopic observation of Golgi bodies reveals the presence of three membranous components. They are

- i. Disc shaped group of flattened sacs or cisternae
- ii. Small vesicles
- iii. Large vacuoles

Functions

1. It produces secretory vesicles like zymogen granules that may have enzymes inside.
2. It forms certain yolk substances in the developing oocytes.
3. It helps in retinal pigment formation in the retinal cells.
4. It helps in the formation of acrosome in sperm cells.

4. Lysosomes

Lysosomes are a kind of waste disposal system of the cell. Lysosomes originate either from the Golgi apparatus or directly from the endoplasmic reticulum. Each lysosome is of a rounded structure. It is filled with dense material.

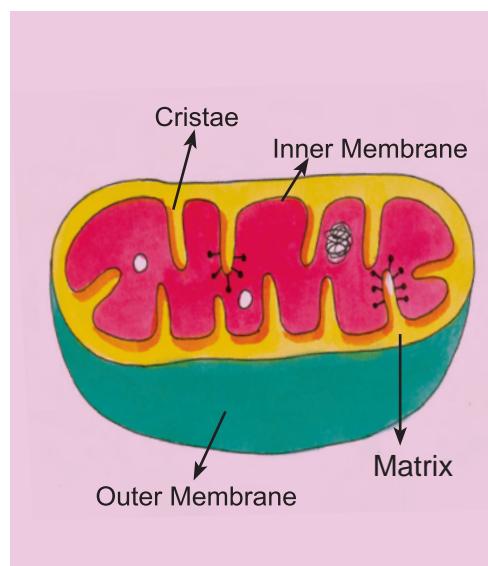
Functions

1. Lysosomes help to keep the cell clean by digesting any foreign material as well as worn-out cell organelles.
2. When the cell gets damaged lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are also known as suicidal bags of a cell.

5. Mitochondria

In the cytoplasm of most cells, large size filamentous, rounded or rod-like structure known as mitochondria

may be seen. The mitochondria are bounded by two membranes made of proteins. The outer membrane forms a bag like structure around the inner membrane, which gives out many finger like folds on the lumen of the mitochondria. The folds of inner mitochondrial membrane are known as cristae.



Internal structure of Mitochondria

Functions

Mitochondria are considered to be the power houses of the cell because they are the seat of cellular respiration. They also synthesize the energy rich compound ATP- Adenosine Tri Phosphate.

6. Centrioles

Centrioles were first described by **Henneguy** and **Leuhossek** in 1897. The centrioles are micro tubular structures, found in two shapes- rods and granules located near the nucleus of the animal cell.

At the time of cell division, the centrioles produce spindle fibres and astral bodies. They also decide the plan of cell division.

1.2.2. Nucleus

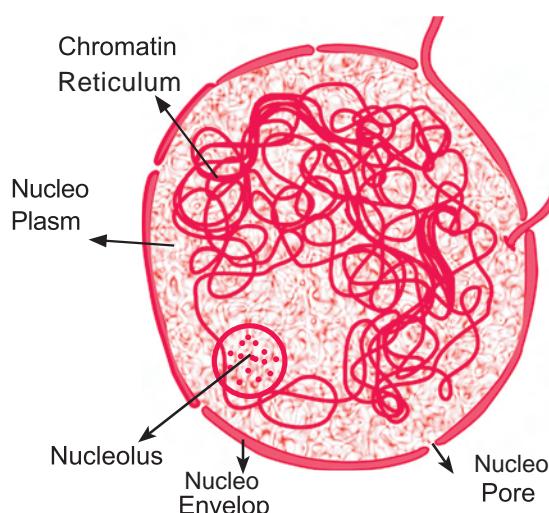
The nucleus is a highly specialised cell organelle which controls all the activities in a cell. It is the brain of a cell. It is round or oval in outline and possesses four parts.

They are :

1. Nuclear Membrane
2. Nucleoplasm
3. Chromatin Reticulum
4. Nucleolus

The nuclear membrane is the outer delicate covering of the nucleus. It contains pores of different dimensions.

The nucleoplasm is the protoplasmic substance of the nucleus. It is also known as nuclear sap. Chromatin Reticulum is composed of a network with highly elongated chromatin threads



Structure of Nucleus

which overlap one another and are embedded in the nucleoplasm. At the time of cell division, the chromosomes become clearly visible.

The nucleolus is generally present in the nucleus of most of the cells. The nucleolus become enlarged during active period of cell division and are less developed in quiescent stage. It is often called as cell organizer.

Functions

1. It controls all metabolic processes and hereditary activities of the cell.
2. The nuclear membrane allows exchange of ions between the nucleoplasm and the cytoplasm.

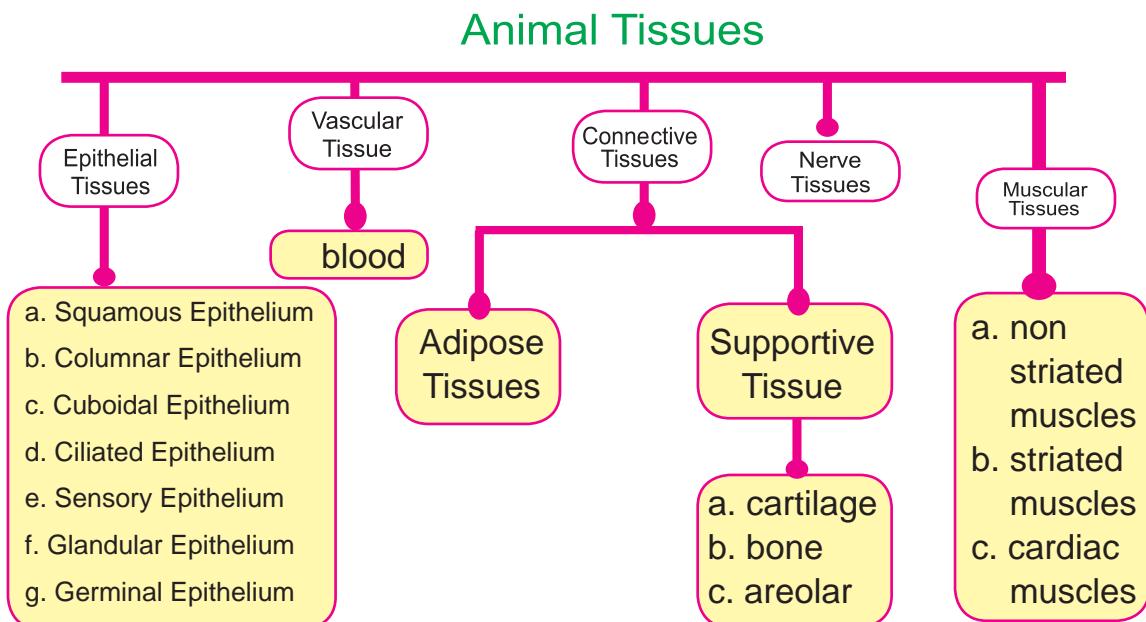
1.3. ORGANIZATION – CELLS – TISSUES – ORGANS – ORGAN SYSTEM

In multicellular animals, cells multiply by the process of cell division and specialise themselves in performing a particular function. For example, the muscle cells perform contraction and relaxation of organs that help in locomotion and conduction.

1.3.1. Tissues

A group of cells having common origin, structure and function is referred to as tissue. The bodies of animals are composed of several distinct tissues. On the basis of the function,

We can classify animal tissues into five broad categories.



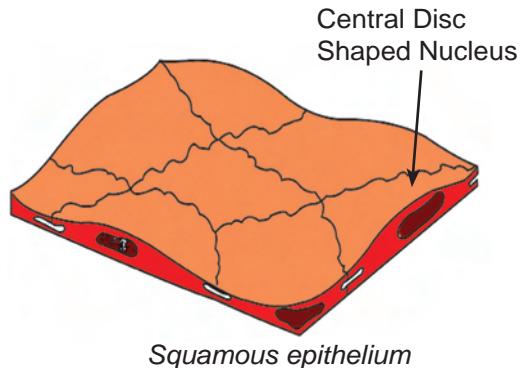
1. Epithelial Tissues

Epithelial tissues cover most organs and cavities within the body. Since the cells are closely packed, there is very little space between them. The absence of intercellular space is the characteristic of epithelial tissues. The cells in this tissue remain attached to the basement membrane that separates it from the other tissues.

Based on the shape, arrangement of cells and the functions, Epithelia are classified into seven types.

A. Squamous Epithelium

Squamous epithelium consists of a single layer of flattened cells with a central disc like nucleus. The inner lining of the cheek and the membranes within the body are examples of this epithelium.

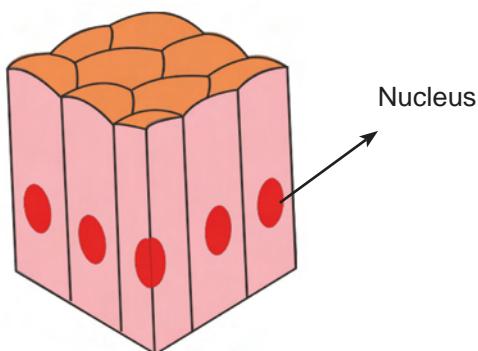


Functions

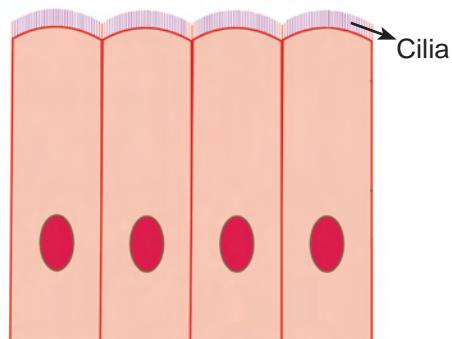
Protection is their function. In the alveoli they help in exchange of gases.

B. Columnar Epithelium

The cells are cylindrical and tall, the height of each cell being greater than its width. The oval nuclei are usually found at the base of these cells. E.g. : The inner lining of the intestine.



Columnar Epithelium



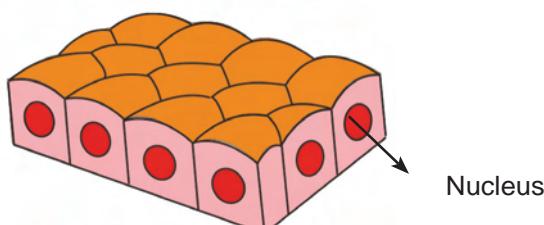
Ciliated Epithelium

Function

Secretion of enzymes in the stomach and absorption of digested food in the intestine.

C. Cuboidal Epithelium

The cells of this epithelium are cube shaped. The walls of the intestine and the endocrine glands are examples of Cuboidal type of epithelium.



Cuboidal Epithelium

Function

This tissue helps in secretion and re-absorption of water in kidney tubules.

D. Ciliated Epithelium

Its structure is like the columnar epithelium. In addition it contains a number of fine protoplasmic projections called cilia. The wind pipe or trachea is internally lined by ciliated epithelium.

Function

They remove the dust particles by the vibration of the cilia.

E. Sensory Epithelium

Some of the epithelial cells are modified to respond to stimuli and they form the sense organs.

2. Vascular Tissues

This is a liquid tissue adapted for the transportation of the nutritive materials, respiratory gases, excretory materials and others. It consists of 55% plasma and 45% blood cells. There are three kinds of blood cells.

They are,

- i) Red Blood Cells
(Erythrocytes) : RBC
 - ii) White Blood Cells
(Leucocytes) : WBC
 - iii) Blood Platelets
(Thrombocytes)
- i) **Erythrocytes:** The Red Blood Cells are present in vast majority. Each red cell is a circular or biconcave disc without a nucleus. These are formed in the bone marrow. Their life span

is between 100 and 120 days. They contain haemoglobin, a respiratory pigment that chiefly carries oxygen from the lungs to the other parts of the body.

ii) **Leucocytes:** The nucleated white blood cells are irregular and contain no pigment. They are produced in the bone marrow and in the lymph glands. The life span of WBC is two to three weeks.

They are the police force of the body and protect it from disease producing organisms.

iii) **Thrombocytes:** The blood platelets are the smallest of the blood cells. They are responsible for the clotting of the blood when blood vessels are damaged.

3. Connective tissues

The cells of connective tissues are loosely spaced and embedded in an inter cellular matrix. The matrix may be a jelly like fluid, dense or rigid. They are of two types. They are

- A) Adipose tissue
- B) Supportive tissue

A) Adipose Tissue:- This is modified for storing fat. The inter cellular material is more or less absent. It is found chiefly below the skin and in between the internal organs.

B) Supportive Tissue:- This tissue gives support to the entire body.

ACTIVITY 1.2 WE OBSERVE

- ◆ We observe the different types of epithelial tissues under a compound microscope.
- ◆ We identify their important features.

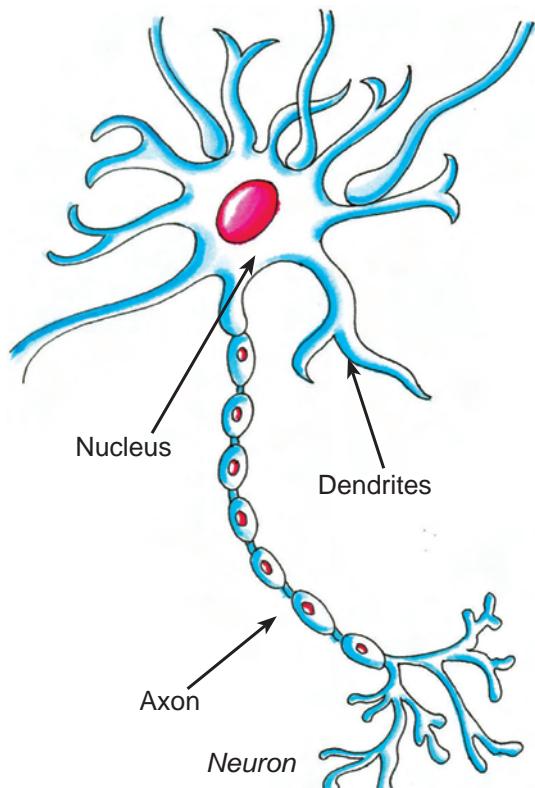
The supportive tissues are of three types. They are :

- i) Cartilage tissue
 - ii) Bone tissue
 - iii) Areolar tissue
- i) **Cartilage Tissue:-** It has widely spaced cells. The solid matrix is composed of proteins and sugars. The cartilage smoothenes the bone surface at the joints and is also present in the nose, ear, trachea and larynx.
- ii) **Bone Tissue:-** It forms the framework that supports the body. Bone cells are composed of calcium and phosphorous compounds. Two bones can be connected to each other by the ligament. This tissue is very elastic and the ligaments contain very little matrix.
- iii) **Areolar Tissue:-** It is found between the skin and the muscles around the blood vessels, nerves and in the bone marrow. It fills the space inside the organs. It supports the internal organs and helps in repairing the tissues.

