

**Model Textbook of**

# **General Science**

**4**

**Based on National Curriculum 2022-23**

**National Curriculum Council Secretariat  
Ministry of Federal Education and Professional Training,  
Government of Pakistan**



**National Book Foundation  
as  
Federal Textbook Board, Islamabad**



**National Book Foundation**



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Model Textbook of **General Science**  
for Grade 4



**Authors**

Jawaid Mohsin Malik, Muhammad Ali Shahid

Neelofar Shaheen, Mian Imran Khaliq

**Supervision**

Dr. Mariam Chughtai

Director, National Curriculum Council Secretariat  
Ministry of Federal Education and Professional Training, Islamabad

**Internal Review Committee**

Dr. Munazza Faheem, Federal Directorate of Education, Islamabad.

Ambreen Tassawar, Army Public School and College System, Rawalpindi.

Shabana Asghar (Rtd), Federal Directorate of Education, Islamabad.

Muhammad Ali, Beaconhouse School System, Islamabad.

Riffat Zeba, Federal Directorate of Education, Islamabad.

M. Nawaz Aslam, Knowledge Platform.

Abdul Rauf, Federal Government Educational Institutions (Cantt/Garrison), Rawalpindi.

Dr. Shehnaz Perveen, Federal Government Educational Institutions (Cantt/Garrison), Rawalpindi.

**National Review Committee**

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Majida Parveen, Directorate of Curriculum Assessment and Research, Government of Sindh, Jamshoro.

Zeba Naureen, Federal Government Educational Institutions (Cantt/Garrison), Rawalpindi.

**Desk Officer**

Mrs. Zehra Khushal (Assistant Educational Advisor), NCC Secretariat

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# PREFACE

Rapid developments in Science and Technology have revolutionized our lives. Advancement in the field of science have led to many benefits manifested in increased yields of crops for human consumption, genetically modified animals, faster means of communication and transportation and more life saving drugs, to name a few. These developments have been coupled with leaps in technological advancements, which have brought communication and information to the palms of a vast majority of the population through smart phones and many other portable devices. Within this age of technological sophistication it is imperative to have learners develop understanding and conceptual clarity in science to provide a strong foundation for future learning in this field. Such an outlook is particularly important for developing nations to bringing their population at par with the trends in the global community.

This model textbook of **General Science Grade 4** has been developed by NBF according to the National Curriculum of Pakistan 2022, in the light of standards for quality textbooks. It has been developed with the aim of providing a strong foundational basis of general science concepts upon which subsequent learning of the students will be built. Offering an improved design with attractive graphics, comprehensive content and interactive elements, this textbook aims to make learning for students of grade - 4 an interesting and rewarding activity. The material has been developed with a keen eye to establishing real life links for the learners so that their education process enriches them through better conceptual understanding and the ability to apply their learning. The increased emphasis on activities and project work is for steering children away from rote memorization to developing critical thinking and analytical skills.

This textbook has been aligned with TIMSS (Trends in International Mathematics and Science Study). Structured Questions are included in each chapter's exercise. These questions are internationally used to assess student's reasoning, analyzing and problem solving skills.

The National Book Foundation is always striving for improvement in the quality of its books. The present book features an improved design, better illustration and interesting activities relating to real life to make it attractive for young learners. However, there is always room for improvement and the suggestions and feedback of students, teachers and the community are most welcome for further enriching the subsequent editions of this book.

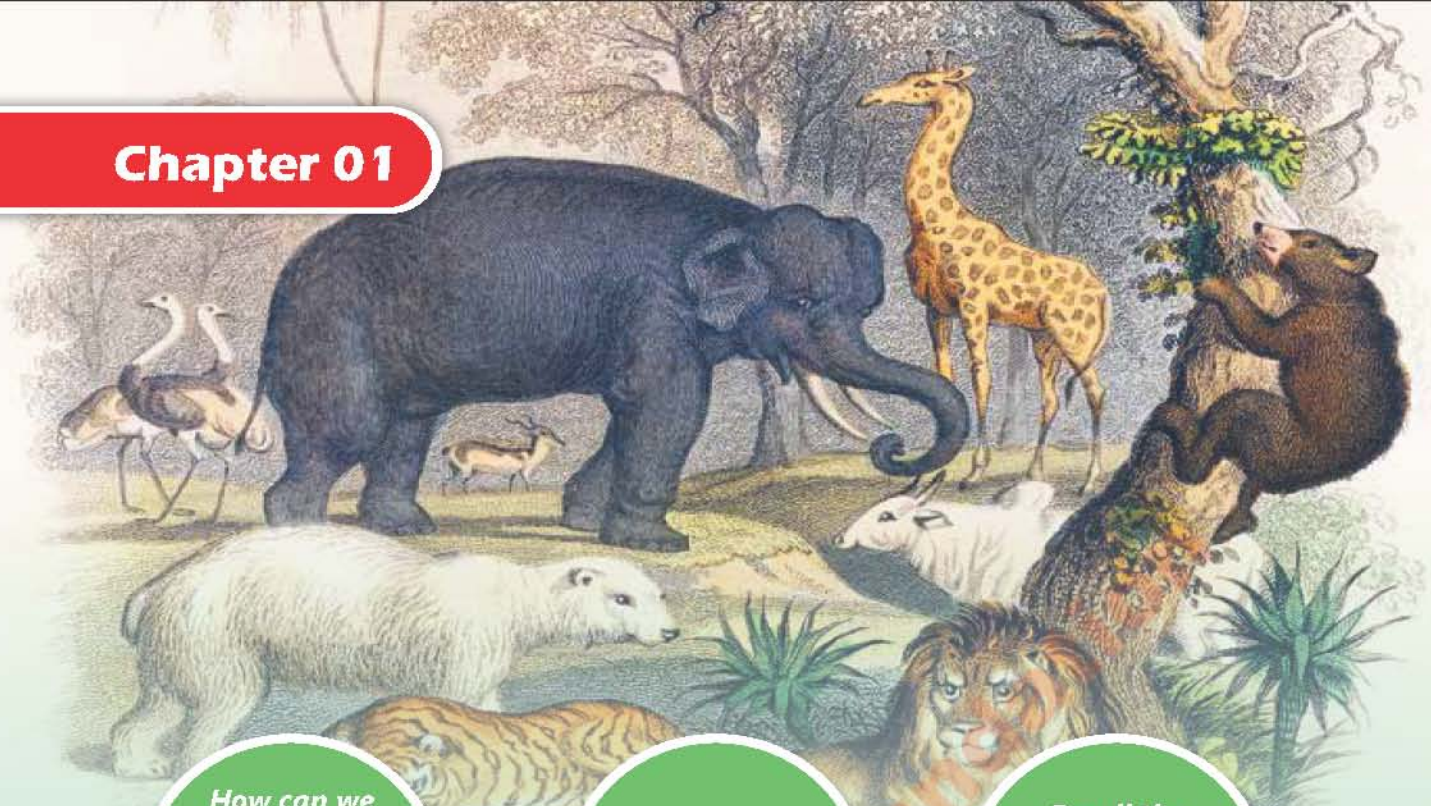
**Dr. Raja Mazhar Hameed**  
Managing Director

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## Chapter 01



*How can we  
differentiate  
between living  
and nonliving  
things?*

*How do plants  
and animals  
get nutrition?*

*Do all the  
living things  
need energy  
to grow ?*

# Life Processes of Plants and Animals

### **Students' Learning Outcomes**

**After studying this chapter, the students will be able to:**

1. Recognize that living things take in nutrients, grow, breathe, have sensitivity, movement, reproduce, eliminate waste and die.
2. Know that living things need energy to grow, live and be healthy and plants get their energy from light (photosynthesis) while animals get their energy from eating plants, and other animals.
3. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and space to grow).



**Activity 1.1****What are the common life processes of living things ?**

- Q.1 The teacher will ask the students: Are you alive or not? How do you know? The teacher will record students ideas and create a criteria for life. The teacher will show a plant to the students and ask:
- Q.2 Is the plant alive or not alive? How do you know? The teacher will show some dried leaves and wood to the students and ask:
- Q.3 Are the dried leaves and wood alive or not alive? How do you know? The teacher will discuss students ideas and establish that the dried leaves and wood are not alive?
- Q.4 The teacher will ask the students: Were the dried leaves and wood once alive? How do you know? The teacher will discuss students' ideas and establish that they were once alive.
- Q.5 The teacher will ask the students: Are the stones alive or not alive? Have the stones ever been alive? The teacher will discuss students' ideas and establish that they were once alive. The teacher will collect and show to the students a few things which have never lived e.g., stones, glass etc.

**Activity 1.2****1. Tick (✓) correctly the given picture.**

- (A) Alive  
(B) Once alive  
(C) Never lived



- (A) Alive  
(B) Once alive  
(C) Never lived



- (A) Alive  
(B) Once alive  
(C) Never lived



- (A) Alive  
(B) Once alive  
(C) Never lived

We have seen that plants and animals are living things. All living things carry out certain activities. So, these activities are the characteristics of living things. All living things take in nutrition, grow, breathe, have sensitivity, move, reproduce, eliminate waste and die.

## 1. Characteristics of Living Things

There are eight characteristics of living things.

### Nutrition

All living things need food to remain alive. Plants make their own food but animals get from other living things.



### Growth

Growth is simply an increase in size. For example, you start life as a small baby. Now you are large one having increased in weight and height.



### Breathe

All the living things breathe. It is a process of moving air into and out of the lungs. During this process oxygen gas is absorbed and carbon dioxide gas is removed from the body.



### Sensitivity

Animals and plants are sensitive to changes in their environment. For example, when you touch a hot object, you immediately move your hand away from it. Plants also show sensitivity e.g., there is a plant named "touch-me-not". When it is touched it leaves automatically fold-up.





## Movement

Raise your right arm. The muscles are working to move your right arm. Muscles provide movement in all animals. The cow, man, goat, deer etc. move with their legs. The birds and butterflies fly with their wings. Some animals like seals, move their bodies to perform movement. Snakes do not have limbs. They move their body by muscles. Fish move with their fins. Parts of plants always move slowly, e.g., opening and closing of flower. The shoot of the plant bends towards light as they grow. All living things show movement.



## Reproduction

All living things produce young ones of their own kind and thus maintain the continuity of a species, e.g., frog produces new frogs. A coconut plant will produce new coconut plants and a rose plant will produce new rose plants. A rat will always produce a rat. A cat will produce kittens.

A bird has wings, feathers, beak, legs and claws etc. A bird inherits the characters from its parents. A human baby looks like another human. These examples show that characteristics are transferred from one generation to the next.





## Elimination of Waste

Every living thing makes waste which are harmful for the body or the material the body no longer needs. For example, all the animals e.g., cow, goat, horse etc. produce urine and feces which are given out of the body. Plants also produce waste such as gums and resins which are given out of the bark.



## Death

No living things have a limitless life. Sooner or later they die. They die of diseases, old age, in accidents or eaten by other living things.



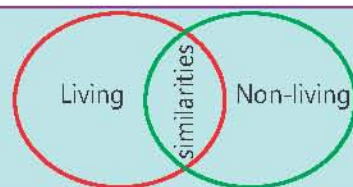
### Activity 1.3

Tick (✓) correctly the given table.

Sr.No	Characteristics	A plant	An animal	A fallen leaf	A stone
1	Moves				
2	Grows				
3	Reproduces				
4	Requires nutrition				
5	Once moved				
6	Once grew				
7	Once reproduced				
8	Once required nutrition				
9	Never moved				
10	Never grew				
11	Never reproduced				
12	Never required nutrition				

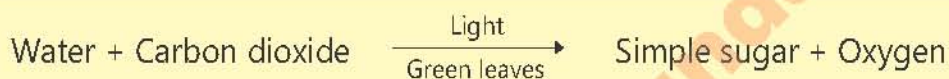
**Interesting information**

This is a Venn diagram. Similarities are written in its centre and differences are written on its sides.