4. Nervous Tissue

The nervous tissue is formed of nerve cells called neurons and nerve fibres. It has highly developed powers of irritability and conductivity. The brain, spinal cord and nerves are all composed of nervous tissues.

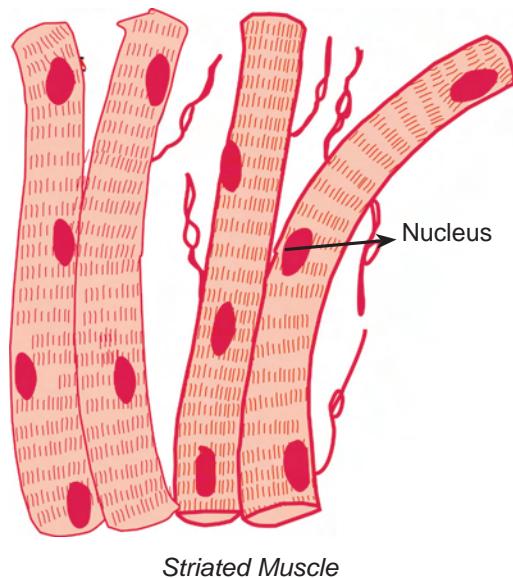
Neurons: It is a structural unit of the nervous system. It has a cell body



called cyton which assumes different shapes in the different regions of the nervous system, and a long tail called axon. Neurons may be either rounded or oval shaped. The protoplasm of the cyton has a number of small dark granules referred to as **Nissil's bodies**. The cyton gives out numerous branches called dendrons. These in turn, divide into finer branches called dendrites.

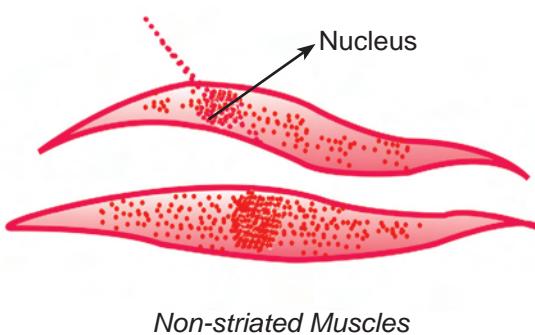
5. Muscular Tissue

It consists of elongated cells, also called muscle fibres. This tissue is responsible for movement in our body. Muscular tissue contains proteins called **Contractile Proteins**. There are three types of muscular tissues:



a) **Striated Muscle:** Since these muscles are attached to the skeleton, they are also called Skeletal Muscles. Each muscle fibre in this muscle is a long parallel sided cylindrical structure with cross striations and are hence named striped muscles. There are a number of nuclei placed near the periphery. They are covered by a membrane called Sarcolemma. Since their contraction is under conscious control they are also called voluntary muscles.

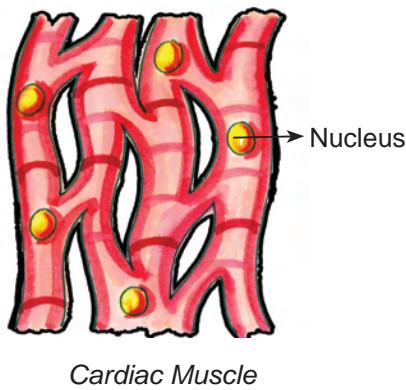
b) **Non-striated muscles:** The cells are arranged to form a sheet of muscular tissue commonly found in the wall of the digestive tract, urinary bladder and



other internal organs. They are not under the control of our willpower. So, they are called involuntary muscles.

c) Cardiac muscle: In structure it is between the striped and unstriped muscles fibres. These are found only in the heart.

They are multi nucleated but the nuclei are centrally located. **Dark** and **Light** bands are present. The muscle of the heart show rhythmic contraction and relaxation **throughout life**. These involuntary muscles are called cardiac muscles.



1.3.2. ORGANS

Two or more kinds of tissues associate together to form an organ. An organ is a specialized part of the body performing some specific

functions. For example, the eye, has epithelial tissue, connective tissue, nervous tissue and muscular tissue. We have many such organs in our body like eyes, ears, lungs, etc.

Now let us study in detail the structure of the eyes.

The eyes (Photoreceptor)

The sense organ eye is concerned with vision. The eye which is spherical in shape is kept in the orbit of the skull.

The eye is made up of three coats.

1. the outer- Sclerotic coat
2. the middle - Choroid coat
3. the inner - Retina coat

1. Sclerotic coat

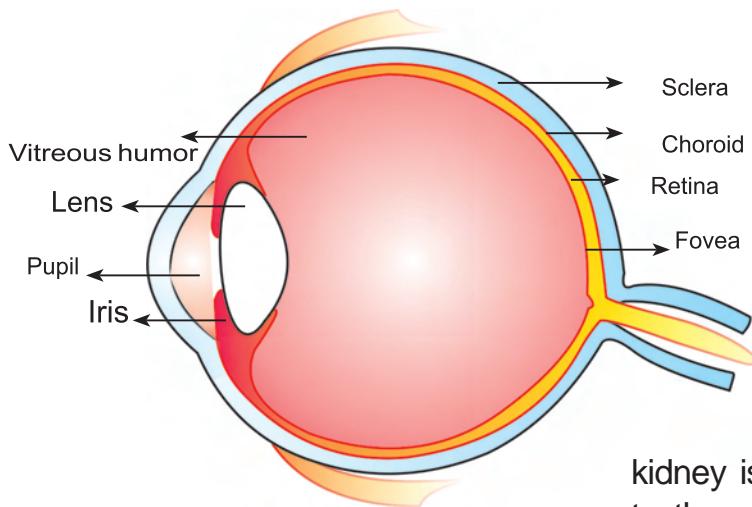
The outer sclerotic coat is white in colour except in the front where it forms the transparent cornea.

2. Choroid coat

It is highly vascularised and deeply pigmented. In front of the eye the choroid coat forms the iris and lens. An opening called the pupil is present in the centre of the Iris.

3. Retina coat

Retina is the sensitive part of an eye. It contains two types of receptor cells - the **rods and cones**. Rods are sensitive to different shades of light but not to colour. Cones are sensitive to colour. The fovea or yellow spots of the retina are densely packed



Cross-Section of the eye

with cones. It is the part, that is used when one concentrates on something. e.g. when reading, sewing etc. The lens is transparent, elastic and biconvex in shape. It is attached by ligaments to the ring shaped ciliary muscles. The aqueous humor is a clear, watery liquid between the cornea and the lens. The vitreous humor is a viscous liquid which fill the space between the lens and the retina. Vitreous humor helps in image formation and in maintaining the spherical shape of the eye.

1.3.3. Organ System

Several organs of the body together perform a common function. They constitute an organ system. Now let us discuss the excretory system and their functions.

Excretory system

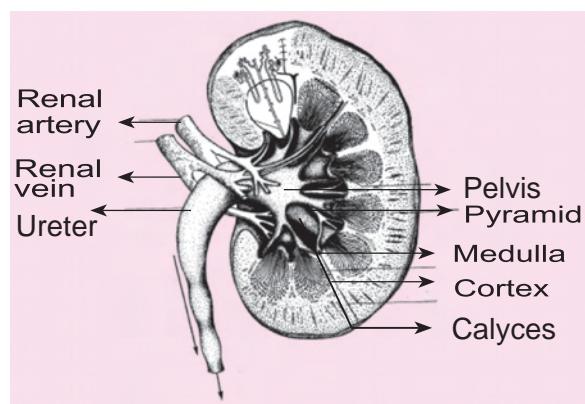
Excretion is the elimination of metabolic waste products from the body. The major function of the excretory system is the elimination of nitrogenous waste products from the body. The mammalian urinary

system consists of two kidneys, ureters and an urinary bladder.

Kidney

There is a pair of kidneys located inside the abdomen on either side of the vertebral column in the lumbar region and against the posterior abdominal wall. The right kidney is slightly on the lower side due to the presence of the liver. The outer surface is **convex** and the inner surface is concave. The concave side is called **hilus**.

A vertical section of the kidney shows an outer dark portion called the **cortex** and an inner pale region called medulla. The medulla has a number of cone like

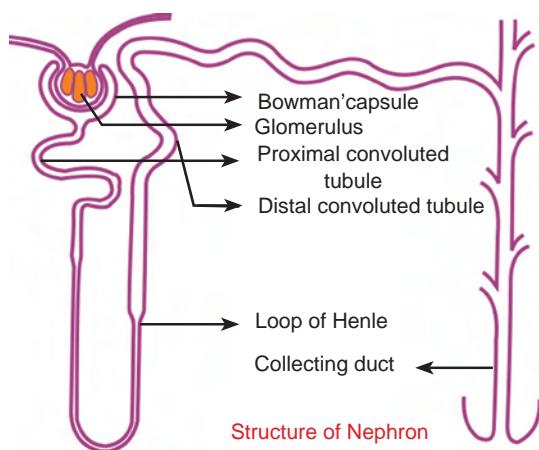


Vertical section of the kidney

structures called **pyramids**. The pelvis projects in between the pyramids as cup like spaces called **calyces**.

Nephrons

The kidney contains many minute tubular nephrons. These are the structural and functional units of the kidney.



Functions of the Kidney

- The kidney not only removes the waste product from the blood but also maintains a constant composition of blood.
- It maintains the pH of blood.
- The kidney regulates the loss of excess water from the body.

ACTIVITY 1.3 WE OBSERVE

- ◆ We observe the preserved organs like, the human eye, the kidney and models of some organs with the help of the teacher.

1.4. HOMEOSTASIS

Homeostasis is the maintenance of a constant internal environment of the body. It was first pointed out by the French physiologist **Claude Bernard** in 1857. All mammals are capable of maintaining a constant body temperature despite changes in the external temperature. Behavioural and physiological responses are two important regulating mechanisms that maintain the stability of Homeostasis.

For example

The control of blood glucose level is a good example of homeostasis and it involves the secretion of atleast six hormones. A rise in the blood glucose level stimulates insulin secretion whereas a fall in the blood glucose level inhibits insulin secretion and stimulates the secretion of glucagon and other hormones which raise blood glucose levels.

1.5. CELLULAR RESPIRATION

Respiration is the process by which chemical energy in organic molecules is released by oxidation. This energy is then made available to living cells in the form of ATP.

The biochemical process which occurs within cells is called cell respiration. If it uses oxygen, it is called as **aerobic respiration**. If the process takes place in the absence of oxygen, it is termed as **anaerobic respiration**.

Aerobic respiration

It involves the utilisation of free oxygen and results in complete oxidation of glucose into carbon-dioxide and water.

Anaerobic Respiration or Fermentation

Here oxygen is not utilized for respiration. So, it is called anaerobic respiration. It is often referred to as fermentation.

A variety of micro organisms use anaerobic respiration as their major source of ATP - E.g. bacteria, yeast.

1.6. METABOLISM

The word **metabolism** has its root from the Greek word **Metabole** which means **change**. The sum total of the biochemical reactions involved in the release and utilization of energy or energy exchange within the organism is termed as metabolism.

Such a chemical reaction in the metabolic process can be divided into two categories.

1. Anabolism

The simple substances obtained from the food are converted into cellular substance. This process is called Anabolism. During this process energy is not released.

For example,

Glucose → Glycogen and other sugars

Amino acids → Enzymes, hormones, proteins

Fatty acids → Cholesterol and other steroids.

2. Catabolism

Organic substances which are obtained from the food are broken down to produce energy for the purpose of physiological functions of the cells. This process is called as **catabolism**.

The following are examples for catabolism.

Glucose → CO_2 , Water and heat

Protein → amino acid

Fats → Glycerol, fatty acid, etc.

The repeated anabolism and catabolism reactions in the metabolic process maintain the homeostatic condition of the body.

Because of the metabolic process, the ionic balance is being maintained in the body.

The metabolic process is responsible for movement, growth, development, maintenance and repair of the cells, tissues and the human body.

This metabolic process occurs in different organs of living species.

1.7. DESIGN OF THE BODY – ITS BEAUTY – STRUCTURE AND FUNCTION – SOME EXAMPLES

Our body structure suits its function. The human foot, which was originally a climbing structure, has been readapted for bipedal walking and running.

Likewise, there are various animals that range from unicellular to multicellular organisms whose body structures suit their function and the movements they make.

Some animal movements are very beautiful. For example, an insect walking on the reverse of a leaf, the soaring of eagles and the running of Jaguar and other animals.



Soaring of eagle

Body Contour

Contour is nothing but the shape of the body. Observe a race horse. Its body has been beautifully designed by nature. The body is spindle-shaped, its streamlined contour offering minimum resistance in air.



Racehorse

The body of fish is also streamlined so that it can freely swim in the water.



Fish - Rohu (Belongs to Kendai)

How do animals fly?

The nature of the flight of an aeroplane differs from that of birds, animals and insects. Planes have fixed wings that create lift when air flows past. They move forward by pushing air through a jet engine or around a propeller very swiftly.

The wings of animals do both these jobs at once. When the wings flap downwards, the body of a bird or a bat or an insect is pushed forward and it is kept aloft and stable in its flight.



Bat

Bats are the only mammals that truly fly, by flapping their wings. The wing of bat is a fold of skin called patagium supported by all digits of the hand except the first.

Now let us learn about the various shapes of beaks.

They have been beautifully designed by nature to suit their feeding habits.

Pelicans feed on fish, which they scoop up in the flexible pouch that lies under their long beaks.



Pelicans

When a bird eats insects, worms or berries, its bill or beak helps it to get the food it wants. For most birds, bill is a special tool that has the right shape. In fact, the bills of many birds work just like the tools you may have at home.



Sparrow

A sparrow eats seeds it finds on the ground. Its bill helps it to pick up things easily.

A heron gets its food found in water. It lifts fish out of water, and swallows them.



Heron

ACTIVITY 1.4**I DO**

Find out the type of beaks in sparrow, parrot, eagle, duck, pelican etc. they can choose any 5 animals and draw the beaks they can get information from books or internet.

EVALUATION**1. Match the following.**

- | | | |
|--------------------------|---|------------------|
| a) Endoplasmic Reticulum | — | sweat gland |
| b) Glandular Epithelium | — | streamlined body |
| c) Retina | — | porter |
| d) Kidney | — | cone cells |
| e) Fish | — | nephron |

2. Choose the correct answer :

1. Muscle fibres are branched in _____ (cardiac/ skeletal) muscle.
2. Bone and cartilage are types of _____ (nerves/ connective) tissues.
3. Ciliated epithelium is found in _____ (trachea / oesophagus)

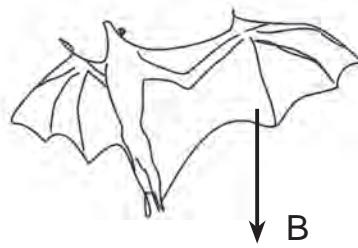
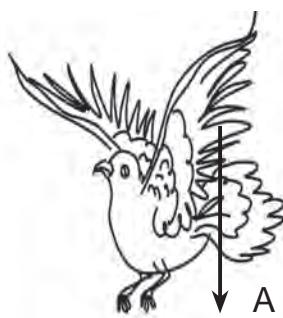
3. Choose the correct answer :

- i) Assertion : The image falls on Fovea
- ii) Reasoning : Because of refraction of light by vitreous humors
 - a. A is correct B is wrong
 - b. B is correct A is wrong
 - c. B explains A
 - d. A explains B.

4. Complete the table by filling the functions.

Tissues	Functions
1) Columnar epithelium	
2) Glandular epithelium	
3) Ciliated epithelium	

5. i) Identify part A and part B.
- ii) How does part A differ from part B ?



6. Our kidneys help our body to lead a healthy life - How?

7. Can you name and describe the muscle which is present only in our heart and works throughout our life?

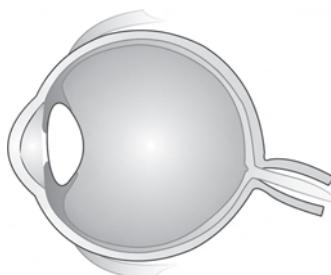
8. Identify the odd item from column A and write it under column B. Write the common features of the other two items in column C.

S.No	A	B	C
1.	Cristae, Matrix, Ribosome		
2.	Nerve, Muscle, Golgi apparatus		

In Column A, 3 terms are given of which 2 belong to one group and 1 remains odd. Identify the odd item and write it under Column B. Write the common features of the other two under Column C.

9. Copy the diagram of the human eye. Label the following parts:

- The transparent part of the sclera.
- The spot on the retina where cones are most abundant.



FURTHER REFERENCE

Books

Biology - P.S. Verma and V.K. Agarwal - S. Chand and Company Ltd.,

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2. Conservation of Plants and Animals

2.1. CONSERVATION OF FOREST AND WILD LIFE

Forest Ranger: Hello Sheelan, Good Morning. Welcome to Topslip. This is one of the forest areas in the state, which is rich in bio-diversity. This is the Anaimalai Tiger Reserve.

Sheelan : Thank you sir. I was told to meet you and get all information regarding forest and wildlife.

Forest Ranger: Fine! I would be glad to share interesting facts about forests and wildlife with you. Trees, what do they mean to you?

Sheelan: Well, trees provide a number of economically valuable commodities, the most important being



A forest

Conservation can be defined in simple terms, as the management of resources in such a manner that largest number of people benefit for the longest possible time without harming the natural or ecological balance.

timber, fuel wood, bamboo, resins, gums and leaves.

Forest Ranger: You know that they also support living organisms like animals, birds, insects and also many micro organisms.

Sheelan: Sir, it is said that forests are signs of prosperity.

Forest Ranger: Yes, Forests are of immense economic importance as they are a source of livelihood for many different human settlements as well as governments. They also provide timber and timber products which are a source of income for many people. They are habitats to diverse animal and plant species, they prevent soil erosion and help in maintaining the water cycle.

Hence it is important that we should conserve the existing forests covering the Himalayas, the Western and Eastern Ghats, and start establishing more National Parks and sanctuaries and maintaining properly the existing ones. Let us wander into the forest and explore its wonders.

All non-domesticated and non cultivated biota found in the natural habitat are termed wildlife.

Need for Conservation

- Wildlife is an asset to be protected and preserved because of its aesthetic, ecological, educational, historical and scientific values.
- Wildlife is essential for ecological balance.
- Wildlife is a big boost to tourism.
- The innumerable plants could yield products of immense medicinal value.
- Wildlife is an important source of genetic material used in genetic engineering.

India being a sub-tropical country, the temperature in most parts of the country is conducive to plant growth.

Based on this, the forests can be divided into five major types.

1. **Desert (Dry forests)** - Rajasthan, Southern parts of Punjab & Haryana
2. **Deciduous forests** - Peninsular region
3. **Tropical Evergreen forests** - Western Ghats, hilly areas in North Eastern India, The Sub Himalayan belt
4. **Hilly (mountainous) forests** - The Himalayas, Southern India
5. **Tidal forest** - Estuaries of Ganges & Mahanadi.

Plot or shade the different types of forests in India



- DESERT VEGETATION
- TROPICAL DECIDUOUS FOREST
- TROPICAL EVERGREEN FOREST
- MOUNTAIN FOREST
- TIDAL FOREST

2.2. DEFORESTATION AND AFFORESTATION

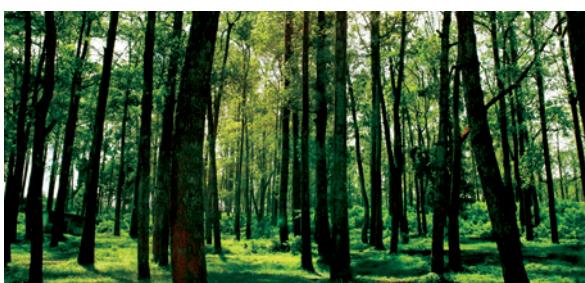
Selfish and anti-social elements have been destroying our natural wealth. Deforestation is one such dangerous act harming the ecological balance in the hilly areas.

The ill-effects of deforestation are reduced rainfall, change in climatic conditions, soil erosion and greenhouse effect (global warming). The process of planting new trees is called afforestation. This is generally done in deserts and open grounds to check the velocity of wind. How can people involve themselves in planting new trees?

Afforestation is aimed at two kinds of forestry programmes such as **social forestry** and **agro forestry**. In a locality, 'Tree lovers Club' can be started, and more people can be invited to join these clubs'. Tree saplings can be planted on the road side. Sapling can be gifted to friends on special occasions and celebrations.

Social Forestry

In India, the Social Forestry Project was started in 1976. Its aim is to promote natural forests and create forests on unused lands. Social forestry



AFFORESTATION

also aims at raising plantations by the common man so as to meet the growing demand for timber, fuel wood, fodder etc. thereby reducing the pressure on the traditional forest area.

Agro Forestry

Planting of trees in and around agricultural boundaries and on marginal, private lands, in combination with agricultural crops is known as agro-forestry. The land can be used to raise agricultural crops and trees and to rear animals.

MORE TO KNOW

Cutting down forests increases the amount of carbon dioxide in the atmosphere, which can affect climate and destroy homes of many animals and plants. Deforestation leads to soil erosion, irregular rainfall and global warming.

2.3. FLORA AND FAUNA

India has a large variety of plants, about 45,000 species in number. Of these

- Flowering plants - 15,000
- Algae - 1,676
- Lichens - 1,940
- Fungi - 12,480
- Gymnosperms-64



DEFORESTATION



Lion tailed monkey

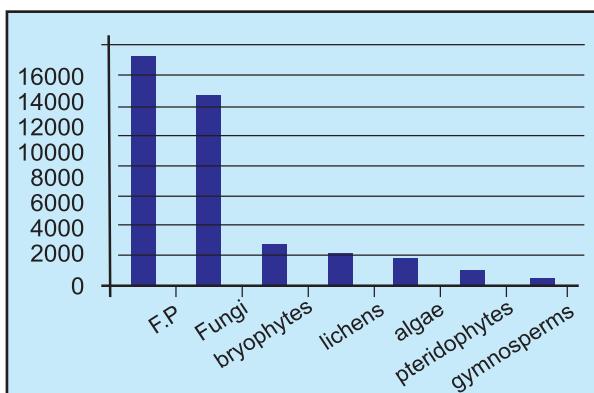
- Bryophytes - 2,843
- Pteridophytes - 1,012

India can be divided into eight distinct floristic regions.

India has a great variety of fauna numbering 81,251 species, which represent 6.67 % of the world's fauna. Of these,

- Insects - 60,000
- Mollusca - 5,000
- Mammals - 372
- Birds- 1,228
- Reptiles - 446
- Amphibians - 204
- Fishes - 2, 546

The Zoological Survey of India (ZSI) is responsible for carrying out surveys of the faunal resources of the country.



Deforestation refers to the indiscriminate cutting down of forest trees for use in wood-based industries (furniture making, paper, plywood) as domestic fuel and to accommodate agriculture and industries, in many parts of our country natural vegetation is being destroyed illegally.

ACTIVITY 2.1

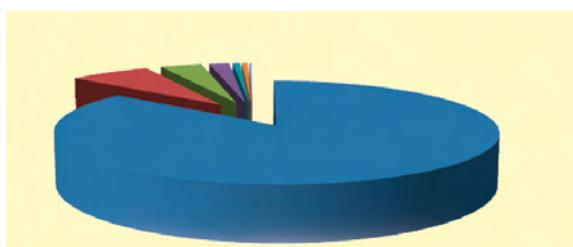
WE DO

- We identify the different plants in our school campus and label them with common names and botanical names.
- We grow medicinally important plants like *Acalypha indica* (Kuppaimeni), *Phyllanthus amarus* (Keezhanelli) etc. in the school garden.

2.4. ENDANGERED SPECIES

Why did animals begin to live on land?

The very earliest creatures lived in water. Then, plants began to grow on land. These provided a new source of food and some animals came away from water to the land. They developed lungs instead of gills for breathing.



Molluscs	Birds	Insects
Fishes	Reptiles	Mammals

The first to come on land were the amphibians.

How did the dinosaurs become extinct?

They are prehistoric animals and disappeared due to natural calamities. Their names are of Greek terms. The word dinosaur means ‘terrible lizard’

Today many species of animals are in danger of extinction. They include rhinos, whales, wolves, eagles and a few rain forest birds. Some are being killed for their horns, skins, bones or the land they live on. Others are being poisoned by man - made chemicals and are caught in traps. In ancient days, kings and high officials of Royal Britain hunted many wild animals. Today, poachers keep hunting the animals for their own benefits. Monal found in Himachal Pradesh is one of the most beautiful birds and it has been hunted to the level of extinction. Species that are less in number and are in considerable danger of becoming extinct are termed as **Endangered Species**.

There are many Projects which were

proposed by the Government of India, such as Project Tiger, Project Elephant, Operation Rhino, Gir Lion Project and the Crocodile Breeding Project.

“Project Tiger” The population of tigers (*Panthera tigris*) reduced from 40,000 to 1827 in 1972. On 1st, April 1973, Project Tiger was launched by the Government of India, it resulted in the increase of population of tiger.

“Project Elephant” Elephant is our National heritage animal. The population of the Indian elephant- *Elephas maximus*, is threatened due to habitat destruction and poaching for ivory. An ambitious programme “Project Elephant” was launched by the Ministry of Environment and Forests, which focuses on solving the problems of humans and elephants competing for the same habitat.

“Operation Rhino” Number of Indian rhinos or one horned Rhinoceroses (*R.unicornis*) are lost due to hunting and natural calamities. To protect the Indian species, a centrally sponsored

Due to deforestation and various causes, the populations of several species of plants and animals are at the verge of extinction and are considered endangered.



rehabilitation programme was undertaken in Dudhwa National Park.

“Lion Sanctuary” In 1972, a five year plan was proposed by the Government of Gujarat, to protect this magnificent feline species in the Gir Sanctuary. Its National Park and ecological balance of the habitat are properly protected. This has resulted in an increase in lion population.

Crocodile Breeding Project:

Crocodile Breeding and Management Project was launched by the Government of India in 1975 for all the three endangered crocodile species namely, the fresh water crocodile (*Crocodylus palustris*), saltwater crocodile (*Cricidylus porosus*) and the rare gharial (*Cravialis gangeticus*)



ACTIVITY 2.2

I DO

- If I find stray dogs disturbing the public, I inform the Blue cross and request them to take care of the dogs.

2.5. RED DATA BOOK

It is a record book. The International Union for Conservation of Nature and Natural Resources (IUCN) maintains the Red Data Book. The Red Data Book contains a record of animals which are identified as endangered species or animals which are on the verge of extinction.

In India, animals like the Indian one - horned Rhino, Nilgiri Tahr, Lion - tailed Macaque, Asiatic Lion, Indian Tiger, Olive Ridley turtle and birds like Hornbill, Monal, Great Indian Bustard, and Pheasant are on the verge of extinction.

MORE TO KNOW

NGC (National Green Corps) of the Ministry of Environment and Forests, Government of India.