## 2. Living Things Need Energy

Energy is the ability to do work. It is needed by all living things to grow, to move, to keep themselves warm and to be healthy. Plants get their energy from sunlight. They transform water, carbon dioxide and energy from sunlight into oxygen and simple sugar through the process of photosynthesis. It takes place in the green leaves. Plants use sugars as fuel to get energy.



All the animals depend on plants for survival to get energy. Some animals eat plants directly e.g., cow, goat, horse etc. Other animals eat animals that eat the plants e.g., tiger, lion and wolf. Some animals eat plants and also other animals e.g. humans, birds, foxes and dogs.

We get lots of energy from food. Our bodies turn energy into other forms such as movement.

**Interesting information**

During photosynthesis water is broken down to produce oxygen.

## 3. Needs of Plants for Life

Almost all plants need air, light, water, nutrients from soil and space to grow for their survival.

**Air:** Air contains many gases. These include nitrogen, oxygen, carbon dioxide and water vapour. Using light energy plants combine carbon dioxide and water to produce glucose and oxygen. This process is called photosynthesis. Plants also absorb oxygen gas from the air. Plants need oxygen to respire. Respiration is process of breaking down a type of sugar (glucose) for energy.



**Light:** Light is absorbed by leaves. During photosynthesis this light is used as source of energy.

**Water:** Almost 90% of the body of a plant is water. Along with water plants absorb salts and minerals etc., from soil. Water is necessary for photosynthesis. It is also needed for transport of salts and minerals throughout the plant. Too little water can cause plant to wilt or droop.



Healthy plant

Wilted plant

**Nutrients from Soil:** The substances that nourish a plant are called nutrients. The plants need nutrients such as nitrogen, phosphorus and potassium. These nutrients remain dissolve in water which are absorbed by the roots.

**Space to Grow:** All living things need space. A plant's roots need space so that they can spread out and absorb water and nutrients. The leaves of a plant need space so that they can get light. Overcrowded plants become less healthy.

#### Activity 1.4

Do plants need light and water to survive and make their own food?

A "fair test" is that where one condition is changed and all other conditions are kept the same.

The teacher will set, up fair test investigations as a whole class or in small groups.

Take Four potted plant and mark them as 'A', 'B', 'C', 'D'

Keep plant 'A' in light, and the plant B in dark. In 'A' and 'B' pour water



regularly. Keep plants 'C' and 'D' in light. Pour water in plant 'C' regularly. Do not pour water in plant 'D'.

At the end of the observation period, the teacher will ask the students to compare plant 'A' and 'B'. Also compare the plant 'C' and 'D'. Identify the differences and similarities between 'A' and 'B', 'C' and 'D'. The teacher will encourage students to link observations with reasoning.

Q1. Which plants is the healthiest? How do you know?

Q2. Which plant is the least healthy? How do you know?

Q3. Where do you think a plant gets its energy from?

### KEY POINTS

1. All living things take in nutrition, grow, breathe, have sensitivity, movement, reproduce, eliminate waste and die.
2. Taking in and giving out air out of the body by living things is called breathing.
3. Reproduction is the production of offspring.
4. No living things have a limitless life.
5. Living things need energy to grow and be healthy.
6. The green leaves of plants transform water, carbon dioxide and energy from sunlight into simple sugar and oxygen through the process called photosynthesis.
7. Animals get their energy from eating plants and other animals.
8. The need of plants for life are air, light, water, nutrients from soil and space to grow.
9. The capacity of doing work is called energy.
10. Respiration is the process by which oxygen combines with sugar to release energy.

### Key Vocabulary

air	growth	reproduction	water
breathe	light	respiration	wilts
eliminate waste	movement	root	
energy	nutrients	sensitivity	
food	nutrition	shoot	
grow	photosynthesis	soil	



**Weblinks:** Use the following weblinks to enhance your knowledge about the topics in this chapter.

1.	characteristics of living things	<a href="https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/livingthings.aspx">https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/livingthings.aspx</a>
2.	living things need energy	<a href="https://pressbooks.bccampus.ca/humanbiology053/chapter/4-9-energy-needs-of-living-things/">https://pressbooks.bccampus.ca/humanbiology053/chapter/4-9-energy-needs-of-living-things/</a>
3.	needs of plant for life	<a href="https://biggreen.org/wp-content/uploads/2018/06/K-2-Plant-Needs.pdf">https://biggreen.org/wp-content/uploads/2018/06/K-2-Plant-Needs.pdf</a>

## EXERCISES

### 1. Tick (✓) the correct answer.

- i. We need food for:
  - (A) energy only
  - (B) happiness only
  - (C) growth and health
  - (D) health, growth and energy
- ii. When the plants make food from water, carbon dioxide in the presence of sunlight oxygen is produced by the breakdown of
  - (A) carbon dioxide
  - (B) sugar
  - (C) water
  - (D) sunlight
- iii. Which characteristic must all living things have in order to avoid extinction?
  - (A) respiration
  - (B) growth
  - (C) reproduction
  - (D) sensitivity
- iv. Which one of the characteristics of living thing is involved when a rabbit runs away from a fox?
  - (A) sensitivity
  - (B) respiration
  - (C) movement
  - (D) nutrition
- v. Which one of the characteristics of living thing is involved when you sweat after running?
  - (A) eliminating waste
  - (B) movement
  - (C) respiration
  - (D) nutrition
- vi. Which of the following things cannot move by itself?
  - (A) bird
  - (B) cat
  - (C) cow
  - (D) bicycle

- vii. The leaves of which of the following plants fold up on being touched.
- (A) mango plant (B) mustard plant  
(C) apple plant (D) touch me not plant
- viii. Two categories in which all things can be categorized
- (A) living and nonliving (B) plants and animals  
(C) air and land (D) food and water
- ix. Which one is taken inside by the living things during breathing ?
- (A) carbon dioxide (B) hydrogen  
(C) oxygen (D) water
- x. The blooming of buds into flowers shows that:
- (A) plants show movement  
(B) plants are non-living thing  
(C) plants do not grow  
(D) blooming is not a movement

## 2. Write short answers.

- Name the common life process of living things.
- Describe briefly the following characteristics of living things: nutrition, growth, breathing, movement, sensitivity, elimination of waste, reproduction and death.
- How do plants obtain energy?
- How do animals obtain energy?
- Describe the following as needs for plants for life: air, light, water, nutrients from soil, space to grow.

## 3. Constructed response question

- What is our food made of?
- Where do animals get their energy from ?
- What would happen if there are no plants?
- Why is death necessary?



**4. Investigate:**

- i. How does a seedling grow into a bigger plant?
- ii. Where do the materials that make up a tree trunk come from?

**Project:****Let's grow our own food**

Students can plant easily grown seasonal vegetables and other plants in recycled shoeboxes, empty milk cartons, recycle plastic bottle and setup a sale at their school. Student can prepare facts cards and care instruction for the plants they have grown. Suggested vegetable include garlic, onion, coriander, mint, lettuce and tomato etc.



Garlic



Mint



Onion



Lettuce



Coriander



Tomato

## Chapter 02



*How can you identify if some thing is a plant*

*How water is transported in a flowering plant?*

*Why is seed dispersal important to plants?*

# Plants-Structure and Function

### **Students' Learning Outcomes**

**After studying this chapter, the students will be able to:**

1. Classify the plants into two major groups (flowering, non-flowering), and give examples of each group.
2. Identify and describe the functions of different parts of flowering plants: roots, stem/ trunk, leaves and flowers.
3. Investigate the way in which water is transported within plants.
4. Identify the parts of the plant transport system and describe their functions. -stem, -leaf, -root.
5. Identify the parts of a flower and describe their functions (limited to petals, sepals, anthers, filaments, stamens, stigma, style, carpel, and ovary).
6. Explore the role flowers play in the life cycle of flowering plants, including pollination, fruit and seed formation and seed dispersal.
7. Describe seed germination and know that seeds require water and an appropriate temperature to germinate.
8. Identify stages in the life cycles of common flowering plants.
9. Demonstrate an understanding of why plants are vital to sustaining life on earth
10. Identify various professions associated with this unit of science, e.g., botanist, farmers, gardeners, florist, etc



## 1. Classification of Plants

The plants are divided into two major groups:

- a. Flowering plants    b. Non-flowering plants

### For Your Information

**Herbs:** Plants with green and tender stem are called herbs e.g., tomato plants.







**Shrubs:** Plants that are small to medium in size are known as shrubs e.g., rose.

**Trees:** Trees are long plants that can live for a long time. A tree has a single trunk and branches that support leaves, e.g., mango tree.

### a. Flowering Plants

Plants having flowers are called flowering plants. Mustard, sunflower, rose, guava and lemon are examples of flowering plants. Flowering plants may be herbs, shrubs, and trees. Flowering plants are of various colours and sizes.

Pictures of some flowering plants are given below:


		
Mustard	Rose	Sunflower
		
Apple	Lemon	Guava
Flowering plants		

### Activity 2.1

Paste pictures of various plants in your scrapbook. Divide them into flowering and non-flowering plants. Which of these are found in Pakistan?

## b. Non-Flowering Plants

The plants on which flowers do not grow are called non-flowering plants. Moss, fern and conifers (for example pine, juniper, thuja, sago palm) are examples of non-flowering plants. Pictures of some non-flowering plants are given below:

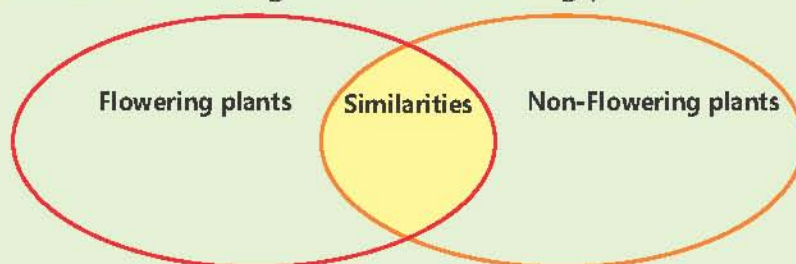
		
Moss	Fern	Pine
		
Juniper	Thuja	Sago palm
Non-flowering Plants		

### Interesting Information

Conifers are found in the northern areas of Pakistan in places like, Murree, Swat, Kaghan and Chilas. Conifers are very important for our economy. Their wood is used for making furniture, construction materials and ornamental things. These are also used to make paper. The seeds of some conifers are used as dry fruit such as pine nut (chilghoza).

### Activity 2.2

Draw this Venn diagram in your scrapbook. Write the similarities and differences between flowering and non-flowering plants in it.





**Activity 2.3****Plant Walk**

The teacher will take the students on walk within the school ground or further afield and ask:

Q1. How can you identify if something is a plant?

Q2. What features are you looking for?

In pairs, students will discuss and write answer to the following questions.

Q3. What is a tree?

Q4. Do all plants have flowers?

Q5. Student will try to find examples of non-flowering plants such as mosses, ferns and conifers. The students will sketch or photograph the plants, if cameras are available. Students will focus on plants that have no flowers and discuss if they are all plants.

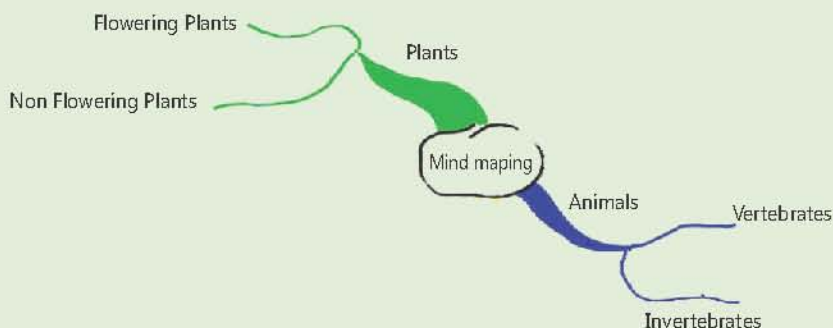
Q6. What are the similarities between flowering and non-flowering plants?