National Animal - Tiger

National Bird - Peacock

National Flower - Lotus

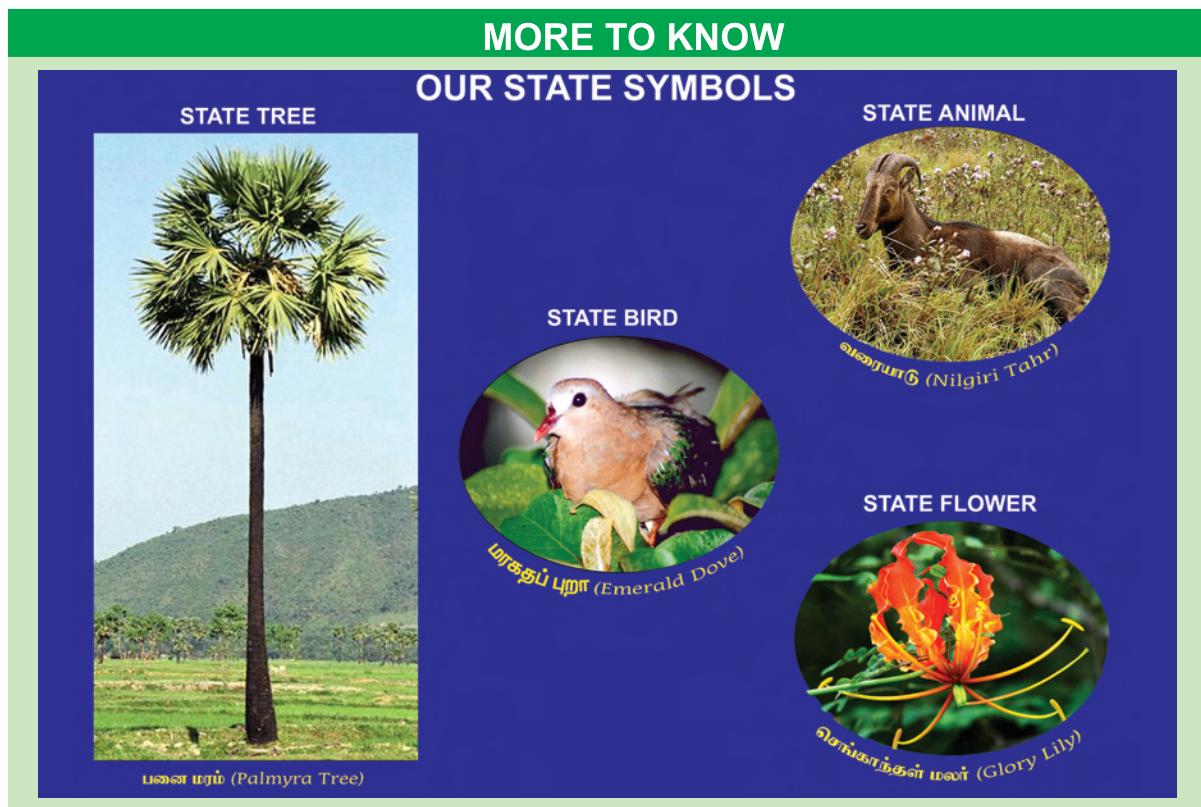
National Fruit - Mango

National Tree - Banyan tree

National Heritage Animal- Elephant

Lion, Tiger, Leopard, Snow leopard and Clouded leopard are found in India. Cheetahs became extinct in the 1950s.

The breeding area of the famous Olive Ridley's turtle is the Coast of Odisha while the Hawksbill Turtle is on the Coast of Tamil Nadu.



2.6. MIGRATION

All animals have an instinctive perception of the changes in temperature and just as people seek or spend their summer in cool places and their winter in warm places, all animals that can do so, shift their habitat in various seasons

ARISTOTLE, 384 – 322 B.C, History of animals

Aristotle recognized the seasonal movements of animals 2000 years ago. Migration is the phenomenon of the movement of animals from their habitat to some other habitat for a particular time or period every year for a specific function like safe breeding. The Vedanthangal Bird Sanctuary is one of the most spectacular breeding grounds in India. This Sanctuary has been protected by the local people for

over 250 years. **Vedanthangal** is a home for migratory birds such as pintail, garganey, grey wagtail, blue-winged tail, common sandpiper and other birds.

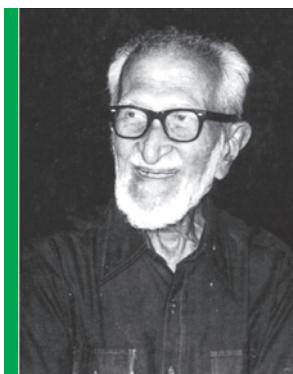
Navigation Databanks of Migratory Birds

Each year as the days shorten and the food supply dwindles, many bird species prepare themselves for a long flight to warmer and more congenial



Migration of birds

climates. Then one day, driven by deep ancestral urges, they set out for unknown destinations. For example, the swallows of Northern Europe may fly 6800 miles (11,000 km) or so, to their African wintering grounds. When they move in groups they are protected from their predators. Many birds that migrate may be sensitive, to variations that occur in the earth's magnetic field. With the help of that, they find their destinations. Racing pigeons find their way home only by this method.



Dr. Salim Ali
(1896 – 1987)

Ornithologist,
known as
“the bird man
of India”

MORE TO KNOW



When a swarm of desert locust is on the move (a single swarm is about 50,000 million) it eats 3000 tons of vegetation in one day.

- The salmon fish travel up to 1500 miles (2400 km) from the sea to fresh water for breeding. Most of them die after breeding due to exhaustion.
- The Brazilian turtles travel up to 1250 miles (2000 km) in eight weeks time for breeding
- Barren grounds Caribou of North America travel over 3700 miles (5000 km) the longest annual migration of any mammal

*Migration of turtle*

2.7. WILD LIFE SANCTUARY AND NATIONAL PARKS

Why do herds of elephants enter the villages ?

It is not the herd of wild elephants that enter the village, or field etc. Humans have occupied their habitat (territory).

The Government has taken many steps to protect wild life by creating Sanctuaries and National Parks.

Sanctuaries : Sanctuaries are places where the animals are well protected from any danger. Hunting or capturing is highly prohibited there. In our country there are about 500 sanctuaries. One of the most important missions of sanctuaries, beyond caring for the animals is educating the people. The individuals should be educated about the importance of animals so that the

animals can be protected, and a good ecological balance can be maintained.

Bio-diversity Loss

Loss of bio-diversity occurs when either the habitat essential for the survival of a species is destroyed or a particular species is destroyed. The former is more common. The latter reason is encountered when particular species are exploited for economical gain and hunted for sports or food.

*Peacock*

Conservation of Plants and Animals

The main objectives and advantages of bio-diversity conservation are as follows:

- To preserve the continuity of food chain.
- The genetic diversity of plants and animals is preserved.

- It provides immediate benefits to the society such as recreation and tourism.
- It ensures the sustainable utilization of life supporting systems on earth.

Some important Sanctuaries in Tamilnadu

S.No	NAME OF THE SANCTUARY / LOCATION	ANIMALS
1.	Mundanthurai and Kalakkadu Sanctuary-Tirunelveli	Lion-tailed monkey, Tiger
2.	Srivilliputtur sanctuary - Virudhunagar	Grizzled squirrel, Barking Deer
3.	Vedanthangal sanctuary - Kancheepuram	Cormorants, Grey Heron
4.	Mudhumalai sanctuary - The Nilgiris	Elephants, Gaur, Langur
5.	Viralimalai sanctuary - Tiruchirappalli	Wild Peacocks
6.	Kodikkarai sanctuary - Nagapattinam	Chital, Wild Bear

NATIONAL PARKS: National Park is an area dedicated to protect the environment, the natural objects and the wild life there in. Many National Parks were initially wild life sanctuaries. There are about 89 National Parks in India.

Some important National Parks in India

Name and Location	Important Species
1. Bandipur National Park, Mysore - Karnataka	elephant, panther, barking deer, tiger, sambar.
2. Corbett National Park, Garhwal - Uttarpradesh	four horned antelope, elephant, chital, tiger, nilgai.
3. Gir National Park, Junagarh - Gujarat	Asiatic lion, panther, nilgai wild boar, chinkara.
4. Kaziranga National Park, Jorhat - Assam	elephant, one horned rhinoceros, wild buffalo, tiger, leopard.
5. Periyar Sanctuary, Idukki - Kerala	elephant, chital, nilgai, sambar, tiger, barking deer.

ACTIVITY 2.3

WE OBSERVE

We try to have a pet corner at school so that an awareness about the love and care of animals is created among students. eg. aquarium, birds.

2.8. THREATS TO BIO-DIVERSITY

Currently bio-diversity is estimated to range from 10 to 100 million species, of which only 1.4 million have been formally catalogued. There are 12 mega diversity centres in the world. India is one among them. Diversity among the living organisms is known as Bio-diversity. The bio-diversity of the earth is unimaginable.

The natural causes for the loss of bio-diversity are floods, earthquakes, landslides, natural competition between species, lack of pollination and diseases.

At the same time, man is the only cause for the loss of bio-diversity. Destruction of habitats occurs in the wake of developmental activities like

housing, agriculture, construction of dams, reservoirs, roads, railway tracks etc. These developmental activities affects bio-diversity.

Even the loss of a single species is a tragedy, because each form of life is a storehouse of irreplaceable genetic resources. Extinction is an irreversible process and when a species becomes extinct it leads to a cascade of extinctions.

All life on earth is interdependent and man is only a strand in this delicate web of relationships.

We keep rapidly eliminating the conditions necessary for the continued existence of bio-diversity due to over exploitation and ignorance.

Nature Big Cats of India

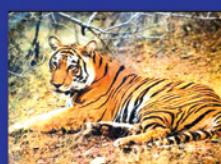
Tigers and lions belong to the cat family. They are commonly known as "Big Cats".

India is the only country having 5 species of big cats in its forests.

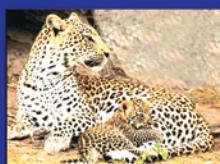
But, we should have, had six. Unfortunately, Cheetahs became extinct in 1950s



Lion



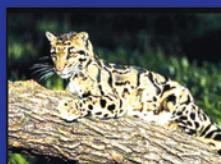
Tiger



Leopard



Snow Leopard



Clouded Leopard

No other country has this diversity.
But have you realized its significance ?

2.9. TRADITIONAL KNOWLEDGE & PEOPLE'S INITIATIVES IN BIO-DIVERSITY

Sacred grove

These are the tracts of forests that are communally protected. As they have a temple or a deity pertaining to a particular forest, conservation of the sacred grove is of high priority and the whole community is involved in it. Tradition of tree worship (to protect) is observed all over India.

Worship of the species varies according to community, region, as well as use value as per availability. Because of traditions these species are protected. Traditional practices still followed by the tribals do not commercialize forest products and they never exploit them in an unsustainable manner.

Traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural value beliefs and rituals including the development of plant species and animal breeds.

Sheelan: Thank you, sir. I have gained a lot of knowledge about the importance of conserving our forests, I promise to spread this awareness to my friends and others.

ACTIVITY 2.4

I DO

- I present a sapling to the school on my birthday.
- I grow new plants in the empty places near my surroundings including the space inside my house and on the terrace of my house too.



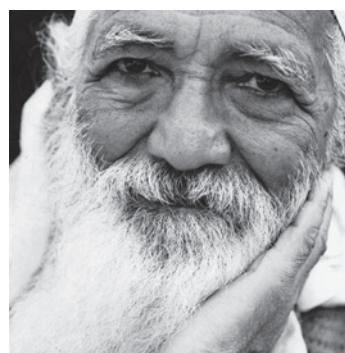
Sacred grove

2.10. HUMAN WILD LIFE CONFLICTS

It is a well known fact that man has been the sole creature responsible for the destruction of a large number of habitats, by over population, crowding, over exploitation etc. As human population keeps on increasing, we move into the forest land and occupy the habitats of plants and animals. So conflicts arise between the animals and man. Animals like elephants, wild buffaloes, and tigers come in groups to the farmlands for food and water and destroy them. Human beings encroach their lands for their benefits. So the animals are not to be blamed.

Protecting the environment is every one's responsibility. There is an increased awareness among the people towards the conservation of ecologically sensitive areas. Green Peace – a group devoted to environmental protection was responsible for the ban on whaling. In India, the Chipko movement was initiated by Sunderlal Bahuguna who stopped the felling of trees in some parts of the Himalayas.

Some of the activities in the areas of environmental conservation include:



Sunderlal Bahuguna

- Holding rallies and marches to bring about a mass awakening to environmental issues.
- Spreading awareness through mass media.
- Introducing environmental legislation to tackle the issue.



ACTIVITY 2.5

I DO

1. I list the factories disturbing the bio-diversity of my area. Some of these factories and human activities may disturb bio-diversity unknowingly. I list these human activities and analyse how these can be checked.
2. I find the endemic (confined to my area alone) plants and animals of the region where I live, and I specify how many varieties are very rare.

EVALUATION

1. Choose the best answer:

- a. Species with low population numbers that are in considerable danger of elimination are termed as _____ (endangered species / extinct)
 - b. All non-domesticated and non-cultivated biota in the natural environment are termed _____ (wildlife / ordinary life)
 - c. The natural vegetation in a particular area is termed as _____ (flora / forest)
 - d. All the organisms of the animal kingdom are termed as _____ (fauna / protozoans)
 - e. The word 'dinosaur' means _____ (terrible lizard / dragon lizard)
2. In India, Social Forestry was started in 1976. Its aim is to promote natural forests and create man made forests on unused lands. Suggest some steps to convert a sterile land into a cultivable one.
 3. Wildlife is essential for ecological balance and is a big attraction to tourism. Support the statement with your suggestions.
 4. People tried several methods to keep wild animals away from the fields and villages. Power fences were erected around the fields against animals. Is it a healthy practice? Do you have any alternative that would help both animals and man?
 5. Planting trees is known as afforestation and cutting down trees is deforestation. Is there any permanent solution to the problem of deforestation?
 6. Deforestation leads to many changes in the following but they are not in the right order. Arrange them in proper sequence.
 - a) Earth b) cities (urban area) c) environment d) wild animals
 - e) villages f) rural areas g) the next generation

7. What will happen if
 - a. we go on cutting down trees?
 - b. the habitat of an animal is disturbed ?
 - c. the top layer of the soil is exposed ?
8. Indiscriminate cutting of trees will lead to deforestation. How does it reduce rainfall on the one hand and lead to floods on the other hand?

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3. COAL AND PETROLEUM

Do you know Ram? He is my neighbour who is studying in 8th standard. He goes to school by bicycle. His father goes to office by car. His brother goes to college by bus. Ram's family cooks food using a gas stove.

What are the fuels used in the various modes of transport and for cooking by Ram's family in the above activity? Car uses petrol and the bus uses diesel for cooking LPG (Liquefied Petroleum Gas)

ACTIVITY 3.1	I DO
I tabulate the vehicles that use (i) Manpower (ii) Fuel	
   	
   	

Manpower	Fuel

Fuels

“Substances that burn in air to give heat energy are called fuels”

Fossil Fuels

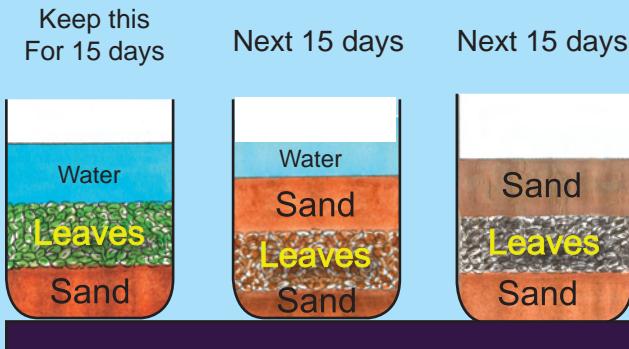
Fossil fuels are formed from the buried remains of decayed plants and animals over millions of years, under the influence of heat and pressure in the absence of air. Coal, petroleum and natural gas are called fossil fuels.

ACTIVITY 3.2**I DO**

I need : a glass beaker, sand, water, leaves, twigs pieces of fern

Procedure :

- ◆ I take a glass beaker and I spread two inches of sand at the bottom. I pour some water and drop leaves, twigs and pieces of fern on the sand.
- ◆ I allow it to stand for two weeks. I note down the change in colour after two weeks. Now I gently put some sand on the top of the plant layer to a depth of two inches.
- ◆ I wait for two more weeks and drain the water. Again I allow it to dry for another two weeks.
- ◆ I can see the fossil imprint between the sand layers.

**3.1. COAL****Occurrence of coal**

Coal mining was started in India in 1774. India now ranks third among the coal producing countries in the world. USA and China have $\frac{2}{3}$ of the world's coal reserve.

Three hundred million years ago, some plants grew into giant

ferns and mosses. These plants got buried into the bottom of the soil and were converted as fossil due to high temperature and pressure. The decaying plants were pressed and coal was formed. As coal contains mainly carbon, the slow process of conversion of dead vegetation into coal is called **carbonisation**.



MORE TO KNOW

- Coal would have a higher sulphur content if it was formed in swamps covered by sea water.
- Combustion is caused by the chemical reaction of hydrocarbon with oxygen. When ignited, the fuel molecules are broken down and release heat energy.

COMPOSITION OF COAL:

Coal is a natural black mineral, which is a mixture of free carbon and compounds of carbon containing hydrogen, oxygen, nitrogen and sulphur.

3.1.1. Types Of Coal

On the basis of carbon content, coal is classified into the following types:

1. PEAT: Peat is the first stage of coal. It is the most inferior variety of coal which contains 10-15% of carbon. When it is burnt, it produces a lot of smoke.

4. ANTHRACITE COAL: It is also called hard coal. It is one of the most superior variety. It contains 87-97% carbon. It produces high heat energy.



2. LIGNITE: Lignite is brown in colour. It contains 25-35% of carbon. Like peat it also produces a lot of smoke on being ignited. It can be used for power generation.

3. BITUMINOUS COAL: It is also called soft coal. It contains 45-86% of carbon. It is used as a common household fuel and industrial fuel.

3.1.2 Destructive distillation of coal

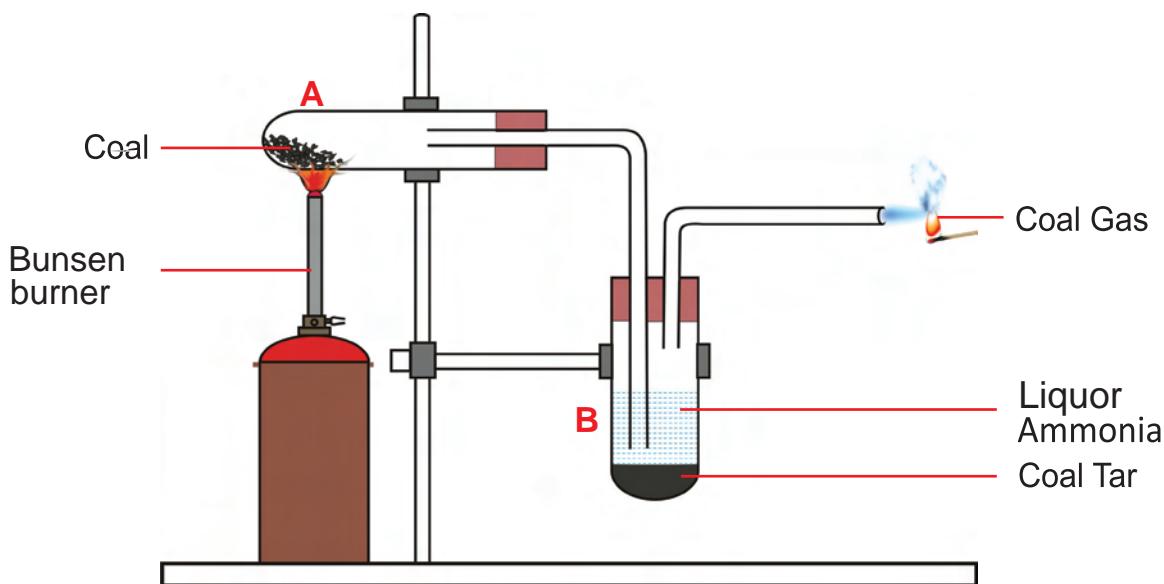
Heating coal in the absence of air is called destructive distillation of coal.

ACTIVITY 3.3

WE OBSERVE

We need: Powdered coal, two boiling tubes, two delivery tubes, a Bunsen burner, a one holed rubber cork, a two holed rubber cork and some water.

Procedure: Two boiling tubes are taken powdered coal is taken in tube 'A', and water is taken in tube 'B'. The apparatus is arranged as shown in the figure. Tube 'A' is heated first gently and then strongly using Bunsen burner. Now what do we observe?



1. A gas escapes through the delivery tube from the test tube B. On ignition the gas _____. This shows that the gas liberated is coal gas.
2. We can see a _____ coloured residue at the bottom of the test tube B. That black residue is coal tar.
3. Now, we take out the liquid present above the coal tar and test it with red litmus paper. Since the liquid turns red litmus paper to _____, it is basic. We smell the liquid, it has a pungent irritating smell. Hence, the liquid obtained is liquor ammonia.
4. We observe a _____ residue in the tube A. The residue is coke.

Our findings: When coal is subjected to destructive distillation it gives coal gas, liquor ammonia, coal tar and coke.

Products of coal and their uses

Products of coal	Uses
Coal Gas	As a fuel in cooking food
LiquorAmmonia	To make fertilizers
Coal Tar	To make plastics, paints, dyes,naphthalene balls and explosives
Coke	As a fuel and as a reducing agent in steel manufacturing

Consumption of Coal : The coal that we consume in one day is what the earth took 1000 years to form. The amount of coal we consume is greater than the amount that we produce.

3.2. PETROLEUM

Millions of years ago, dead plants and animals were buried at the bottom of the sea. They got covered with layers of sand and clay. Due to high pressure and temperature, they transformed into petroleum.

3.2.1. Occurrence of Petroleum

The chief petroleum producing countries are U.S.A Kuwait, Iraq, Iran, Russia and Mexico. In India, petroleum is found in Assam, Gujarat, Maharashtra(Mumbai), Andhra Pradesh (Godavari and Krishna basin) and Tamil Nadu (Cauveri Basins). Petroleum is obtained by drilling through the earth. The crude oil is pumped out from the well as a black liquid.

3.2.2 Refining of crude petroleum

Petroleum is a mixture of various constituents such as petroleum gas, petrol, diesel, kerosene, lubricating oil, paraffin wax, etc. The process of separation of the various constituents or fractions of petroleum by fractional distillation in fractionating columns is known as refining of petroleum. The

MORE TO KNOW

On destructive distillation, 1000 kg of coal gives

- 700 kg of coke
- 100 litres of ammonia
- 50 litres of coal tar
- 400 m³ of coal gas

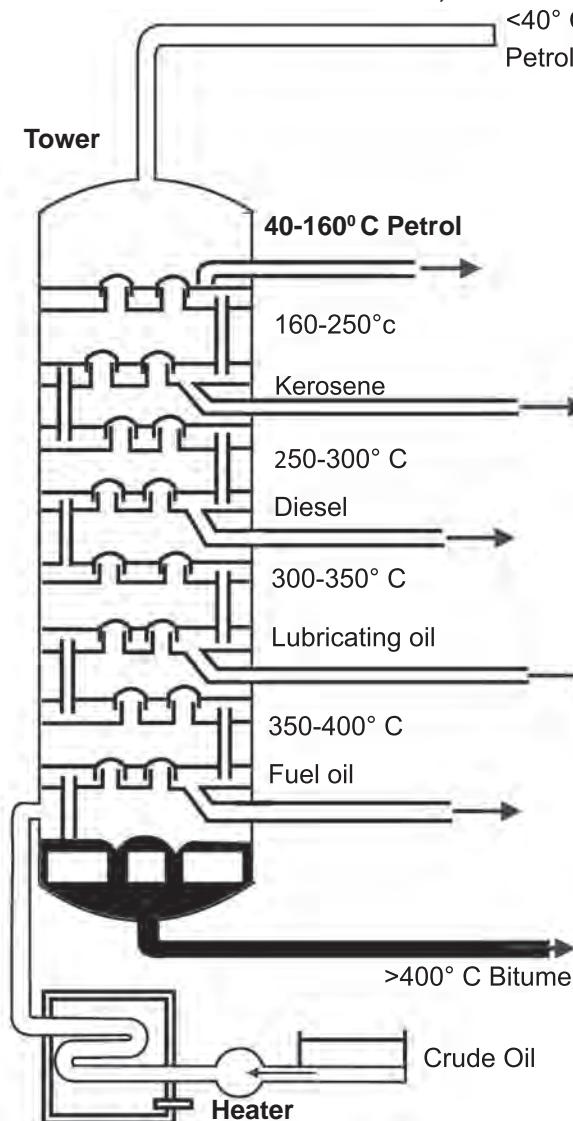
- The world's first petroleum well was drilled in Pennsylvania, USA(1859.)
- Eight years later in 1867, oil was struck at Makum in Assam



Coal and petroleum

process of heating a mixture of liquids having different boiling points and then separating them by cooling is called fractional distillation.

Crude petroleum is first heated to about 400°C in a furnace. As the vapours of crude oil move up the tower, the various fractions condense according to their boiling point ranges. The various fractions of petroleum obtained are tabulated below:



Fraction	Uses
Petroleum Gas	Fuel for home (LPG)
Petrol	Motor fuel
Kerosene	Fuel for stove and jet aircrafts
Diesel	Fuel for heavy motor vehicles
Lubricating oil	Lubrication
Fuel Oil	Fuel for Power Stations and Ship
Paraffin wax	Candles, Vaseline
Bitumen	Paints, Road surfacing

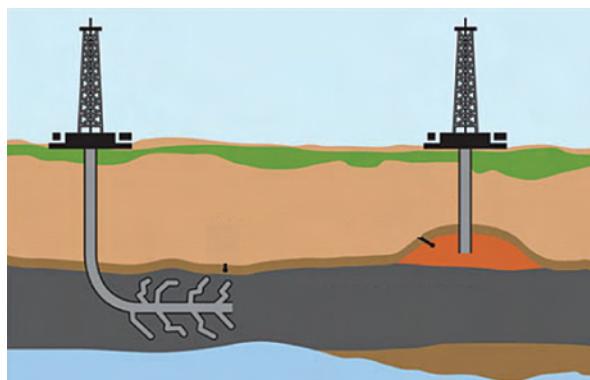
MORE TO KNOW

Many useful substances are obtained from petroleum and natural gas. These are termed 'Petrochemicals'. These are used in the manufacture of detergents, fibres, and other man-made plastics like polythene. Hydrogen gas obtained from natural gas, is used in the production of fertilizers. Due to its great commercial importance, petroleum is also called 'black gold'.

MORE TO KNOW

If we use petroleum rapidly as we do now, in the year 2,050 there may be no petroleum at all.

3.3. NATURAL GAS



Manali

Formation of Natural gas

Natural gas is formed whenever vegetation decomposes in marshy areas and waste sewages. It also occurs in coal mines and petroleum wells. It mainly contains 90% methane.



Neyveli

3.3.1. Occurrence

Naturalgas in Tripura, Rajasthan, Maharashtra, Andhra pradesh (Krishna, Godavari Basins) and Tamilnadu (Cauveri Delta.)

ACTIVITY 3.4

I need : A glass bottle, leaves, twigs, waste paper and saw dust

Procedure: I take a glass bottle and put some leaves, twigs, waste paper and saw-dust in it. I pour some water in it and keep it for 20 days. I open the bottle and bring a glowing splinter near the mouth. I can see a gas burning near the mouth.

My finding: The burning gas is due to the evolution of natural gas.



The way of using natural gas

1. CNG (Compressed Natural Gas)
2. LNG (Liquified Natural Gas)

CNG is stored at high pressure whereas LNG is in ultra cold liquid form. CNG can be produced at lower cost.

Advantages and uses of CNG

1. It is a less pollutant fuel.
2. It is directly used as fuel for burning at home and factories.
3. It is the basic material for the manufacture of a number of chemicals and fertilizers.

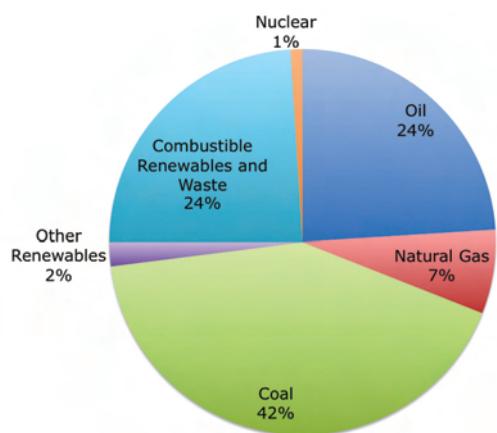
3.4. NATURAL RESOURCES AND LIMITATION

The natural resources in the world have been used by man in a rapid way and so very soon all our exhaustible sources like coal, petroleum and natural gas would be reduced to zero level. So we need to find new alternative sources of energy.