Q7. What are the key features of non-flowering plants?

The students will classify all the plants seen as 'flowering' or 'nonflowering'. Students can use images of plants or label in their environment rather than removing plants from their environment and make a key for flowering and non-flowering plants.

**Activity 2.4****Mind Mapping**

A mind map involves writing down a neutral theme and thinking of new and related ideas which radiate out from the centre.



**Do you know?**




Flowering plants have been divided into monocot plants and dicot plants.

**Monocot Plants**

The flowering plants whose seeds have one cotyledon are called monocot plants. Sugarcane, wheat, rice, bamboo, maize are the examples of monocot plants.

**Dicot Plants**

The flowering plants whose seeds have two cotyledons are called dicot plants. Mango, guava, rose, pea, gram and beans etc., are the examples of dicot plants.

		
Rose	Sugarcane	Maize
Dicot plant	Monocot plants	

**2. Parts of Flowering Plant and their Functions**

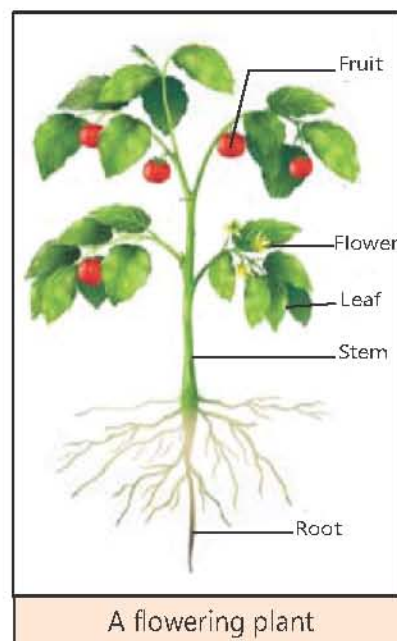
The five important parts of a flowering plant, are root, stem, leaf, flower and seed. Each of these parts performs its particular function.

**Root**

The root is present under the ground. Its branches spread in different directions. The roots anchor plants in the soil. The roots absorb water and minerals from the soil.

**Stem**

The stem grows above the ground. A stem has many branches. There are many leaves on the stem. The stem transports water and minerals from root to the leaves. It also supports the plant.

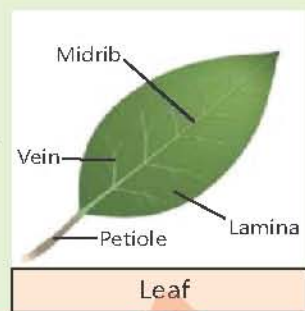




## Leaves

### Activity 2.5

Take a leaf. Draw its sketch. What is the shape of the leaf? Collect a few leaves of various shapes. Keep them between the pages of a newspaper and place a heavy object such as a book over them. After three days, take the leaves out. Paste these on the scrapbook. Identify and write the names of the parts of the leaf.



When you look at a plant, what is the first thing you notice? The first thing you usually notice in a plant, is its leaves. Leaves are of different sizes and shapes. Usually the colour of the leaves is green. One of the most important functions of the leaves is to make food for the plant.

## Flowers

The flowering plants have beautiful flowers, of different sizes and colours. Fruits and seeds are formed from the flowers.



## 3. Transportation of Water in Plants

The structure of roots, stems and leaves of the plants helps the transport of water and minerals. Plants transport water and the minerals from its roots to the tips of the leaves.

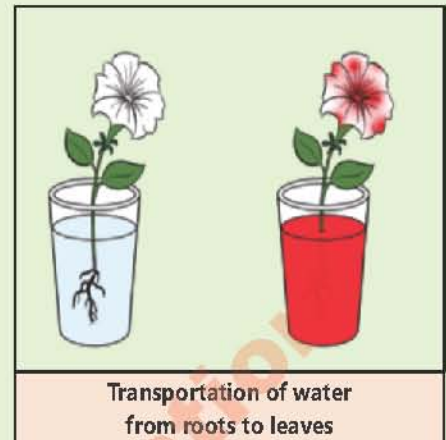
Plants contain a network of tubes throughout the plant. Roots have tiny threads called roots hairs. The root hairs enable the root to take in water and minerals. From root hairs water enters the tubes in the root, then into the tube of the stem and then to the tubes in the leaves.

What makes water move up the tube of roots, stem and leaves? You may think of the tube like a drinking straw. The bottom of the straw (tubes) is in a place where there is lots of water in the roots. There is plenty of water here because the root hairs always absorbing water from the soil. At the top of the 'straw' (tube), water is always being removed. How? The tubes in the leaves open through pores. Water evaporates through the pores. Evaporation of water vapour through the pores in the leaves is called transpiration. The movement of water in plants is driven by transpiration. Water particles are attached with one another and are also attached to the wall of the tubes. Water evaporating from the pores of the leaves of a plant causes the plant to draw up more water from the roots.

**Activity 2.6**

Take two soft plants having white flowers, for example Petunia. Wash their roots thoroughly with water. Take two bottles or glasses, and pour water in them. In one glass, put few drops of red ink. Then put a plant in each glass in such a way that their roots remain under the water.

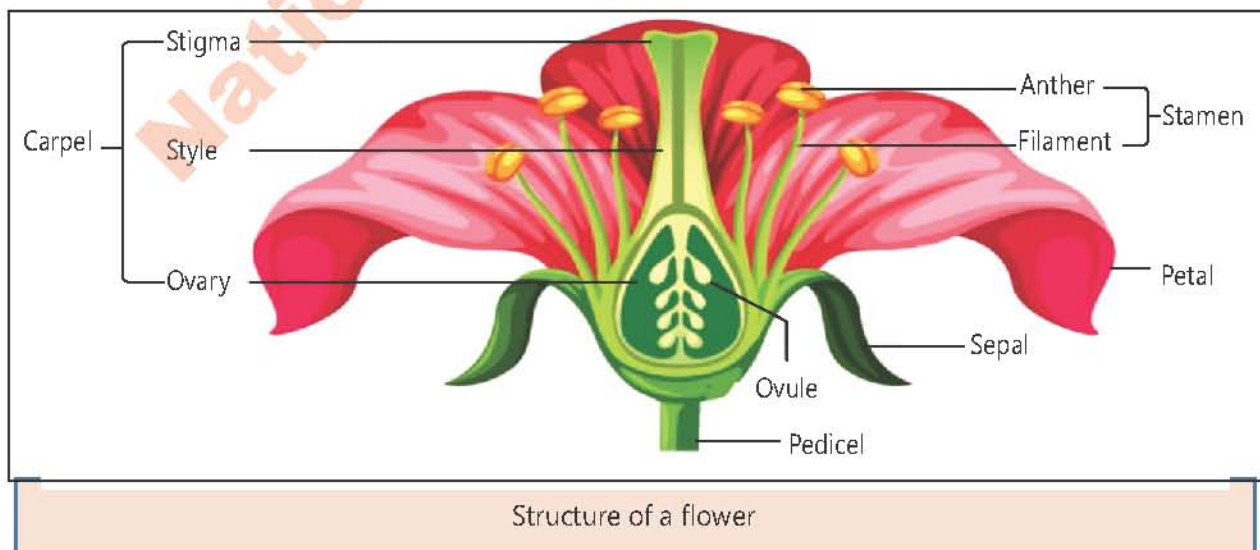
Leave the plants for few hours or overnight. What did you observe? Cut the stem of the two plants. Observe under the microscope and identify the differences between the two stems.

**Interesting information**

The secret to how water can move upwards is that it is pulled, not pushed. The powerful suction force generated by transpiration can pull water to the tops of plant.

**4. Structure of a Flower**

A flower is a very important and attractive part of the plant. In some plants there is only one flower at a stalk e.g., rose. Some flowers are produced in bunches e.g., mustard. The stalk of the flower is called pedicel. The flower has four parts at the pedicel. These occur in the form of four whorls. The four parts of flower are sepals, petals, stamens and carpel.



Structure of a flower



No.	Name	Characteristics	Functions
1	Sepals	These are green leaflets. Sepals form the first whorl.	They protect the internal structures.
2	Petals	These are coloured leaflets. Petals form the second whorl.	They attract insects and birds towards the flower.
3	Stamen	It consists of anther and filament.	It is the male reproductive part.
3(a)	Anther	It is round or oval sac-shaped structure, which is usually yellow in colour.	Here, pollen grains are formed.
3(b)	Filament	It is a long stalk-shaped structure.	It gives support to the anther.
4	Carpel	It consists of stigma, style and ovary.	It is the female reproductive part.
4(a)	Stigma	It is bottle-shaped part of the carpel.	Pollen grains adhere to it and germinate to form the pollen tube.
4(b)	Style	It is neck-shaped long part of the carpel, which is below the stigma.	The pollen tube passes through the style.
4(c)	Ovary	It is an oval-shaped part of the carpel, which is below the style.	It has one or more ovules.

### Do you know?

- The flowers are important in a plant's life. It is a flower where reproduction happens. The two events that take place are pollination and fertilization
- The flower with the world's largest bloom is the *Rafflesia arnoldii*. This rare flower is found in the rainforests of Indonesia.

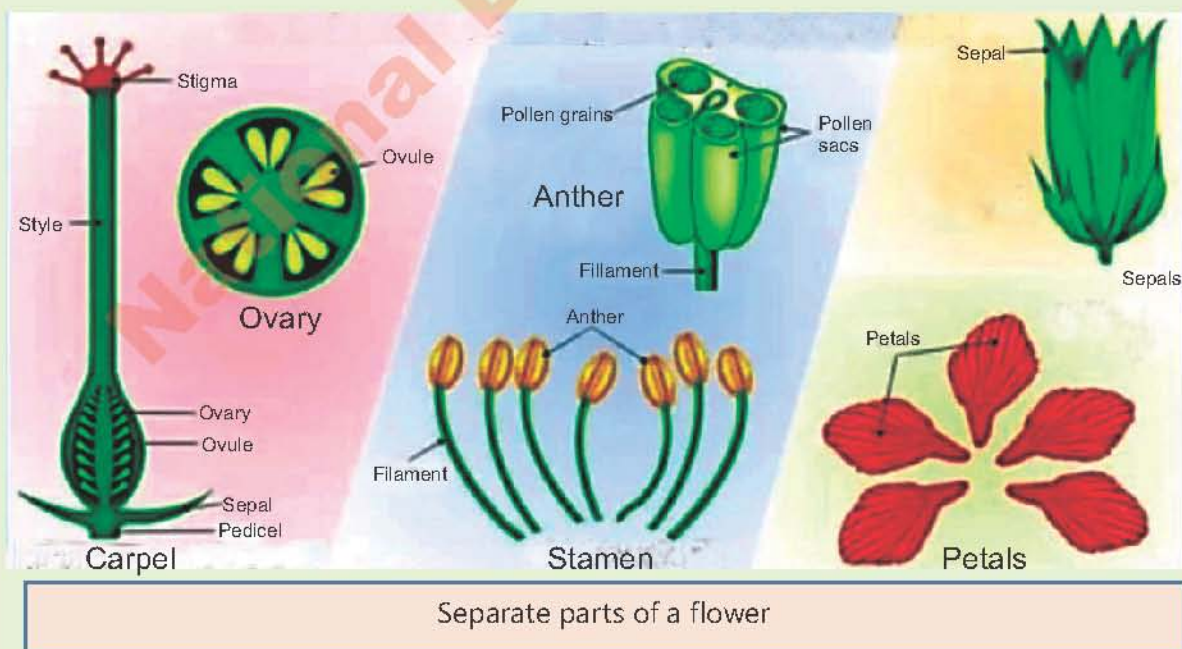


**Activity 2.7****Flower Dissection**

1. Take a large flower (individually or in small groups).
2. Identify the different parts through external observation.
3. Internal parts of a flower cannot be seen by the external observation.
4. The teacher will demonstrate how to use dissected flower to identify the parts of flower.
5. A magnifying glass can be used to see pollens on the anthers.
6. Label the dissected flowers and draw summary diagram and write short note.
7. Discuss how the diagram acts as a model of a flower.

**How to dissect a flower?**

- a. Choose a flower with clearly defined parts.
- b. Use a magnifying glass to observe the parts of the flower.
- c. Gently wipe some of the pollen onto a paper and examine under magnifying glass.
- d. Dissect the ovary. If the flower is large enough, you may be able to observe the ovule.



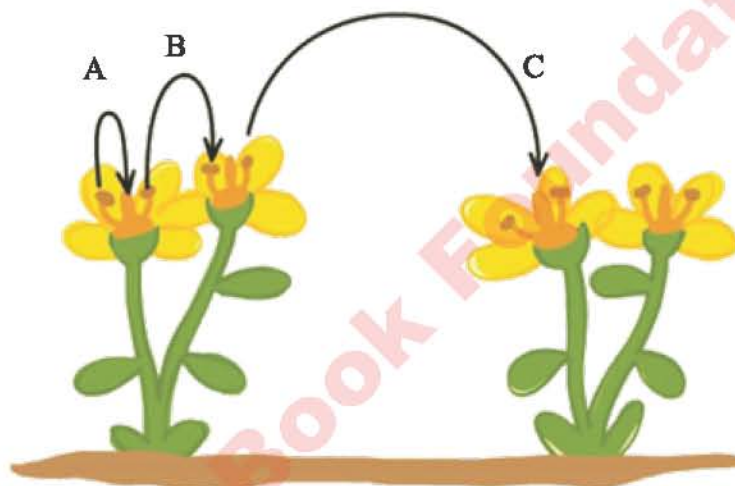


## 5. Pollination and its Types

There are many pollen grains in the anther. There are male sex cells in each pollen grain. During reproduction, pollen grains are transferred from the anther of flower to the stigma. This process is called pollination. There are two types of pollination i.e., self pollination and cross pollination.

### Self-Pollination

If pollen grains are transferred from the anther to the stigma of the same flower (A) or to the stigma of other flower of the same plant (B), it is called self pollination. It takes place in pea, cotton and tomato, etc.



(A & B) Self pollination, (C) Cross pollination

### Cross Pollination

If pollen grains are transferred from the anther to the stigma of the flower (C) of another plant (of the same type), it is called cross pollination. It takes place in maize, papaya, rose etc.

#### Do you know?

1. There may be more than one carpels in a flower e.g., China rose.
2. Most of the pollination takes place through insects and air. The structure of wind-pollinated flowers is different from insect-pollinated flowers. Other than wind and insects, pollination also takes place through bird, bat and water.

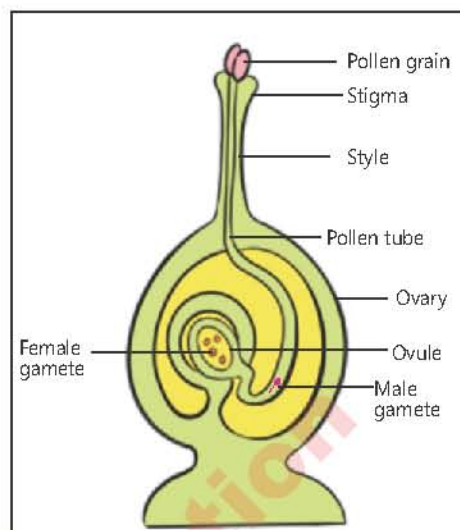
#### Point to Ponder!

Why is cross pollination must for papaya plants?

## 6. Sexual Reproduction in Plants

In flowering plants, sexual reproduction takes place through flowers. As a result of pollination, the pollen grain reaches the stigma. Here, it forms a thin tube in the style called pollen tube. After passing through the style, pollen tube reaches the ovary. Then it enters the ovule.

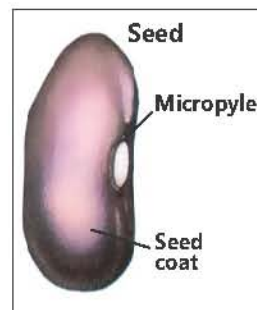
Male gametes are formed in the pollen tube and female gametes are formed in the ovule. The male and female gametes fuse to form a zygote which is called fertilization. The zygote divides many times to form the embryo. Then the ovule becomes seed and ovary ripens to form the fruit.



Sexual reproduction in plant

## 7. Structure of Seed

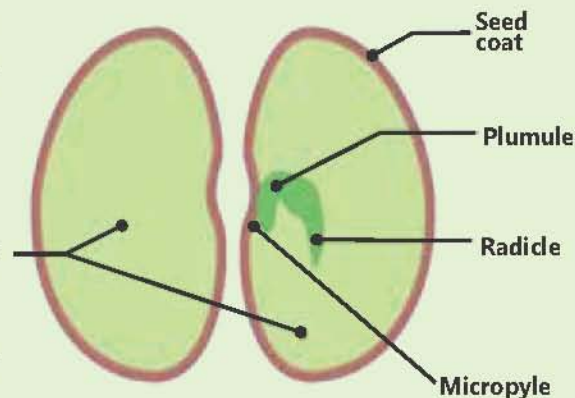
The outer covering of a seed is called seed coat. It protects the tiny embryo which is present inside seed. There is a pore on seed coat. It is called micropyle. Embryo consists of cotyledons, which store food. The axis of embryo is between the two cotyledons. The first part that comes out of the seeds is called radicle. When seed germinates, its radicle forms roots. The other end of the axis is called plumule. It gives rise to the shoot.



### Activity 2.8

Soak few bean seeds and keep them overnight. Study the internal structure of a bean seed:

1. Remove the seed coat.
2. Open the seed longitudinally. How many cotyledons did you see?
3. Draw the longitudinal section of the seed on your notebook.

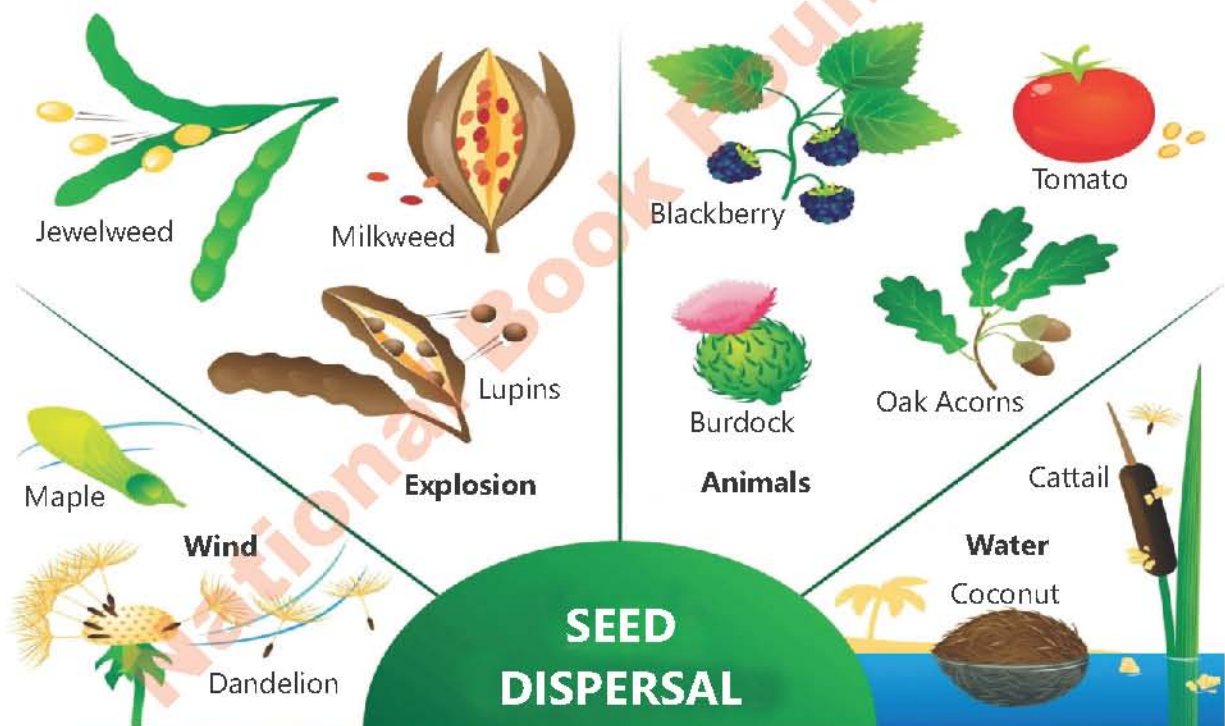




## 8. Seed Dispersal

The process by which the seeds are moved away from the parent plant is called seed dispersal. There are different ways by which seeds are dispersed.

- i. **Wind dispersal:** Seeds which are light weight and have wing like structure are scattered by wind, e.g., maple seeds, cotton seeds, and dandelion.
- ii. **Water dispersal:** Seeds of the plant that grow in or near ponds, lakes, oceans are dispersed through the water e.g., waterlily, coconut, lotus.
- iii. **Animal dispersal:** Many fruits such as guava, tomato, blackberry are eaten by animals. The animals disperse the seeds to different places.
- iv. **Explosion of Fruits:** Some fruit pod containing seeds burst on ripening and scatter their seeds e.g., pea plants, mustard, jewelweed, lupins and milkweed.



### Do you know?

Dispersal of seeds is very important for the survival of plants. If plants grow too closely together, they have to compete for light, water and nutrients of the soil. Seed dispersal allows plants to spread out over a wide area and avoid competing with one another for same resources.

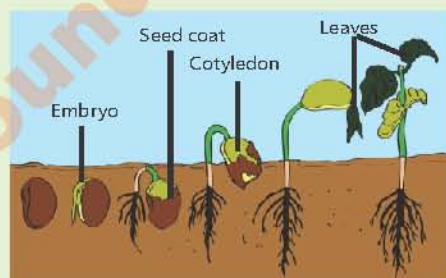
## 9. Seed Germination

The germination of a seed is a process in which a seedling (new plant) comes out of the embryo. During germination, seed absorbs water through its micropyle. On absorbing water, seed swells and the seed coat bursts. The cotyledons of seed provide food to radicle and plumule. The radicle grows towards the ground and gives rise to roots. Then the plumule grows upwards and gives rise to a tiny shoot. The cotyledons form the first leaflets of new plant. These leaflets provide food to the growing roots and shoot till the new leaves appear on the stem.

### Activity 2.9

Predict what will happen if we wrap bean seeds in a wet paper, tissue paper or cotton and put them in a plastic bag.

1. Before sowing bean seeds, keep them soaked in water for the whole night in water.
2. Put saw dust or soil in a transparent plastic cup.
3. Sow the bean seeds in saw dust or sand so that you can observe them easily.
4. After pouring some water, place the cup at a place where it can get sunshine.
5. Keep on pouring some water everyday.
6. Observe the seeds for two weeks and write your observations in the given table.



Days	Observation of Changes in the Seed
3 <sup>rd</sup> day	
6 <sup>th</sup> day	
9 <sup>th</sup> day	
12 <sup>th</sup> day	
15 <sup>th</sup> day	

7. Draw the changes that occurred during fifteen days. Write the changes observed, such as growing length of the plant- according to your observations.