Natural Resources	Lasting period
Coal	148 years
Petroleum	40 years
Natural Gas	61 years

3.4.1. Alternative sources of energy

1. Biodiesel : Biodiesel is a fuel obtained from vegetable oils such as Soyabean oil, Jatropha oil, Cornoil, Sunflower Oil, Cotton seed oil, Rice bran oil and Rubber seed oil.



Energy sources in usage

Not for fun

- ◆ My father rode on a cart.
- ◆ I drive a car.
- ◆ My son flies a jet plane. His son will ride on a cart.

2. Wind Mills : All of you might have seen wind mills. They have long blades connected to a dynamo. When wind blows, they rotate and current is produced in the dynamo. Wind mills are mostly located at Kayathar, Aralvaimozhi, Palladam and Kudimangalam in TamilNadu.



3. Solar Energy : Sun is the foremost energy source that makes life possible on our earth. Solar energy has been used by man from ancient times. Solar energy is harnessed using (i) solar cookers (ii) solar water heaters (iii) solar cells.



4. Gobar Gas: Gobar gas is obtained by the fermentation of cow dung in the absence of air (anaerobic conditions). It mainly contains methane and a little ethane. It is widely used in rural areas for cooking and operating engines.

3.5. SCIENCE TODAY

3.5.1. Hydrogen - The future fuel

Hydrogen could be the best alternative fuel. It is a clean fuel as it gives out only water while burning. Moreover, it has the highest energy content. It does not pollute air.

3.5.2. Cold Fusion Process

Nuclear fusion is a process in which two or more lighter nuclei of atoms are combined to produce

nuclear energy. This process requires very high temperature. If the nuclear fusion process is carried out at room temperature, it is called as cold fusion process.

3.5.3 Methane from sewage

Sewage sludge can be decomposed by microorganisms to produce methane gas along with impurities like carbon dioxide and hydrogen sulphide. After removing these impurities, methane gas can be used as an efficient fuel.

MORE TO KNOW

In India, the Petroleum Conservation Research Association(PCRA) advises people with methods of saving petrol/diesel while driving.

Some tips:

- Drive at a constant and moderate speed as far as possible.
- Switch off the engine at traffic signals or at places where you have to wait.
- Ensure correct tyre pressure.
- Ensure regular maintenance of the vehicle.



“Today’s wastage - tomorrow’s shortage”

**“A mile we walk
we save a litre of petrol
and
a day of life”**

EVALUATION

I. Choose the correct answer :

1. Which type of coal has high content of carbon?
a) lignite b) peat c) bituminous coal d) anthracite coal
2. Which type of coal is used in the household?
a) lignite b) peat c) bituminous coal d) anthracite coal
3. Naphthalene ball is obtained from
a) coal gas b) coke c) coal tar d) liquor ammonia
4. Fuel that is used in jet air craft
a) petrol b) petroleum gas c) kerosene d) diesel
5. Which of these is a fossil fuel?
a) wood b) paper c) petroleum d) phosphorus

II. Fill in the blanks:

1. The expansion of LPG is _____.
2. LPG is stored in _____ form in the gas cylinder.
3. The expansion of CNG is _____.
4. The chief element in coal is _____.
5. Natural gas contains mainly _____.
6. Heating in the absence of air is called _____.
7. _____ is the primary source of energy.
8. The coal obtained in Neyveli is _____.
9. The process of separating individual liquids, from the mixture of liquids which differ in their boiling point is called _____.
10. _____ is used as a reducing agent in steel manufacturing.

III. Answer the following :

1. Ram's family cooks food quickly as they use LPG gas. Murugan's family takes a longer time to cook food. What could be the reason?
2. Find the relevant pair :
 - a) Coal - coal gas; then **petroleum** - _____
 - b) LPG - propane and butane; then **natural gas** - _____
 - c) Diesel - petroleum; then **bio-diesel** - _____
3. Read the following tabular column carefully and decide which fuel we should use for cooking.

Wood	L.P. Gas
Smoke is produced	Smoke is not produced
Has low calorific value	Has high calorific value
It takes a long time to cook	It takes less time to cook
Ashes are formed	Ashes are not formed

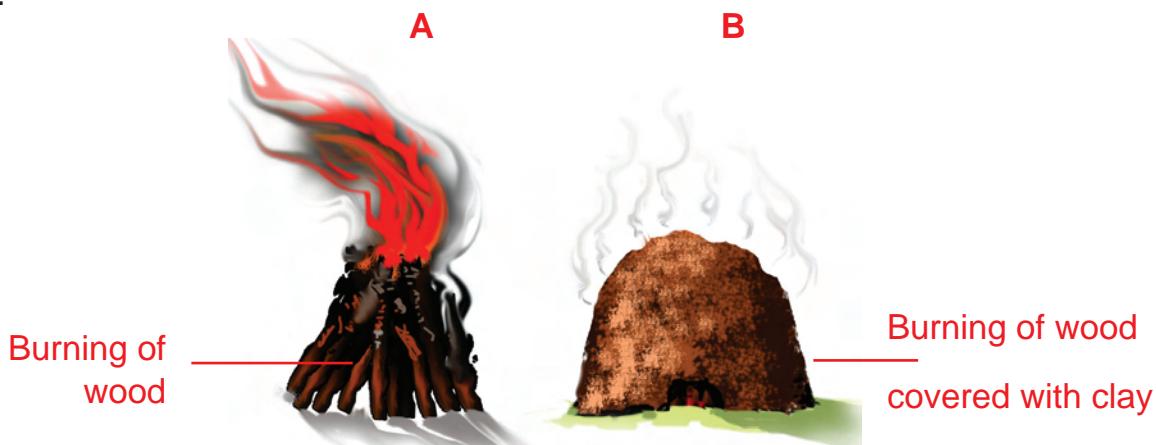
4. What do you understand by the term carbonisation?
5. Point out the difference between coal and coke.
6. Distinguish between petroleum and petrol.
7. The boiling point of three components A, B and C of petroleum are 120°C, 70°C, 250°C respectively. If a mixture of these three is fractionally distilled, which of these will be obtained at the bottom of the distillation column?
8. Coal, petrol, diesel and LPG are the fuels used by us now. If they are harnessed completely we would be running short of fuels for cooking and using vehicles and working of factories in our near future. So, we need alternative sources of energy. As a young scientist suggest a source of alternative energy.
9. Types of coal and the percentage of carbon in each type is given below. Which type should be used to get high heat energy?

Lignite	-	25 to 35% carbon
Bituminous	-	45 to 86% carbon
Anthracite	-	87 to 97% carbon

IV. Explore:

- Countries like Dubai, Saudi Arabia, Abu Dhabi etc. have become very rich in recent years. What could be the reason?
- Why do millions of people turn off their lights on Earth Hour at 8.30pm (20:30 local time) on the last Saturday of March every year ?
-

3.



In 'A' we get only ashes whereas in 'B' we get charcoal. Give reason.

- You might have read news items such as the one given below.

Worker dies in septic tank, court ban flouted again

Daniel P George | TNM

Chennai: A 29-year-old man died after inhaling toxic fumes while cleaning a septic tank in a house at Adambakkam on Thursday morning. This is the fourth death of workers involved in manual scavenging, which has been banned by the Madras high court, in the city.

out masks or any safety gear. Though the government claims it has abolished scavenging, the practice continues. "The drainage system should be redesigned and people should be prevented from disposing plastic waste in sewage lines," said Narayanan. "If these steps are taken, workers will not have to enter man-

What is the reason for the tragedy? List out the precautionary measures.

- Workers in coal mines use battery operated torch lights instead of lanterns. Find out the reason for doing so.
- If we identify the leakage of LPG in our kitchen, what measures should we take? (make use of the nearest gas dealer)
- LPG can be lit with a gas lighter whereas wood can not be lit using a gas lighter, why is it so?

V. Field Trip :

- Pay a visit to the Neyveli coal mine.
- Pay a visit to the Manali Petroleum Refineries(CPCL).

VI. Choose any one of the following projects that you like most. Complete the project and submit it for FA(a)

1. Collect various petroleum products and display them in your class. (any five)
2. Prepare posters regarding the importance of alternative energy sources. (any two)
3. Prepare slogans for spreading awareness of saving fuel.(any five)
4. Construct a working model of a windmill (Group work).
5. Explore the constituents present in coal gas, producer gas and water gas and find their applications by referring to books or by browsing the internet.
6. Find out the consumption of petrol/diesel/CNG/LPG/kerosene and electricity in your house. Calculate your monthly household expenditure on fuel and electricity. Suggest to your family the measures to be taken to conserve energy.
7. Find out the different types of petrol and diesel that are available at the petrol bunk. What is the composition of each product? Is there any difference in the price of these products ?

FURTHER REFERENCE

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Webliography

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www.bbc.co.uk/schools/gsce bitesize/physics/energy/energy_resources

4. LIGHT AND SOUND

INTRODUCTION

Meera and her friends were enjoying themselves on a picnic. They had a wonderful time visiting new places. Suddenly Meera felt a flash of light falling on her face. Where did that light come from? She looked around and saw her friend holding a mirror in her hand and the light seemed to be coming from the mirror.

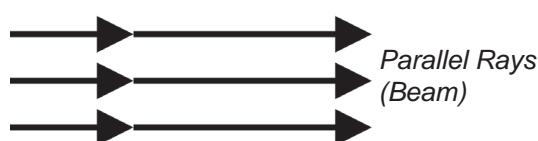
Her friend explained that she was directing the sun's rays to Meera's face with the help of the mirror.

Reflection of Light

The bouncing of light from the surface of a body is known as **reflection**. Everything that is around us is seen with our eyes because of the phenomenon of reflection of light.

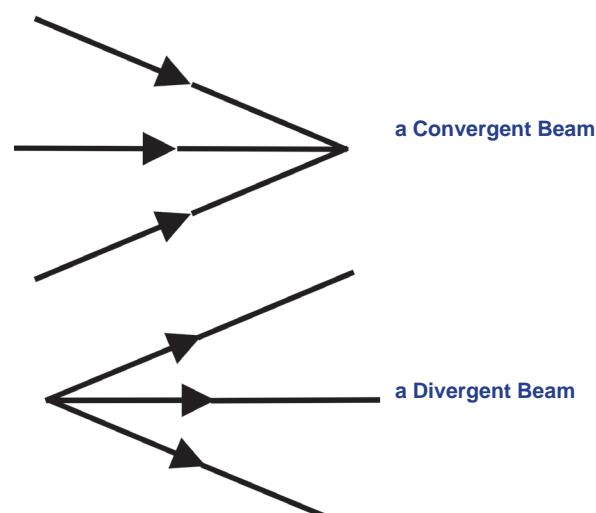


a Ray



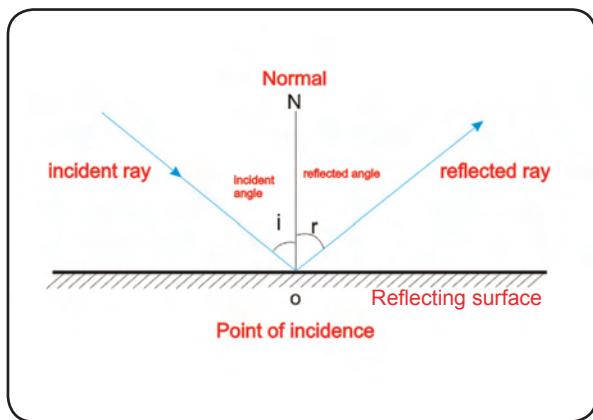
Parallel Rays
(Beam)

Light travels along a straight line. The path taken by the light is known as a ray and is represented by a straight line with an arrow mark. The arrow mark denotes the direction of the light.



Two or more rays form a beam. When the rays are parallel, it is known as **parallel beam**.

If the rays meet at a point (converge), they form a **convergent beam**. If the rays move away from a point it is called as **divergent beam**.



A light ray which strikes the surface is called an **incident ray**.

The light ray that comes out from the reflecting surface after reflection is called **a reflected ray**.

The perpendicular line drawn to the surface at the point of incidence is called a **normal**.

The angle between the incident ray and the normal at the point of incidence is called the **angle of incidence (i)**.

The angle between the reflected ray and the normal drawn from the point of incidence is called the **angle of reflection (r)**.

ACTIVITY 4.1

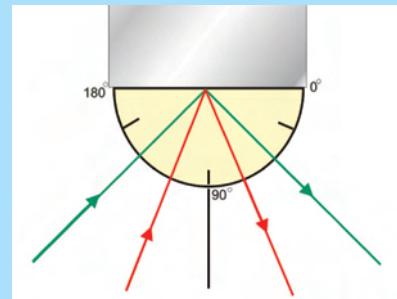
I DO

I need : Drawing sheet, a protractor, a plane mirror, torch light.

procedure :

I arrange the drawing sheet, protractor and a plane mirror as shown in the diagram.

- ◆ Using the protractor I draw a normal at a point.
- ◆ Then I draw the number of lines at different angles.
- ◆ From the torch light, I make a ray of light to pass along a line and draw the path of the reflected ray. I measure the angle of reflection.
- ◆ I repeat the experiment for different angles of incidence and I measure the corresponding angle of reflection and tabulate the measures.



S.No	$\angle i$	$\angle r$

My finding: _____

Inference

1. The incident ray, the normal and the reflected ray lie in the same paper plane.
2. The angle of incidence = the angle of reflection.

4.1. LAWS OF REFLECTION

1. The incident ray, the reflected ray and the normal to the surface at the point of incidence lie in the same plane.
2. The angle of incidence is equal to the angle of reflection.

$$\boxed{i} = \boxed{r}$$

ACTIVITY 4.2**WE DO**

We need : wood, window panes, table tops, polished granite surfaces, paper.

procedure :

- ◆ Let us look ourselves through the surface of all these objects.

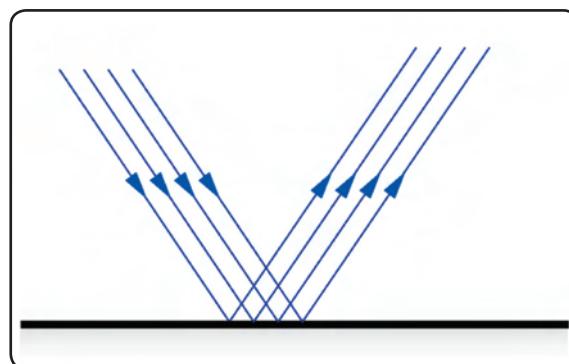
My finding :

From this activity, We see that we can see our face clearly in the polished surfaces and not very clearly in the rough surfaces.