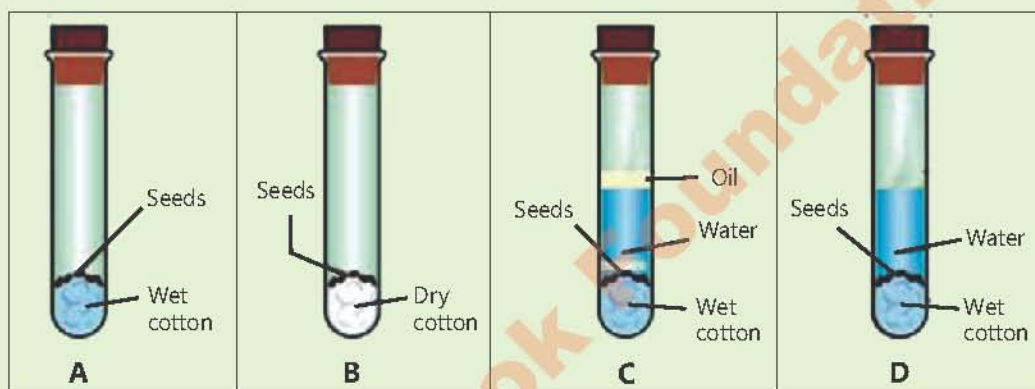


**Do you know?**

Did you ever wonder why roots grow down into the ground instead of up into the air? Root grow down because they grow with the pull of gravitation. Roots will also grow towards water that is found underground.

**Conditions Necessary for Seed Germination**

All seeds need water, air (oxygen) and proper temperature to germinate.

**Activity 2.10**

1. Take four test tubes and mark them as A, B, C, D.
2. Put a wet ball of cotton and add four to five seeds in test tube A.
3. Put a dry ball of cotton and add four to five seeds in test tube B.
4. Put a ball of cotton and add four to five seeds in test tube C. Pour water and then add one or two drops of oil over it.
5. Put four to five seeds in the test tube D and fill half of the test tube with water.
6. Seal the mouth of the four test tubes by corks.
7. Put test tube A, B and C in laboratory at room temperature.
8. Put the test tube D in a freezer.
9. Pour water in the test tube A daily, after removing the cork, so that seeds may not dry up.
10. Observe the seeds for one week and write your observations in the given table.

Test Tube	Number of Germinated Seed
A	
B	
C	
D	

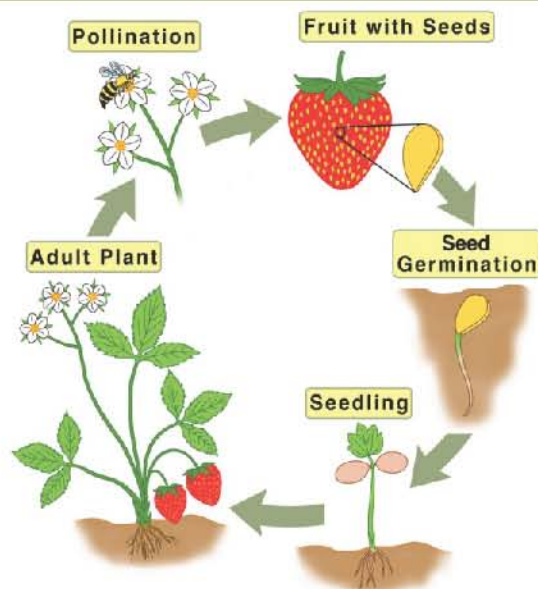
- (i) In which test tubes did the seeds germinate? Why did the seeds not germinate in the test tubes B, C and D.
- (ii) Why were the drops of oil put on the water in test tube C.

In test tube A, all necessary conditions for germination i.e., water, air and suitable temperature are present. There is no water in the test tube B and no air in the tube C. The test tube D has no suitable temperature.

This experiment proves that water, air (oxygen) and suitable temperature are necessary conditions for seed germination.

## 10. Stages in the Life Cycle of a Flowering Plant

The plant life cycle describes the stages of a plant from the beginning of its life till the end. The life cycle of the flowering plant starts with a seed. When the proper condition is met for the seeds, it will begin to sprout. A very young plant that grow after germination is called seedling. The seedling grows into a mature plant. When a plant becomes mature, it starts to grow flowers. The flowers produce seeds.



Life cycle of a flowering plant



## 11. Plants are Vital to Sustaining Life on Earth

Life would not be possible without plants. Why are plants so important? Plants maintain the atmosphere. They produce oxygen and absorb carbon dioxide during photosynthesis. Removal of carbon dioxide from the atmosphere reduces global warming. Plants supply food to nearly all the living things that live on land, including humans. Through transpiration plants remove water from the soil to the atmosphere. Plants provide habitats to many living things. Plants provide us with food, fibre, shelter, medicine and fuel.

## 12. Professions Associated with Plants

There are many career options for those who love working with plants. Here we will discuss only professions associated with plants.

**Botanist:** A Botanist is responsible for researching plant life.

**Farmer:** A Farmer is a person engaged in agriculture, raising organisms for food or raw material.

**Gardner:** A Gardner is a lawn care professional who helps to maintain attractive out door space.

**Florist:** A Florist is responsible for creating floral arrangement for wedding, holidays and other special occasions.



Botanist



Farmer



Gardner



Florist

**Key Points**

1. The plants have been divided into two major groups: the flowering and non-flowering plants.
2. Flowering plants may be herbs, shrub, and trees e.g., mustard, rose, guava etc.
3. Non-flowering plants have no flowers e.g., moss, fern, juniper, thuja etc.
4. Transportation of water in plants takes place through fine tubes. The tubes are continuous in root, stem, and leaves.
5. The root hairs enable the root to take in water and minerals.
6. The evaporation of water vapours from the pores of leaves is called transpiration. Water moves from roots to leaves due to transpiration.
7. The four parts of a flower are sepals, petals, stamens and carpel.
8. Transfer of pollen grains from anther to stigma is called pollination.
9. The two types of pollination are self-pollination and cross pollination.
10. Reproduction is the process by which organisms produce new organism of their own kind for the continuation of their generation.
11. The fusion of male and female gametes results in the formation of zygote. Zygote divides repeatedly and forms embryo.
12. Ovule forms seed. The ovary ripens to form fruit.
13. A seed consists of seed coat, micropyle, cotyledon.
14. Germination is the process of seeds developing into new plants. Example of germination is the spouting of a seedling from seed.
15. For the seed germination the necessary environmental conditions are water, air and suitable temperature.
16. The process by which the seeds are moved away from the parent is called seed dispersal. Seeds are dispersed through wind, water, animal and explosion of the fruits.
17. The stage in the life cycle of a flowering plant are seed, seedling, mature plant having flowers and seeds.
18. Plants are vital to sustaining life on Earth.
19. Professions associated with plant are botanist, farmers, gardeners and florist etc.



**Key Vocabulary**

anthers	nutrients	root	stigma
botanist	ovary	seed development	stored food
fertilization	ovule	seed dispersal	transpiration
filaments	petal	seed germination	transport system
florist	pollination	seed	transported
flowers	pollinators	stalk	
leaves	reproduction	stem	

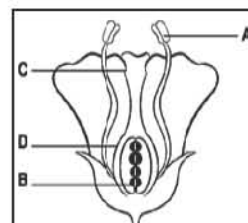


**Weblinks:** Use the following weblinks to enhance your knowledge about the topics in this chapter.

Video of Flower Blossoming	1. <a href="https://pixabay.com/videos/search/blooming%20flowers/">https://pixabay.com/videos/search/blooming%20flowers/</a>
Pollinator	2. <a href="https://www.nationalgeographic.com/news/2015/05/150524-bees-pollinators-animals-science-gardens-plants/">https://www.nationalgeographic.com/news/2015/05/150524-bees-pollinators-animals-science-gardens-plants/</a>

**Exercise****1. Tick (✓) the correct answer.**

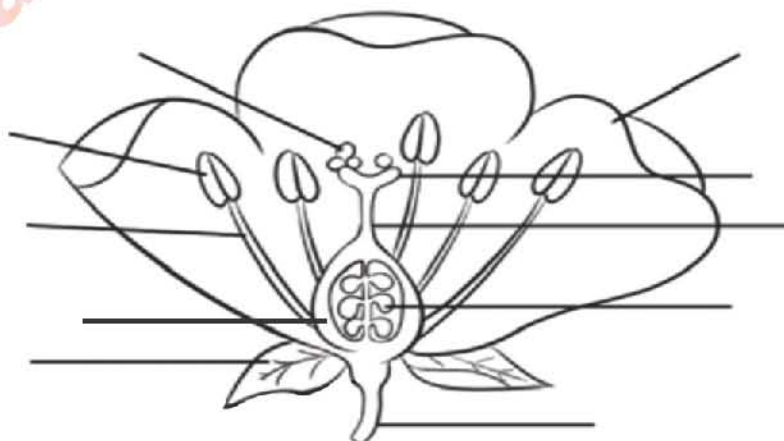
- i. Many plants produce fruits to:
  - (A) protect seed
  - (B) produce food for the seed
  - (C) store water for the seed germination
  - (D) stop seed from germination
- ii. Which part of plant is absent in non-flowering plants?
  - (A) root
  - (B) seed
  - (C) fruit
  - (D) leaf
- iii. Which one of the following is a non-flowering plant?
  - (A) apple
  - (B) rose
  - (C) mango
  - (D) pine
- iv. In the given picture of the flower, which are the female reproductive parts of a flower?
  - (A) B,C and D
  - (B) A,B and D
  - (C) A,B and C
  - (D) A,C and D



- v. Which conditions are necessary for seed germination?
- (A) water, soil, air, darkness (B) air, water, light  
(C) water, temperature, air (D) temperature, soil, light
- vi. Which profession is associated with plants?
- (A) zoologist (B) dentist  
(C) botanist (D) artist
- vii. Pollen grains are produced inside the:
- (A) stamen (B) carpel  
(C) anther (D) petal
- viii. In order to attract insects for pollination petals are:
- (A) brightly coloured (B) many in number  
(C) protected by sepals (D) large in size
- ix. In plants water and minerals are taken up by:
- (A) leaves (B) stem  
(C) roots (D) root hairs
- x. Loss of water from plants in the form water vapour is called:
- (A) transpiration (B) pollination  
(C) reproduction (D) evaporation

**2. Write short answers.**

- i. Write any two differences between flowering and non-flowering plants?
- ii. Give two examples of flowering and non-flowering plants.
- iii. How transportation of water takes place in plants?
- iv. Differentiate between self-pollination and cross pollination?
- v. Label the given diagram.





- vi. Describe the stages in the life cycle of a flowering plant.
- vii. Why are plants vital to sustain life on earth?
- viii. What is the role of the following:
  - (a) Botanist
  - (b) Farmer
  - (c) Gardner
  - (d) Florist

### 3. Constructed response question.

- i. Observe the given pictures. What is the role of water in seed germination?



Plain water

Water with salts



Water with sugar

Water with vinegar

- ii. Observe the given pictures. For which type of pollination, the shapes and structures of flowers are suitable?



### 4. Investigate:

- i. What will happen if the root of the plant is cut off by mistake?
- ii. What would happen if there were no leaves or stems?
- iii. What is the role of flowers in the life cycle of a flowering plants?

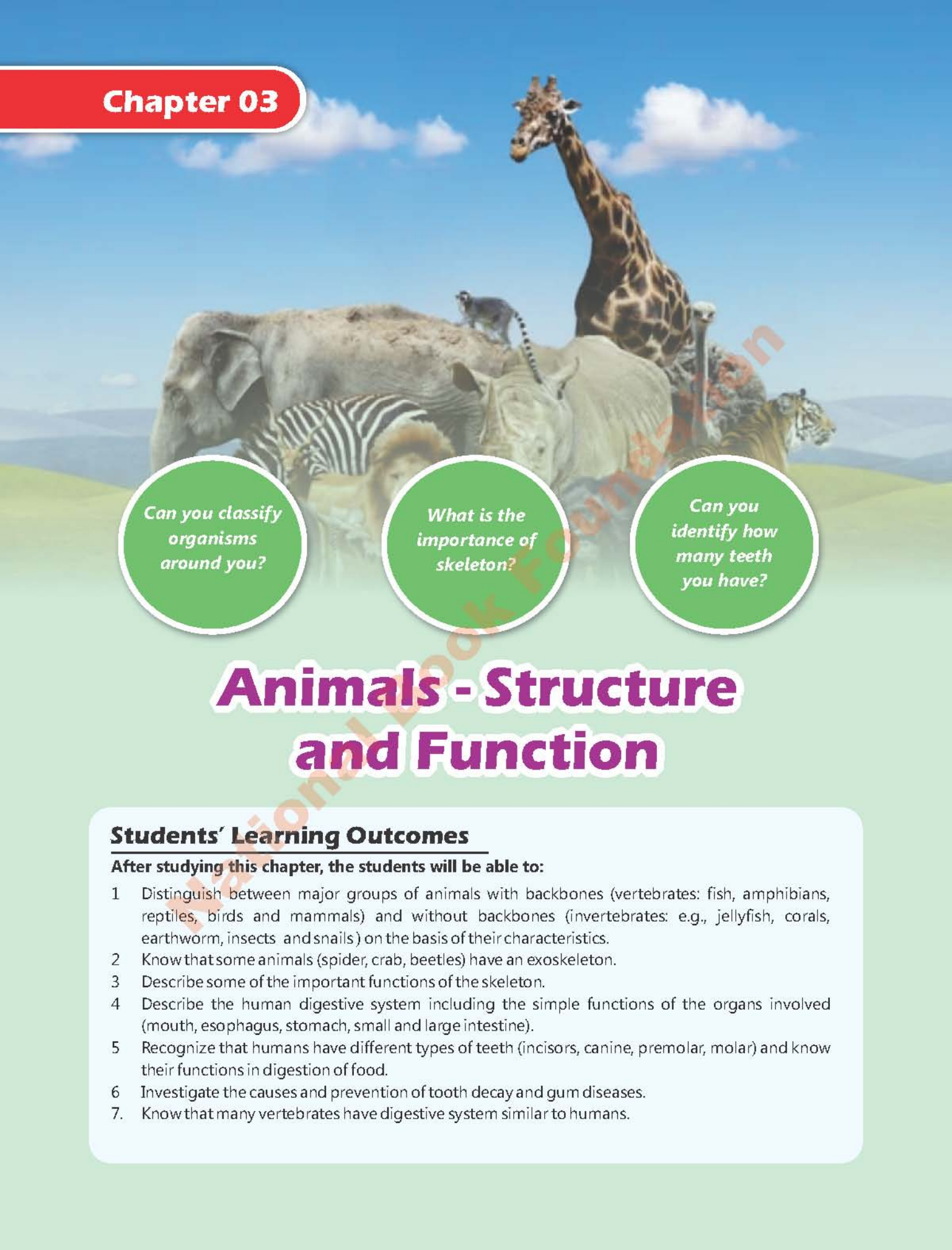
**5. Project:**

- i. Collect five different types of flowers. Observe which flowers have the sepals, petals, stamen, and carpel and in which these are absent? Compare the structures in different flowers.
- ii. Using low-cost or no-cost materials, make a model of a flower. The following are pictures of four models given for your guidance.





## Chapter 03



*Can you classify organisms around you?*

*What is the importance of skeleton?*

*Can you identify how many teeth you have?*

# Animals - Structure and Function

### **Students' Learning Outcomes**

**After studying this chapter, the students will be able to:**

- 1 Distinguish between major groups of animals with backbones (vertebrates: fish, amphibians, reptiles, birds and mammals) and without backbones (invertebrates: e.g., jellyfish, corals, earthworm, insects and snails) on the basis of their characteristics.
- 2 Know that some animals (spider, crab, beetles) have an exoskeleton.
- 3 Describe some of the important functions of the skeleton.
- 4 Describe the human digestive system including the simple functions of the organs involved (mouth, esophagus, stomach, small and large intestine).
- 5 Recognize that humans have different types of teeth (incisors, canine, premolar, molar) and know their functions in digestion of food.
- 6 Investigate the causes and prevention of tooth decay and gum diseases.
7. Know that many vertebrates have digestive system similar to humans.

## 1. Classification and Characteristics of Animals

The animals have been divided into two main groups i.e., the vertebrates and invertebrates.

### Activity 3.1

Look at the pictures. What differences do you see between the pigeon and butterfly. ? Write your observations.



All vertebrates have backbone in their body. They have an internal skeleton made of bones. Their body is divided into three main parts: head, abdomen and tail. The brain is present within the skull. They have great ability to hear, see, smell, taste and feel. The blood circulates in the blood vessels of the body. The skin of vertebrates is covered with scales, feathers and hair of different groups.

Various types of invertebrates are found on the Earth. The invertebrates are animals with no backbone. The body structure of invertebrates is of different types. Some are flat, some are round and some are segmented. The body parts of invertebrates are different in different groups.


## 2. Classification of Vertebrates

The vertebrates are divided into five groups i.e., fish, amphibians, reptiles, birds and mammals.

### 1. Fish

Fish live in water. Most fish have streamlined bodies. The streamlined body is one that tapers at both ends. The head and tails are smaller and more pointed than the middle part of the fish. Most fish have scales which cover and protect their bodies. Most fish breathe through gills.

Fish have fins and tails which help them to swim. Reproduction in fish takes place through eggs. Their body temperature, depends on the temperature of their surroundings.

				
Rohu	Shark	Catfish	Goldfish	Butterfly fish
Fish				



**Do you know?**

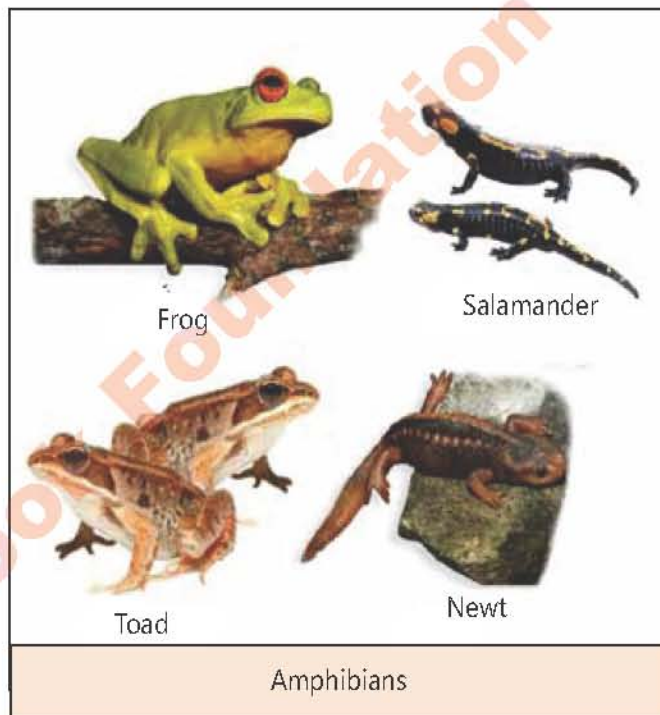
Some fish live in icy water. Others live in the warm water. Fish come in all size. The pygmy goby is just a little bigger than a centimeter, but the huge whale shark can measure up to 18 meters. The colours of fish vary. Fish may be dull gray, bright red, yellow or blue. In fact, they come in all the colours of the rainbow.

**ii. Amphibians**

Amphibians can live on land and also in water. They respire through lungs and skin. Usually their skin is moist and loose. They live on land but lay eggs in water. Their development takes place in water. Their body temperature depends on the temperature of their surroundings. Frog, toad, salamander and newt are the examples of amphibians.

**Point to Ponder!**





What is the difference between a toad and a frog?

**Do you know?**

Why amphibians could not flourish in the whole world? They are not found in the whole world because they cannot live away from water. They depend on water for reproduction and development.

**iii. Reptiles**

Reptiles are also called creeping animals. Their skin is thick, coarse and dry which protect their body from external effects. They reproduce by laying eggs on land. Their body temperature depends on the temperature of their surroundings. Lizard, crocodile, snake, tortoise are the examples of reptiles.

			
Tortoise	Snake	Crocodile	Lizard
Reptiles			

**Do you know?**






1. Dinosaurs were the largest reptiles of the ancient times but they have become extinct.
2. Compared to the amphibians, the reptiles flourished all over the world because they do not depend on water for reproduction.



Dinosaurs

**iv. Birds**

The birds have feathers and beak. Their bones are hollow, thus their body weight is less. Besides lungs, birds also have air sacs. Birds can fly in air. Some birds can swim in water e.g., duck. Some birds cannot fly and are called running birds e.g., Kiwi, Ostrich. All birds lay eggs. The birds that live in water have webbed feet e.g., duck. The body temperature of birds does not depend on the external environment. Dove, sparrow, kiwi, ostrich, rooster, pigeon and parrot are the examples of birds.

				
Dove	Sparrow	Kiwi	Ostrich	Rooster
Birds				



**Do you know?**

Eagle is a large bird of prey, which lives on high trees or rocks. Humming bird is the smallest bird. Hawk is a hunter bird. Woodpeckers live in the holes that they make in tree trunks.



Hawk



Hummingbird



Eagle



Woodpecker

**For Your Information**

1. Birds have evolved from a generation of carnivore dinosaurs.
2. How are the birds different from reptiles? The body temperature of birds does not depend on the temperature of external environment, so they remain active round the year. They show parental care. They make nests to live. They migrate from one place to other.

**Interesting Information**

Some interesting facts about the birds:

1. Birds are the only animals with feathers.
2. We can find birds all over the world.
3. Birds flock together to protect themselves.
4. Some birds can mimic human speech.
5. The ostrich has the largest eyes of any land animal.
6. Crows can recognize human faces.
7. Birds communicate with colour and sound.
8. Birds do not have teeth.
9. Kiwi birds are blind, so they hunt by smell.
10. The first bird domesticated by humans was goose.

A few birds of Pakistan:



Chukar



Peacock



Cuckoo



Parrot



Pigeon



Maina



**Do you know?**

Penguin is a bird that lives on snow in the South Pole. Penguin can jump so high as nine feet. The penguin is the only bird that can swim but cannot fly. It is also the only bird that walks upright.



## v. Mammals

These animals give milk. They have fur or hair on their body. Mammals give birth to their young ones and feed them on milk. The body temperature of mammals does not depend on the temperature of the external environment. The examples of mammals are horse, cow, goat, lion, cat and human.

			
Horse	Cow	Lion	Cat
Mammals			

### Interesting information

1. **Polar bear** lives in the snowy regions of the North Pole. Its body has a thick covering of fur.
2. **Elephant** lives in hot climate so its body is not covered by thick layer of hair or fur.
3. **Bat** is a flying mammal.
4. **Platypus** is a mammal. The female lays eggs and feeds milk to the young ones.
5. **Kangaroo** keeps its newborn babies in external pouch on the belly.

				
Polar bear	Elephant	Bat	Platypus	Kangaroo

### Interesting Information

Among the vertebrates in the world, birds and mammals are the largest groups. What is the reason? The reason is that both show parental care. Such as you must have seen how hens and cats take care of their young ones.



**Activity 3.2****Using Identification Keys**

Use classification keys to sort animals in different groups based on their physical and behavioral characteristics (vertebrates and invertebrates).

**Activity 3.3****Vertebrates**

- Students could make a model of vertebrae (or a whole spine) using modelling clay. Alternatively, a piece of tubing and card could be used; the card could be cut into the shape of the vertebrae and slotted along the tubing).
- Students could draw diagrams of the skeletons of different vertebrates and label the backbone.

**3. Classification of Invertebrates**

The major group of invertebrates are jelly fish, corals, earthworm, insects and snail.

**i. Jellyfish**

Jellyfish are really not a fish. They live in sea. They have umbrella shaped bells having stinging tentacles. They are free swimming animals. They swim by taking in and giving off water. They are large and transparent often colourful.



Jelly fish

**ii. Corals**

Corals are found only in sea. Corals are a large group of colourful animals. They exhibit variety of colours. They have single mouth surrounded by stinging tentacles. There are two types of corals, hard corals and soft corals. Hard corals have rock like skeleton. Soft corals resemble brightly coloured plants. Corals live in colonies.



Corals



**Do you know?**

Coral reefs are made up of colonies of thousand of tiny corals. Coral reefs protect coastline from storms and erosion.

**iii. Earthworm**

Earthworm lives in the moist soil. Its body is round, cylindrical. It is reddish brown in colour. The body is divided into segments. Each segment has bristles. The bristles help in the location of the earthworm. The body begins with a mouth and ends in anus. Earthworm respire through its moist skin.



Earthworm





**Do you know?**

Earthworms can regenerate if they are cut near the head or tail. Earthworms enrich the soil by breaking down decaying matter, and adding their waste products to the soil. As the earthworms feed, they allow air and water to enter the soil. These help the plants to grow.

**iv. Insects**

The insects are invertebrates with jointed legs. Their body is segmented. The body is divided into three parts: head, thorax and abdomen. The number of legs is six or three pairs. The external surface of the body is hard, which is called exoskeleton. The exoskeleton protects and supports the body.



			
Wasp	Cockroach	Mosquito	Honey bee
Insects			

**Do you know?**

Leaf insects look like a leaf, which helps to remain hidden from the enemy.



Leaf insects

**v. Snails**

Snails live on land or sea, pond, stream etc. Snails have one hard shell which protects their soft body. Snails have a large foot for movement. There are two tentacles on the snail's head. Some snails have two eyes on the tip of the two tentacles. The tongue, has thousands of tiny teeth, acts like a nail file enabling the snail to scrape the food. These animals get their food from leaves, fruits and vegetables etc.



Snail

**4. Skeleton**





Press your hand. Is there something hard in it? The hard part of the hand is called bone. Most of the bones in the human body are hard. They are of various size and shape. For example, the bones of the arm are longer than the finger bones.

Joints are the areas where two or more bones meet. All the bones of the body make a frame called skeleton.

It is of two types: exoskeleton and endoskeleton.

### Exoskeleton

The word exoskeleton means 'outside skeleton. Many animals without backbone have exoskeleton e.g., beetles, butterflies, etc. The other animals that have exoskeleton are spider and crab etc.

			
Beetles	Butterflies	Spider	Crab
Animals having exoskeleton			

### Activity 3.4

#### Animals with Exoskeleton

Students could draw animals that have exoskeletons (e.g. insects, snails and shellfish) and label the different types of exoskeleton. Including animals such as tortoises and turtles will add challenges as they have both internal skeletons and an exoskeleton feature (a shell). Clarify that as they have a backbone turtles and tortoises are classed as vertebrates.

### Activity 3.5

#### Human Skeleton

Students could label the main bones on a picture or a model of a human skeleton. Students could use straws (or sticks) to make a physical model of a human skeleton. They could then label the main bones.

Students could add labels to a diagram of a human skeleton with its main functions. For example:

- The skull protects the brain.
- The spine gives shape to the body.
- The bones in the arms and legs help the limbs to move.

Students could construct a shelter to protect a soft object to represent how the skull (or rib cage) protects the brain (or other major organs).

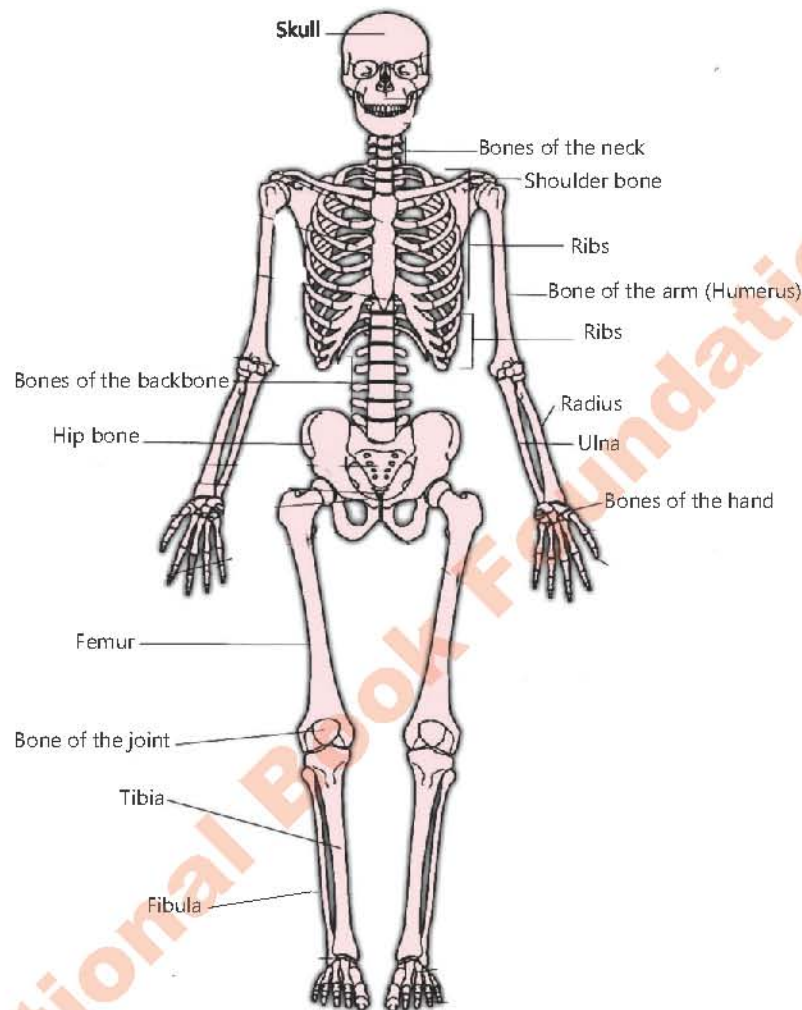
Students could make a simple model of a hand using cards, straws and string to demonstrate how the skeleton helps to enable movement.

Guidance on how to make a simple model of the hand can be found on the internet.



## Endoskeleton

The skeleton that forms the support structure inside the body is called endoskeleton.



Bones of the human body

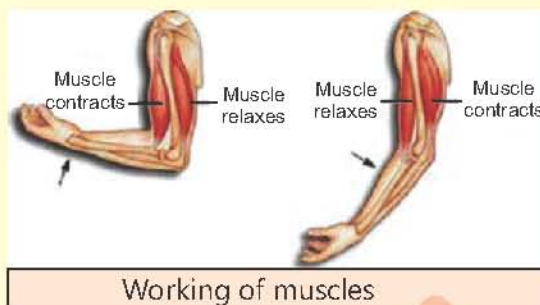
### Activity 3.6

Complete the table.

Name of the Bones	Function
Skull	
Ribs	
Bones of hand	
Bones of leg	

**Do you know?**

When the muscles contract, they pull various parts of our bones. Due to this, the bone moves at the joint. Joint is a place where bones are connected. For example, elbow, wrist, knee etc. Muscles work in pairs. When one muscle contracts, the other one relaxes.



## 5. Important Functions of Skeleton

The skeleton has several important functions. It supports and gives shapes to the body. The skeleton protects the organs inside the body such as brain, lungs, liver, heart.

The skeleton is also important because it enables the body to move. Muscles that are attached to the skeleton move your bones, so that you can walk, sit, run swim. The skeleton also produces blood cells.

**Interesting Information**

Your skeleton is made of bone and cartilage. Touch your nose and ears. Notice how easily they move. Your nose and ears contain cartilage.

## 6. Human Digestive System

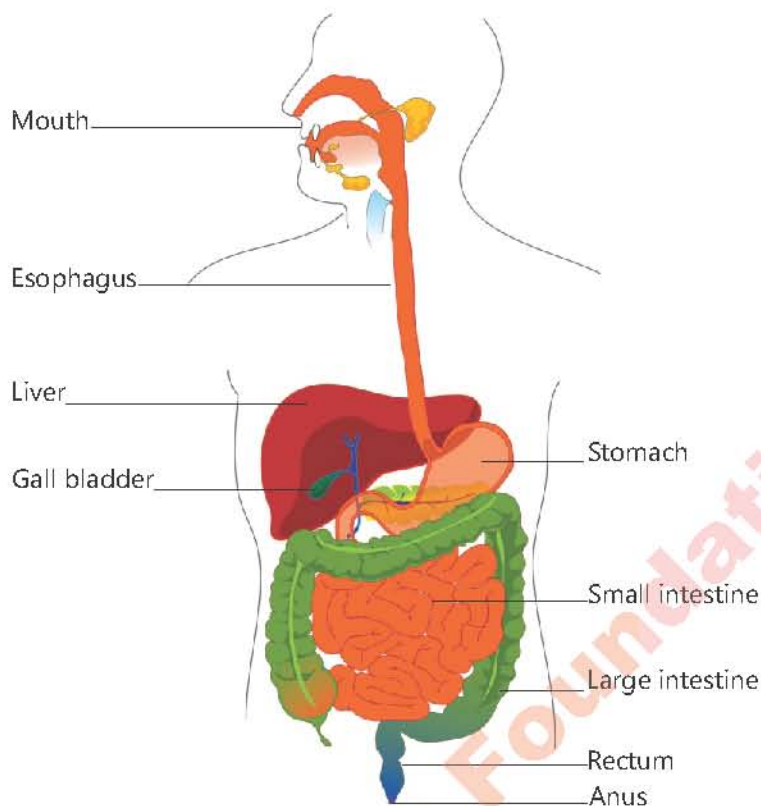
The breakdown of food into small components, that can be absorbed by the blood stream, is called digestion. Think about the food you are taking in the breakfast. It may be bread, egg and milk. Can the egg enter your body cells? Before your cells can use the nutrients in the egg or any food, they must be broken down.

The different body parts that are involved in the process of digestion make up the digestive system. The organs of the digestive system are the mouth, esophagus stomach, small intestine and large intestine. The liver, gall bladder and pancreas also help in the process of digestion.

### Mouth

Digestion of food starts in the mouth. Food is broken down into smaller pieces by the action of teeth. The food is then mixed with saliva. When food is swallowed the tongue passes the food to the throat and then into the esophagus.





Human digestive system

### Esophagus

The esophagus is a narrow tube. No digestion takes place here. Its muscles contract and relax, and pushes the food to the stomach.

### Stomach

The stomach is a large sack like organ. Its wall secretes juice. The juice breaks down the food. The food becomes semiliquid. It is released into the small intestine.

### Small Intestine

The liver produces bile, which is stored in the gall bladder. Bile enters the first part of small intestine. Bile breaks up large fat droplets into smaller fat droplets. Breaking down of food particle is performed by the juice secreted by pancreas and small intestine. Digestion ends in the small intestine. The digested food particles are absorbed by the blood stream through tiny finger like projections on the inner wall of the small intestine. Undigested food is passed on to the large intestine by the movements of muscles of the small intestine.







Finger like projections

## Large Intestine

In the large intestine excess of water and minerals are absorbed into the bloodstream. The remaining undigested contents move into the rectum and are stored as feces. The feces are given out of the body through the anus.

## Human Teeth

Can you swallow large pieces of bread or meat without chewing? Digestion essentially starts by chewing. Teeth help breaking down the food into smaller pieces. There are four types of teeth that perform various functions.

Name	Picture	Functions
Incisors		Biting and cutting food
Canines		Piercing and tearing food
Premolars		Chewing and grinding food
Molars		Chewing and grinding food

### Interesting Information

A tiger has large canines whereas a rat has large incisors. A tiger uses its canines for piercing the prey and rat uses its incisors for biting food or killing prey.



Canines



Incisors



**Activity 3.7****The different types of teeth and their functions.**

Q. What do teeth look like? What is their function?

The teacher will ask the students to look at their teeth in mirrors, to use their tongue to feel their teeth and to discuss what they notice.

Q. Are all your teeth the same shape?

Q. How are they different from each other?

Q. How many teeth do you have?

Using a large model (or diagram) of human teeth, the teacher will show students the different types of teeth and their functions, introducing and discussing the terms 'incisors', 'canines', 'premolars' and 'molars'. The student will use their mirrors to find these different kinds of their teeth in their own mouths.

The students will be given a piece of food to eat that is large enough to require taking a bite out of it using incisors and canines (e.g., a piece of bread, a cracker/biscuit, a piece of fruit). As they bite and chew, the teacher will discuss which teeth are doing which jobs: firstly, the incisors bite off chunks or canines rip food, then the premolars and molars grind down the food so it is small and soft enough to swallow.

On a black and white drawing of a human set of teeth, students colour in the different types of teeth different colours. Students create a key at the side so it is clear which teeth have been given which colour. Then they label the diagram with the function of each type of tooth. Finally, the teacher will highlight how the diagrams are useful as they clearly show the locations of the different types of teeth, but they differ from the real thing as our teeth are not many different colours.

**7. Tooth Decay and Gum Diseases**

The two important diseases of teeth are tooth decay and gum diseases.

**Tooth Decay**

It is the formation of cavities in the tooth. It is caused by bacteria in the mouth.

To prevent tooth decay brush your teeth after each meal specially before going to bed.



Tooth decay

### Gum diseases

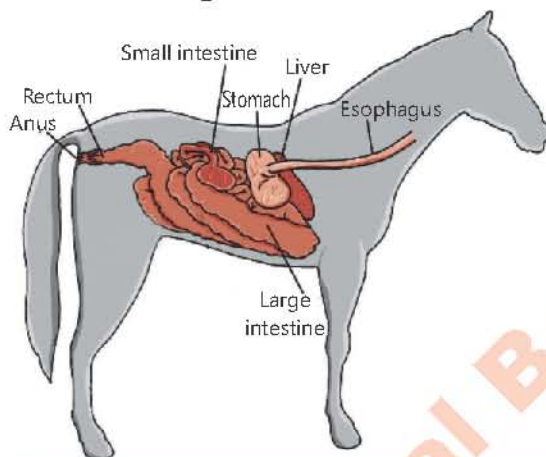
In gum diseases the gums can become swollen, red, and they may bleed. The causes of gum diseases are plaque build up, smoking, chewing tobacco and crooked teeth. To prevent gum diseases brush and floss everyday to remove the bacteria that cause the gum diseases.



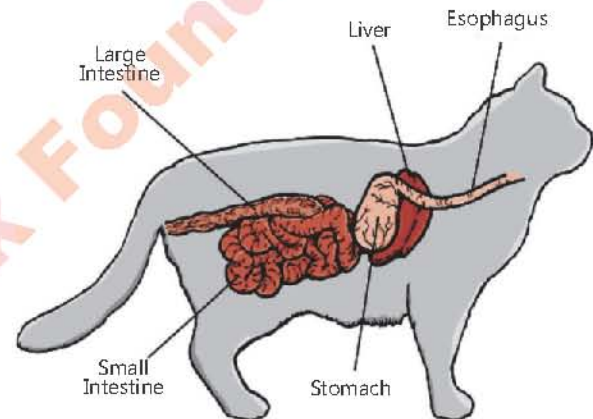
Gum diseases

## 8. Many vertebrates have a digestive system similar to humans

Humans and apes such as bonobos, chimpanzees, gorillas and orangutan, horse, cat etc., have a digestive system similar to human. They have a simple stomach, small intestine, large intestine, rectum and anus.



Digestive system of horse



Digestive system of cat

## 9. The First Aid Box

A temporary and emergency care given to an injured or a sick person is called the first aid. The purpose for the first aid is to provide immediate relief to a person in an urgent medical condition.

Have you seen a First Aid Box?

A First Aid Box contains the following items that are used for providing instant first aid to a patient or injured of an accident:

### First Aid Box





## Handbook of First Aid Box

This handbook provides basic information about measuring body temperature, dressing wounds, stopping blood loss, and other emergency treatments of the patients or victims.

### Tweezers and Scissors

Tweezers are used for picking up shards, thorns, or other bits from a wound. Scissors are used for cutting the bandages.

### Cotton and Spirit

Cotton and spirit are used to clean the wound before bandaging.

### Bandage Spirit

Cotton or other cloth bandages are wrapped and sealed with medical adhesive tape on small wounds.



### Gauze

Gauzes are used to cover wounds and for absorbing seeping blood.

### Medical Tape

It is used to dress up the bandages.

### Medicines and Creams

Some medicines and creams are also kept in the box to relieve the pain, inflammation and minor injuries.

**Instant Cold Pack**

It is a pack that is activated by shaking and which immediately cools an aching or inflamed part of body. It is used to reduce inflammation and pain.

**Thermometer**

It is a device used to measure body temperature.

First aid boxes are available at pharmacies and medical stores. We can also make our own by keeping some basic materials in a box or any container.

**Activity 3.8**

Make your own First Aid Box using items available at your home.



## Key Points

1. Dividing organism into groups on the basis of similarities and differences is called classification.
2. Due to classification, organisms can be identified and their relationships can be known.
3. Animals are divided into two groups: the vertebrates and invertebrates.
4. The major groups of vertebrates are fish, amphibians, reptiles, birds and mammals.
5. The five major groups of invertebrates are jellyfish, corals, earthworm, insects and snails.
6. Some animals have an exoskeleton e.g., earthworm, insects and snails.
7. Some animals have an endoskeleton e.g., cow, goat, horse.
8. The organs of human digestive system are mouth, esophagus, stomach, small intestine, and large intestine.
9. In mouth food is chewed and mixed with saliva.
10. Esophagus is a narrow tube. In esophagus no digestion of food takes places.
11. Stomach is a large organ. Its walls secrete juice, which digest the food. Here the food becomes semifluid.
12. Small intestine receives secretions from liver and pancreas which digest the food. The digested food is absorbed by finger like projections. The digested food particles are transported to all parts of the body through the blood. The process of digestion is completed in the small intestine.
13. In large intestine excess of water and minerals are absorbed. The feces is stored in the rectum and given out of the body through the anus.
14. The five types of teeth are: incisors, canines, premolars and molars. They perform particular function.
15. The two important diseases of teeth are tooth decay and gum diseases.
16. Many vertebrates have a digestive system similar to humans e.g., chimpanzees, gorilla, horse, cat etc.
17. A First Aid Box contains items that are used for providing instant first aid to a patient or injured of an accident.

**Key Vocabulary**

backbone	fibula	movement	skeleton
bone	function	muscles	skull
canines	incisors	premolar	support
endoskeleton	invertebrates	protect	tibia
exoskeleton	major organs	radius	ulna
femur	molar	ribs	vertebrates



**Weblinks:** Use the following weblinks to enhance your knowledge about the topics in this chapter.

Digestive system of man	1. <a href="https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works">https://www.niddk.nih.gov/health-information/digestive-diseases/digestive-system-how-it-works</a>
Animals	2. <a href="https://kids.nationalgeographic.com/animals/">https://kids.nationalgeographic.com/animals/</a>

**Exercise****1. Tick (✓) the correct answer.**

- i. Which characteristics is common among butterfly, bird and bat?
 

(A) teeth	(B) hair
(C) bones	(D) wings
- ii. Which one is an example of invertebrates?
 

(A) cat	(B) butterfly
(C) lizard	(D) frog
- iii. Which statement is correct for all vertebrates?
 

(A) have fur	(B) have more than four legs
(C) have backbone	(D) can fly in air
- iv. Which one of the following is the foot of an aquatic bird?

**A****B****C****D**

- v. To which group does the cat belongs?
 

(A) amphibians	(B) reptiles
(C) birds	(D) mammals



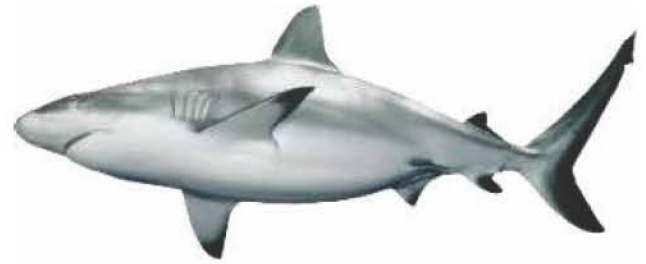
- vi. Which organ does a fish use to respire?  
(A) gills (B) lungs  
(C) air sac (D) skin
- vii. Which group is found only in ocean?  
(A) insects (B) snails  
(C) earthworm (D) jellyfish
- viii. Which of the following animal is NOT a function of skeletal system?  
(A) providing support for the body  
(B) protecting the body  
(C) keeping the body warm  
(D) giving the body shape
- ix. Which of the following are used for piercing and tearing food?  
(A) incisors (B) canines  
(C) premolars (D) molars
- x. Which animal has digestive system similar to human?  
(A) cat (B) earthworm  
(C) lizard (D) frog

## 2. Write short answers.

- i. State the importance of classifications.
- ii. Write the differences between:  
a) Insects and Snails  
b) Amphibians and Reptiles  
c) Birds and Mammals  
d) Endoskeleton and Exoskeleton
- iii. Write any three important functions of skeleton.
- iv. Write the functions of the following in human digestive system.  
a) Mouth b) Esophagus  
c) Stomach d) Small Intestine  
e) Large Intestine f) Liver  
g) Gall bladder h) Pancreas
- v. What do teeth look like? What is their function?
- vi. Are all your teeth the same shape? How they different from each other?
- vii. How many teeth do you have?
- viii. Write the functions of: Incisors, Canines, Premolars, Molars.
- ix. Explain the causes and prevention of tooth decay and gum diseases.
- x. What do you do to take care of your teeth?
- xi. What might happen if we do not have care of our teeth?
- xii. Describe briefly the First Aid Box.

**3. Constructed response questions:**

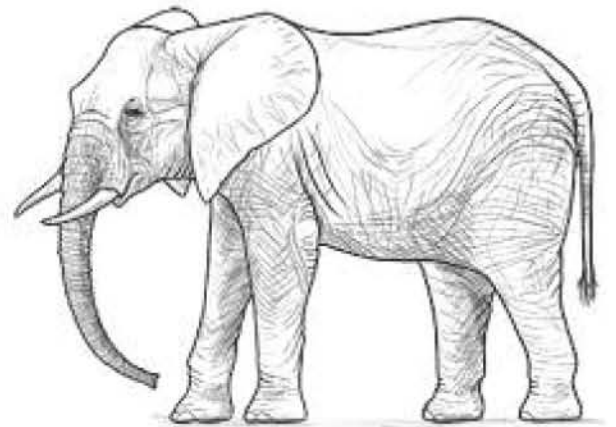
- i. Some animals have internal skeleton of cartilage such as Shark and Sting Ray. They feed on other animals by predation. What is the importance of cartilage in their life?



- ii. Why do zebras have black and white stripes?



- iii. Why do elephants have large ears?

**4. Investigate:**

- i. How are the invertebrates useful for humans?
- ii. What is the importance of exoskeleton?



**5. Project:**

- i. Construct model of main organs of the human digestive system.
- ii. Construct model of different types human teeth and describe their functions.

**Album of Animals****Materials Required:**

- |                                |                     |
|--------------------------------|---------------------|
| a. Old newspaper and magazines | b. Scissors         |
| c. Gum                         | d. Coloured markers |
|                                | e. Album            |

**Procedure:**

- i. Cut pictures of two animals from each of the five groups of vertebrates.  
The pictures can also be downloaded from the internet.
- ii. Paste the pictures on the album.
- iii. Write characteristics of each animal under its picture.  
Example: Fish



- It has fins and tail.
- Its body has scales.
- Its body is broad in the middle.

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