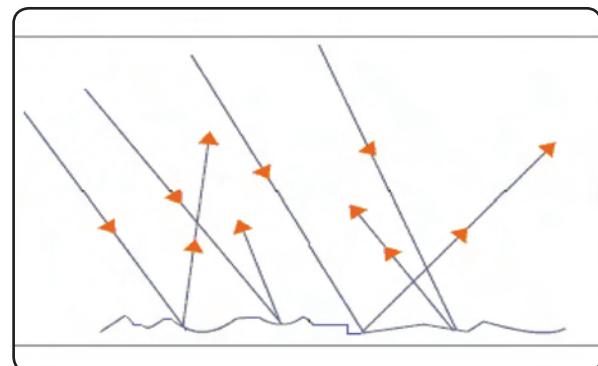
4.1.1. Regular and Irregular Reflections

Reflection from a polished surface is called **Regular reflection**.

Reflection from a rough (unpolished) surface is called **irregular or diffused reflection**.



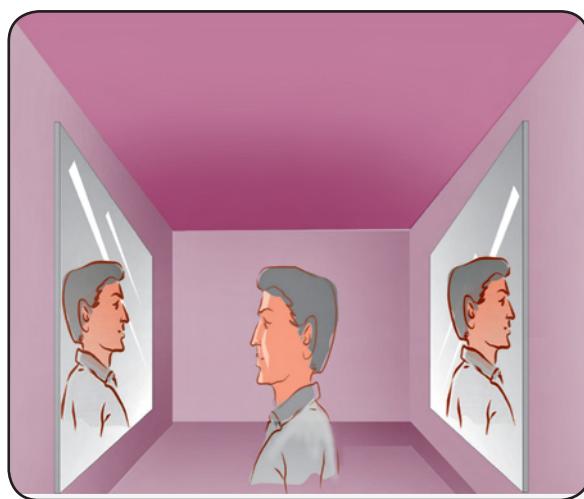
In the case of a rough surface, light is not reflected in one direction, it is scattered in all directions. This is called a diffused or irregular reflection.



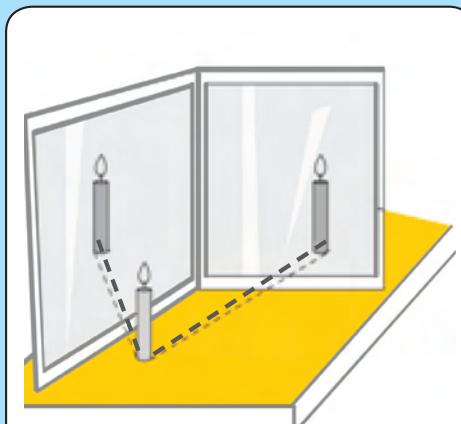
4.1.2. Multiple reflection

When we enter into a jewellery shop, a barber's shop, a hotel or a bakery, can we see a number of images in the mirror?

How does this happen? It is just a trick using the mirror.



ACTIVITY 4.3



Multiple reflections and
Multiple Images

The mirrors are arranged at a particular angle so as to get the maximum number of images. Have you ever tried to look at the back of your head in a mirror? Two plane mirrors are needed to see the back of our head as shown in the figure. This is due to multiple reflection.

4.1.3. Multiple Images

We are aware that a plane mirror forms only a single image of an object.

But two or more mirrors are arranged to form number of images of an object. These are called Multiple Images.

I DO

I need : plane mirrors, a candle.

procedure :

- ◆ I keep a burning candle before a plane mirror.
- ◆ I hold another plane mirror at an angle to the first mirror. Then I count the number of images formed.
- ◆ I do the same by keeping the mirrors at different angles and I count the number of images formed.

ACTIVITY 4.4**WE DO**

We need : two mirrors, cellophane tape.

procedure :

- ◆ We form five different groups. Each group is provided with two mirrors.
- ◆ By using cellophane tape, we fix the mirror at a particular angle say 30° .
- ◆ Then we place the object in between the mirrors and we count the number of images formed.
- ◆ We repeat the experiment for different angles and in each case we count the number of images formed.
- ◆ We complete the table by observing the number of images formed.

Angle	Number of images
30°	
45°	
60°	
90°	

A relation between the number of images and the angle between the mirrors.

$$\text{Number of images} = \frac{360^\circ}{\text{angle}} - 1$$

When the mirrors are placed parallel to each other, the maximum number of images will be formed.

Multiple reflection principle is applied in the kaleidoscope and periscope.

ACTIVITY 4.5 (A GARDEN IN A CHALK BOX)**I DO**

I need : Card board box, plane mirrors, flowers.

procedure :

- ◆ I place the mirrors on opposite sides of a card board box so that the reflecting surfaces face each other.
- ◆ I keep two or three flowers of different colours in the card board box.
- ◆ I make a hole on any one of the sides of the box and remove the coating on the mirror in front of the hole. Now I look into the box through the hole.
- ◆ I repeat the experiment by keeping the mirrors on all sides of the box.

My finding : Multiple images of the flowers like a garden due to multiple reflection.

Mirror Periscope

The working of a periscope is based on the principle of successive reflections from two plane mirrors. It consists of two plane mirrors facing each other fixed at 45° to the framework of a tube.

Fix the two mirrors at an angle of 45° as shown in the figure. View an object through one end.

ACTIVITY 4.6

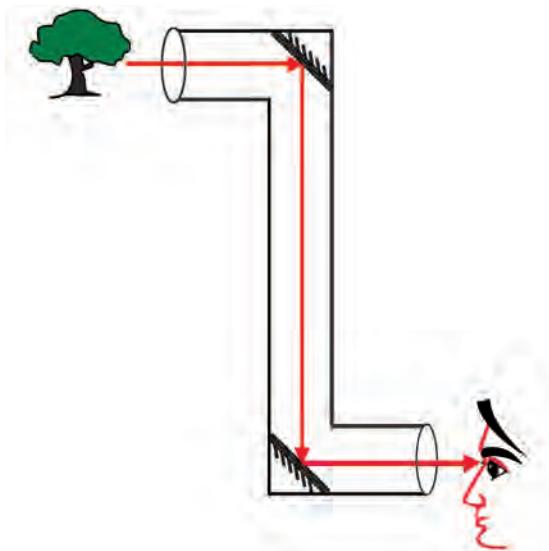
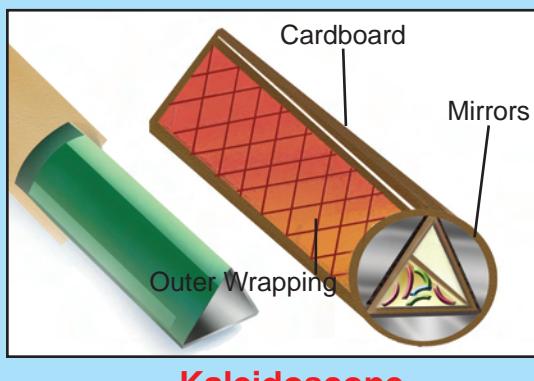
I DO

I need : Three equal mirror strips, pieces of broken bangles, a cardboard.

procedure :

- ◆ I take three equal sized mirror strips and join them as shown in the figure.
- ◆ I fix them in a circular cardboard tube.
- ◆ I close one end completely.
- ◆ I place a few pieces of broken bangles between the mirrors.
- ◆ I close other end of the tube having a hole in the centre through which I can see.

My finding : multiple images due to multiple reflection.



4.2. REFRACTION

ACTIVITY 4.7

I DO

I need: a glass beaker, a pencil.

procedure :

- ◆ I take a glass beaker and place a pencil inside it.
- ◆ I look at the pencil. It appears straight.
- ◆ I add water to the beaker slowly and look at the pencil from the sides.
- ◆ The pencil now appears to be bent after water was poured into the beaker.

Why does this happen? Let us find out.



The path of light seems to have changed before reaching our eyes. We call this phenomenon deviation.

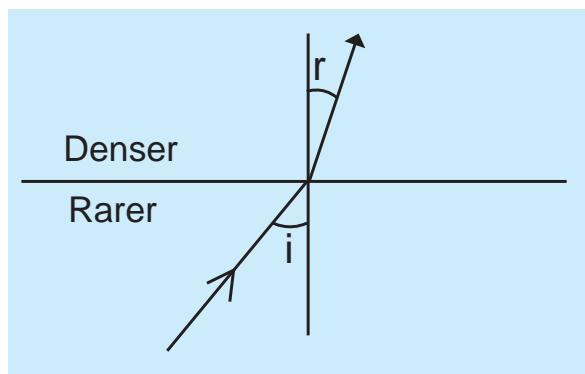
From the above activity we see that the pencil appeared bent when there was water and appeared straight when there was only air. Thus we see that the path of light behaves differently when it passes from one medium into another.

This bending of ray of light when it passes from one medium to another is called refraction.

The direction of deviation depends on the densities of the two media. The medium of greater density is known as denser medium. Ex : Glass

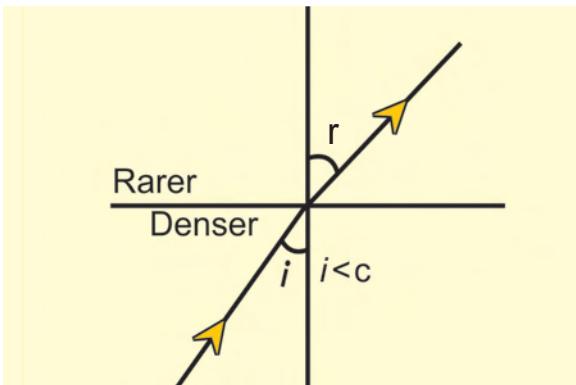
The medium of lower density is known as rarer medium. Ex: Air

- When light travels from a rarer medium and enters a denser medium, it will be deviated towards the normal.



Ex : From Air to Glass

- The light will be deviated away from the normal when it passes from a denser into a rarer medium.



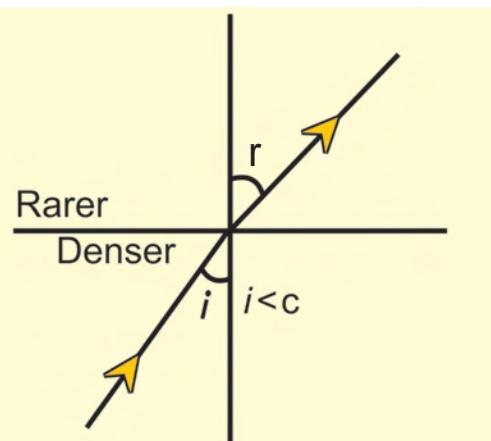
Ex : From Glass to Air

Every day effects of Refraction

- A fruit appears to be bigger in a glass of water due to refraction.
- Printed letters appear to be raised when a glass slab is placed over them.
- A swimming pool appears more shallow than its actual depth.

4.3. TOTAL INTERNAL REFLECTION

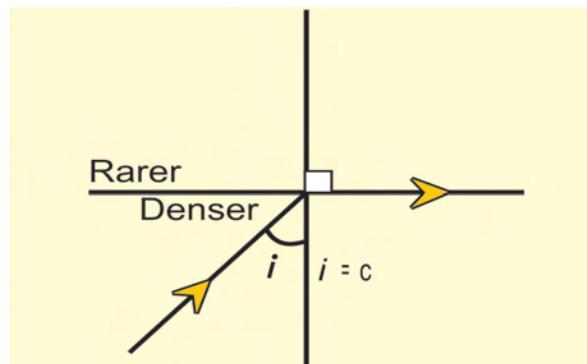
Consider a ray of light passing from a denser medium to a rarer medium.



When a ray of light passes from a denser medium to a rarer medium, the refracted ray is bent away from the normal.

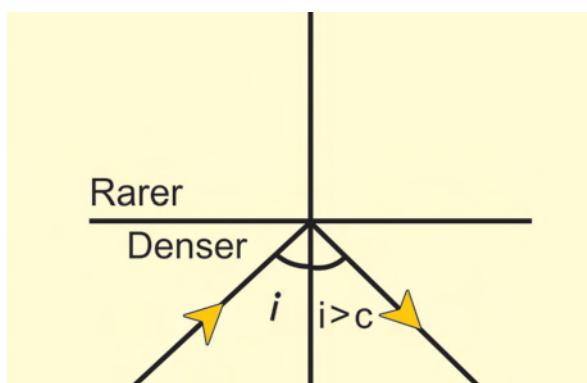
As the angle of incidence increases, the angle of refraction also increases.

At a certain angle of incidence, the angle of refraction becomes 90° . The angle of incidence for which the angle of refraction becomes 90° is called the **critical angle C**.



If you further increase the angle of incidence, at one point the ray will be completely reflected back into the same medium.

If the angle of incidence is more than the critical angle, the ray bends inside the denser medium itself. This phenomenon is **total internal reflection**.



Necessary conditions for total internal reflection

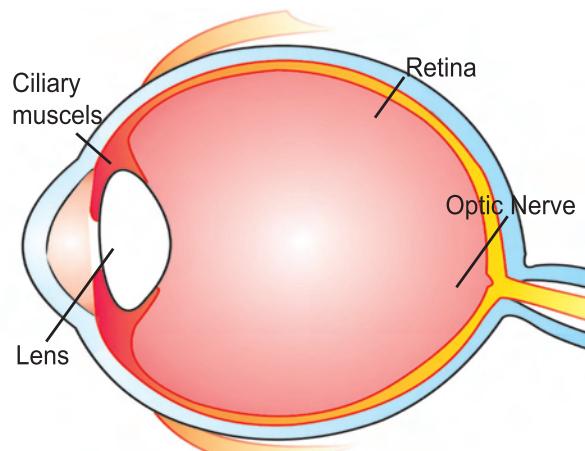
1. The light must proceed from a denser medium to a rarer medium.

2. The angle of incidence in the denser medium must be greater than the critical angle.

4.4. HUMAN EYE

The human eye has a convex lens. The convex lens of an eye forms an image of the object on a screen called the retina. The retina is covered by a large number of nerve fibres(optic fibres) which sensitive to light. They carry the image by means of optic nerves to the brain.

The human eye focusses the image for different objects at different distances by changing the focal length of the lens. This is done by the ciliary muscles, which stretch and relax to change the focal length of the lens. This action of the eye is called the **power of accommodation** of the eye. The most comfortable distance the normal eye can read is about 25 cm. This distance is called the least distance of the eye. The minimum distance at which the eye can see objects distinctly varies with age.



4.5. SOUND

We hear many types of sounds around us everyday. Each sound is characteristic of the object producing it.

Different sources of sounds around us :

ACTIVITY 4.8

I DO



SCIENCE

By observing the picture, I list the various sounds produced.

- | | |
|----------|----------|
| 1. _____ | 5. _____ |
| 2. _____ | 6. _____ |
| 3. _____ | 7. _____ |
| 4. _____ | 8. _____ |

Does vibrating objects produce sound?**ACTIVITY 4.9****I DO**

I need : A metal plate, a glass tumbler, a plastic mug, a sheet of paper, a wooden block, a cloth, metal stick.

procedure :

- ◆ I collect the above objects.
- ◆ I tap all these articles one by one with a metal stick.



From the above activity we observe that they make different types of sound due to vibration.

ACTIVITY 4.10**I DO**

I need : a table, a scale.

procedure :

- ◆ I take a scale and hold its one end firmly on the table with one hand as in the figure.
- ◆ I tap the free end of the scale with my other hand. The scale begins to vibrate now.
- ◆ When I touch the scale with my finger, it stops vibrating. It doesn't produce any sound now.

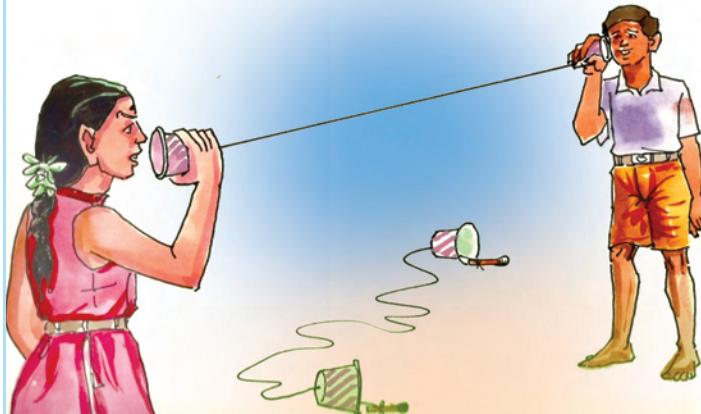
**ACTIVITY 4.11****I DO**

- ◆ I touch a bell when not in use.
- ◆ Now I tap the bell with an iron rod and touch it when it is producing the sound.
- ◆ I feel the vibration in my hand.

From the above activities we observe that the vibrating object produces sound.

4.5.1.SOUND NEEDS A MEDIUM FOR PROPAGATION

ACTIVITY 4.12



WE DO

We need : Two empty paper cups, a string, matchsticks.

procedure :

- ◆ We take two empty paper cups.
- ◆ We make a small hole at the bottom of each cup and pass the ends of a string through the holes. We tie the ends to match sticks to hold them in place.

- ◆ One of us hold one cup near our ear and ask our friend to speak in other cup.
- ◆ What was spoken through one cup was heard clearly in the another cup.

Our finding : Sound can travel through solids.

ACTIVITY 4.13



I DO

I need : Two marbles or pebbles, a bucket of water.

procedure :

- ◆ I take two pebbles or marbles and beat them together. I listen to the sound.
- ◆ I submerge them in a bucket of water then I tap the pebbles together under water.
- ◆ I Listen to the sound by keeping my ear near the bucket.

- ◆ The sound heard is clearer and louder when the pebbles are submerged in water.

Our finding : Sound can travel through liquids.

When you call your friend Gopal who is standing far away, how could he able to hear your voice? How does the sound travel to Gopal? The reason is sound can travel through Air.

ACTIVITY 4.14**WE OBSERVE**

With the help of the vacuum pump when the air is removed from the bell jar gradually, the sound gets feebler. When the entire air is removed from the bell jar and made vacuum, we can not hear the sound from the cell phone. From this we learnt that sound can not travel through vacuum.



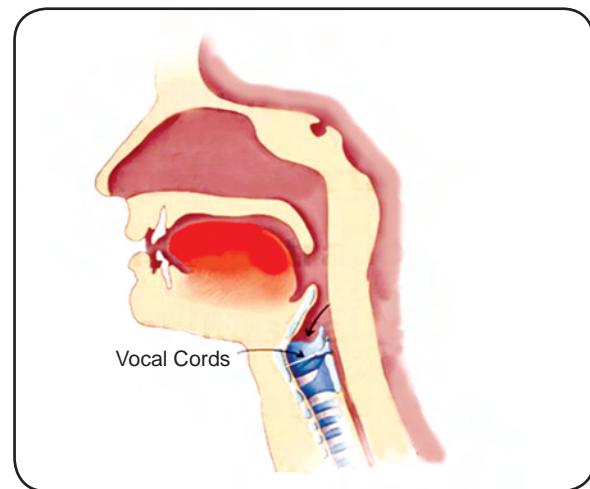
Sound needs a medium for propagation. Sound can travel through solid, liquid and gases. It can not travel through vacuum.

Sound plays an important role in our lives. It helps us to communicate with one another. It is difficult to communicate without talking. Every one and everything around us produce sounds.

4.5.2. Sound produced by humans

Speak loudly or sing a song or buzz like a bee. What helps to do this activity?

In human beings, the sound is produced by the “voice box” or the **larynx**. The voice box has two “vocal cords”. They are stretched across the voice box in such a way that there is



a narrow slit between them for the passage of air. When we speak, the lungs force air through the slit and the vocal cords vibrate, producing sound.

MORE TO KNOW

The vocal cords in men are about 20 mm long. In women, these are about 15 mm. Children have very short vocal cords.

4.5.3. Human ear and hearing

How do we hear sounds?

We know that vibrating objects produce sound which is carried in all directions through a medium. Our ears help us to hear sounds. The human ear has three important parts. Only one of its parts can be seen and felt by you, which is the outer ear.



The outer ear consists of the pinna and the ear tube. The shape of the outer part of the ear is like a funnel. When sound enters the ear, it travels down a canal at the end of which a thin membrane is called “ear drum” stretched tightly. It performs a very important function.

The middle ear has three tiny interlocked bones. The inner ear has a coiled organ of semi circular canals and the auditory nerve.

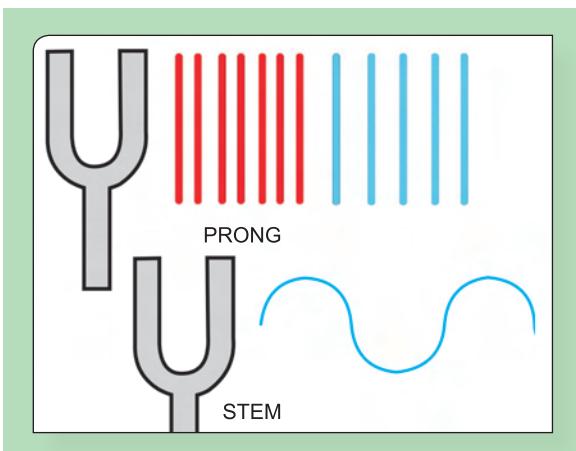
A vibrating body causes air molecules to vibrate. These vibrations reach our ear and are collected by the pinna and then funnelled into the ear tube. The vibrations strike the eardrum and start vibrating. The eardrum sends the vibrations to the inner ear. From there the signal goes to the brain. That is how we hear sounds.

We must never put a sharp or hard object into our ear. It can damage the eardrum. A damaged eardrum can impair hearing.

4.5.4. Amplitude, Time period and frequency of a vibration

You have learnt that to and fro motion of an object is called frequency. A tuning fork is made of steel. The two upper ends of the tuning fork are called the ‘prongs’, while the lower end is called the ‘stem’.

Strike the prongs against a hard rubber pad and observe the vibrations. A vibrating tuning fork produces sound.



ACTIVITY 4.15**I DO**

I need : Two rubber strips of the same length and width.

procedure :

- ◆ I take two rubber strips of the same length and width.
- ◆ I put them one above the other.
- ◆ I hold them at both ends and stretch them tight.
- ◆ I blow air through the slit between them.
- ◆ A sound is now produced.



Frequency (n): The number of oscillations per second is called the frequency. Frequency is expressed by hertz – Hz

Time period (T): The time taken by the vibrating body to complete one vibration or oscillation is called the time period. The unit of period is second(s).

Amplitude (a): The maximum displacement of a vibrating body from its mean position is called amplitude. The unit of amplitude is metre (m)

The relation between frequency (n) and time period (T)

The period of oscillation is the reciprocal of the frequency.

$$\text{Time period (T)} = \frac{1}{\text{frequency(n)}}$$

We can recognize many familiar sounds without seeing the object producing these sounds. How is it possible? These sounds must be different to enable you to recognize them.

- Amplitude and Frequency are two important properties of sound.
- The loudness of the sound depends on its amplitude.

4.5.5. Audible and Inaudible Sounds

The human ear can hear the range of audible frequencies between 20 Hz and 20000 Hz. They are called **audible sounds**.

Sounds of frequencies lesser than 20 Hz and greater than 20000 Hz can not be heard by the human ear. They are called **inaudible sounds**.

4.5.6. Noise

Any unpleasant sound is called noise. In the classroom, if all the students speak together, what would the sound produced be termed? It is noise.

On the other hand, we enjoy sound from musical instruments. Musical sound is pleasing to the ear.

4.5.7. Noise pollution

Unwanted sound from any source that causes discomfort of any kind is called noise pollution.

Harmful effects of noise pollution

- Exposure to sudden high noise level can damage to the eardrum.
- High levels of noise can also lead to nervous tension and increase in blood pressure.
- Noise also disturbs sleep, increases stress and causes headache.

MORE TO KNOW

Sound waves of frequencies above 20,000 Hz are called ultrasonic waves. Bats use ultrasonic waves for their flight.

Some animals can hear sounds of frequencies higher than 20000Hz. Dogs have this ability.



Steps to control noise pollution

1. The use of loudspeaker in functions should be stopped.
2. Cars and other vehicles should not produce loud sounds.
3. T.V and Musical systems should be listened at low volumes.

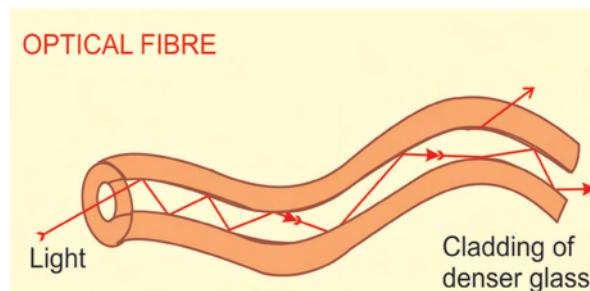
4.6. SCIENCE TODAY

An optical fibre is a device based on the principle of total internal reflection.

Optical fibres are thin, flexible and transparent strands of glass which can carry light along them very easily. A bundle of such thin fibres forms a light pipe.

Light and Sound

When light is incident at one end of the fibre at a small angle the light that passes inside undergoes repeated total internal reflections along the fibre and finally comes out.



Even if the fibre is bent or twisted, light can easily travel through the fibre. The method of using optical fibres to carry images and messages is called fibre optics.

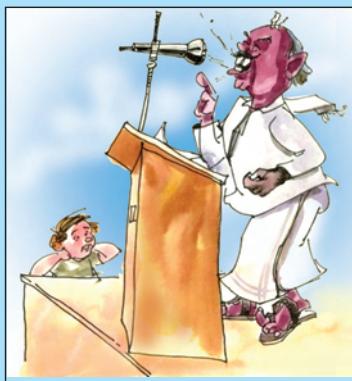
Uses of optical fibres

1. Optical fibres are used to transmit communication signals.
2. In medicine, optical fibres are used in endoscope and laparoscopes.

ACTIVITY 4.16

I DO

I observe the pictures given below and fill up the blanks using the right words, based on the sounds produced. (noise/music)



EVALUATION

I. Choose the best answer:

1. Reflection from a smooth surface is called _____ reflection.
(regular, irregular, multiple, total internal)
2. If the angle of incidence is 40° the angle of reflection is _____
(10° , 40° , 20° , 90°)
3. The angle between the incident ray and the normal is called _____
(angle of incidence, angle of reflection, angle of refraction)

II. Fill in the blanks:

1. The working principle of a periscope is _____
2. A fruit appears to be bigger in a glass of water due to _____
3. Sound can not travel in _____
4. When we touch the ringing bell we can feel the _____
5. An audible sound has the frequency range of _____

III. Identify the mistakes and correct them:

1. The beautiful pattern that we obtain in a kaleidoscope is because of refraction.
2. Unwanted sound from any loudspeaker that causes discomfort of any kind is called Music.
3. An optical fibre is a device based on the principle of refraction.

IV. Match the following:

- | | | |
|------------------------------|---|-------------|
| a. Irregular reflection | - | Glass slab |
| b. Multiple reflection | - | Optic fibre |
| c. Refraction | - | Periscope |
| d. Total internal reflection | - | Wood |

V. Classify the pairs of media as denser and rarer.

- a. Air, water b. Air, glass c. water, glass

VI. Answer the following.

1. Objects present in the dark room are not visible. But when the light is switched on, everything present in the room becomes visible. why does this happen?
2. Differentiate between regular and irregular reflection.
3. State the laws of reflection.
4. Suggest some measures to reduce noise pollution in your residential area.
5. Your parents are going to buy a new house. They have been offered one on the roadside and another two lanes away from the roadside. Which house would you suggest your parents? List out the ways and means to reduce noise.
6. Extremely loud sound can make one deaf. Suggest some measures to check loud noise.
7. Factories should not be constructed in the residential areas. Do you agree or not ? If so, why ?
8. If Raman fixed two mirrors at an angle of 60 degrees to get as many number of images, could you find out the exact number of images produced ?
($N=360/\text{angle } -1$).
9. Veena and Rani are on the moon, Veena calls out her friend, but Rani does not hear Veena's call even though she is near. Discuss.

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'I can, I did'

Student's Activity Record

Subject: