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Reproduction in Plants

Learning Objectives

1. Plants and their various characteristics
2. Reproduction in plants by seeds
3. The structure of a flower
4. The structure of a seed and stages of seed germination
5. The features of seed dispersed by various agents
6. The various steps involved in growing crops

Let Me Answer

- Cyclic process of starting a new life, growing, and then coming back to the starting stage (reproducing) is known as what?

PARTS OF A FLOWER

- Petals
- Sepals
- Stamens
- Pistils

PLANTS ARE OUR GREEN FRIENDS.

Plants make the world a beautiful place, where we live in their presence. They are very important to us. Do you know, why ? Let us recall the characteristics common to all plants and animals.

Movement

Just like animals, plants too show movements, such as opening and closing of petals, turning face to the sun etc.

Breathing

Animals breathe in oxygen and breathe out carbon dioxide where as plants take in carbon dioxide and give out oxygen.

Sensitivity

Animals are sensitive to external changes due to the presence of sense organs. Plants too are sensitive to light and gravity. Stems grow upwards, and roots grow downwards.

Both plants and animals grow during their lifetime.

Animals depend on others for their food, but plants make their own food using sunlight.

Animals give out waste, such as sweat, carbon dioxide, urine etc. Plants give out oxygen and water vapour.

Plants and animals reproduce more of their own kind.
You have already learnt in the earlier classes, about some of the characteristics of living things. Now you are going to learn more about growth, respiration and stimuli in living things.
In this lesson, we will be able to learn how plants reproduce. Reproduction is a process by which plants multiply to make more of their own kind. In plants, reproduction takes place by seeds, spores or by vegetative propagation.

REPRODUCTION

All flowering plants reproduce by giving rise to seeds. Seeds are produced inside fruit, which develops from a flower.

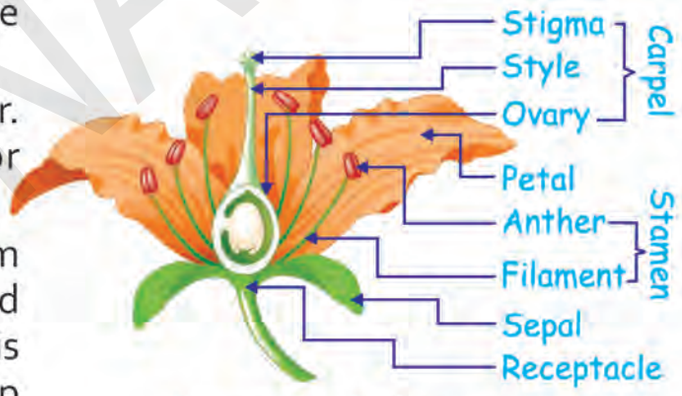
Structure of Flower

A flower has four parts – petals, sepals, stamens and pistil.

Sepals are green small, leaf like structures at the base of the flower. They protect the developing bud.

Petals are bright coloured parts of the flower. They are bright and attract insects for pollination.

Stamens are the third part of the flower from outside. A stamen has two parts : anther and filament. The anther carries pollen grains. It is generally yellow in colour. An anther is held up by a thread-like part called the filament.



Structure of a Flower

Pistil is the innermost part of the flower. The pistil has three parts : stigma, style and ovary. The stigma is the sticky surface at the top of the pistil. It traps and holds the pollen. The style is the tube-like structure that holds up the stigma. The style leads down to the ovary that contains ovule. The pollen grains formed inside the anther

move from the anther to the stigma. This process is called pollination.

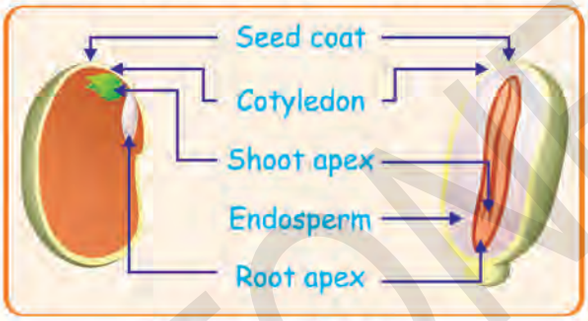
When a pollen grain lands on the stigma, a tiny tube grows from it and moves down the style into the ovary. On reaching the ovary, it fertilizes the ovule. Then the ovule becomes the seed and the ovary becomes the fruit.

Seeds of a plant differ from the seeds of other plants in their number, shape, size, texture and colour.

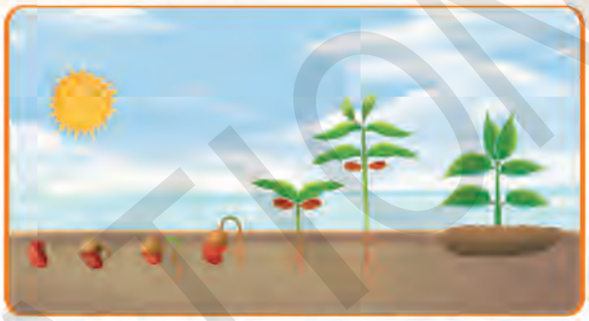
Structure of seed

Let us perform an activity to study the external and internal structure of a seed. All seeds have an external covering called the seed coat. It is of different colours in different seeds. Its function is to protect the seed.

There is a scar on one side of the seed. This is where the seed was attached to the plant. On the top of the scar, you will find a small hole. The seed absorbs water through this hole. The two parts of the seed are called seed leaves or cotyledons. They store food for the baby plant inside. The baby plant is present between the cotyledons. It develops a new root system and a shoot system, and grows into a new plant.



Structure of a Seed


Stages of seed Germination

Seeds like bean, rajma and pea have two cotyledons. They are called dicotyledonous seeds. Some seeds like rice, wheat and maize have a single cotyledon. They are called monocotyledonous seeds.

Germination of seeds

The development of a new plant from a seed is called germination. A seed needs the right amount of water, air and warmth to germinate.

Stages of seed germination

The seed first absorbs water through its hole. This softens the seed coat, so it ruptures. A small root emerges from the seed. It is called the radicle. It grows downwards. Then a small shoot emerges from the seed. It is called the plumule. It grows upwards. The seed with a small root and a small shoot is called a seedling. The growing seedling uses the food stored in the cotyledons for growth. After a few days, green leaves start appearing on the shoot. These leaves make food by the process of photosynthesis. The cotyledons dry up and fall off as all the food in them is used up. The seedling then develops into a new plant.

Seed Dispersal

The process of spreading seeds to different places is called seed dispersal. Seeds need to be dispersed because if they are not dispersed, many germinating seedlings will grow very close to the parent plant. This will result in competition among seedlings as well as with the parent plant. The competition is for light, space, water and nutrients. All of these are important for plants to grow. Seeds can be dispersed in a number of different ways. They may be carried by wind, water or animals. Some plants even shoot out their seeds explosively. The size of seed is an important factor in their dispersal.

Dispersal of seeds by wind

Seeds dispersed by the wind must be light and small in order to be carried by the wind. This means that they can be carried to greater distances. They have hairs or wings to help them get carried away by the wind. The seeds of hiptage, dandelion and cotton have tufts of hair. Sycamore seeds are winged. They spin through the air like mini-helicopters.

Dispersal of seeds by water

Plants which grow in rivers, oceans and ponds or near water bodies, use water for the dispersal of seeds. The lotus fruit has a spongy part which helps it in floating.

Have you seen a coconut ? It is hollow on the inside and is covered with hairs on the outside. This makes it light and hence it can be carried by flowing water over long distances.

Dispersal of seeds by animals and humans

Animals and humans eat fruits and throw away their seeds. Seeds of apple, mango, orange etc., are dispersed in this way. Some seeds have hooks that stick to the fur of animals or to the clothes of humans and get dispersed. Such an example is of the cocklebur seeds.

Birds swallow some seeds which come out with their droppings. Squirrels collect nuts and bury them to be used in winters. They often forget where they had buried the seeds. So when the conditions become favourable, these seeds grow into new plants. While eating fruits, some seeds get stuck on the beaks of birds. When they rub their beaks on the bark of trees, the seeds fall down and later on they grow into new plants.

Seeds of Dandelion with Tufts of Hair

The Spongy Part of a Lotus Fruit

Coconut can be dispersed by water.

Cocklebur Seeds with Hooks

Dispersal of seeds by explosive method

Some plants have pods which explode and burst open when they ripe. This scatters the seeds in all directions. Examples are balsam, pea, lady finger and tamarind.

2. New plants from spores

Some non-flowering plants do not produce flowers. But, they too need to reproduce. So, they reproduce with the help of spores. The spores are small, round and light. They can be dispersed easily in various directions to give rise to new plants. Spores are found in fungi like mushrooms and moulds.

3. Vegetative Propagation

When plants reproduce with the help of their body parts such as roots, stems and leaves and not through seeds, it is called vegetative propagation.

4. Reproduction by roots

Carrot, turnip, radish and sweet potato are the roots that store food in them. They are swollen because of stored food and are called tuberous roots. When these roots are planted in soil, they give rise to new plants.

5. Reproduction by stems

Onion, ginger and potato are underground stems. They also have stored food in them. These stems bear buds from which new plants can grow.

6. Reproduction by Leaves

Reproduction by leaves in Bryophyllum and Begonia

Some plants have leaves which develop buds on their margins. These buds develop into plantlets which later separate out from the parent plant and grow into new plants. Bryophyllum and begonia plants reproduce in this manner.

7. Reproduction by stem cuttings

Cactus and Rose are grown by stem cutting.

A small piece of a mature stem with some buds on it, is cut off from the parent plant. This piece of stem is then planted into the soil and watered regularly. After a few days, it develops roots and buds and grows into a new plant. Plants grown in this way include rose, sugarcane, bougainvillea, cactus and hibiscus.

CROPS

Crops are the plants which are grown in the fields by farmers for food or to obtain other useful products. Growing crops in the fields by farmers is called cultivation.

Some crops are grown in summers. They are called kharif crops. They include rice, maize, jowar, bajra, peanuts, jute and cotton. Some other crops are grown in winter. They are called rabi crops. They include wheat and barley.

Growing crops

Healthy crops are important because they help in feeding the people of a country. A good crop adds to the wealth of the nation. There are several things that farmers keep in mind while growing crops. The following are the different stages for growing a healthy crop.

a. Ploughing the field
b. Sowing the seeds
c. Addition of fertilizers
d. Irrigation
e. Crop protection
f. Harvesting
g. Storage

Ploughing the field

Ploughing is the first preparation for growing crops. The purpose of ploughing is to turn over the upper layer of the soil and bring the fresh nutrients to the surface. It also helps in burying the weeds and the remains of previous crops, allowing them to break down. Ploughing aerates the soil and allows it to hold moisture.

A farmer ploughing the fields

Sowing the seeds

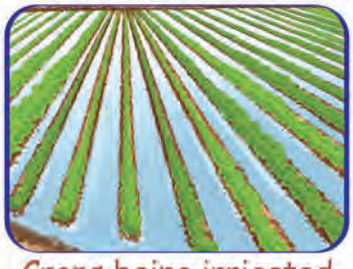
Sowing is the process of planting healthy seeds.

A farmer adding fertilizer to crops

Addition of fertilizers

Farmers mix fertilizers in the soil to make it rich in minerals for the better growth of crops. There are two types of fertilizers.

- Manure is a natural fertilizer made from the remains of dead and decaying plants or from cow dung.
- Chemical fertilizers are man-made like urea, nitrates and phosphates.



Crops being irrigated

Irrigation

Crops need water to grow. Farmers water their crops at the right time with the right amount of water.

Crop protection

A farmer spraying pesticides in the field

As the crop grows, it needs to be protected from herbivorous animals. This is done by creating a fence around the field. Besides this, pests like rats, mice and insects also harm the crops. Farmers use pesticides and insecticides to kill the pests. DDT and gammaxene are some common insecticides.

Harvesting

Harvesting of wheat crop

When the crop ripens, it is cut down. This is called harvesting. After harvesting, grains like wheat and rice are stored in godowns. This protects them from getting spoilt by moisture or eaten by rats, birds or insects.

Storage

Storage of crops

Vegetables and fruits cannot be stored for a long time at room temperature as they get spoilt very quickly. They are stored in cold storages.

Facts to know

- The reproduction in plants can be of two types : asexual reproduction and sexual reproduction.
- Because plants do not have the ability to move they must rely on external factors to facilitate fertilization.

LET'S RECALL

1. Plants reproduce by seeds, spores and by vegetative propagation.
2. Stamens and pistils of a flower are involved in reproduction.
3. The ovary of the flower changes into the fruit and ovules into seeds after fertilization.
4. A seed needs, air, water and warmth to germinate.
5. Wind, water, animals and humans are the agents of seed disposal.
6. Various stages and requirements are involved in growing healthy crops.

Word Power

aerate	:	to mix water with air
insecticide	:	a chemical substance used for killing insects
margins	:	the amount of space, time etc.
pesticide	:	a chemical substance used for killing crop eating insects
scar	:	a mark on the skin

Cross Curriculum Connect

1. Answer the following questions in short.

a. What is germination of seeds ?
b. What are spores ?
c. Why is ploughing done before planting seeds in a field ?
d. Why are cereals stored in godowns ?

2. Fill in the blanks.

plants anthers seed coat radicle crops

a. Pollen grains are found in the ..... .
b. A seed is protected by a ..... .
c. Water, air and warmth are needed for ..... .
d. The small shoot emerging from a germinating seed is called a ..... .
e. Plants which are grown in the fields are called ..... .

3. Answer the following questions.

a. What are the functions of sepals and petals of a flower ?
b. What is the function of a cotyledon ?
c. Why is seed dispersal important ?
d. How do animals help in seed dispersal ?
e. What are the characteristics of seeds dispersed by :
   (i) wind
   (ii) water

f. Define the following.
   (i) Manure
   (ii) Fertilizers
   (iii) Pollination
   (iv) Germination

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. The innermost part of the flower is pistil. ☐
b. Seeds dispersed by the wind must be heavy. ☐
c. Some non-flowering plants reproduce with the help of spores. ☐
d. Coconut is dispersed by air. ☐
e. Animals grow throughout their life time. ☐

5. Multiple choice questions

a. Anther is a part of the ..... .
   (i) stamen ☐ (ii) filament ☐
   (iii) ovary ☐ (iv) style ☐

b. The stigma is a part of the ..... .
   (i) stamen ☐ (ii) filament ☐
   (iii) pistil ☐ (iv) style ☐

c. After fertilization, which of the following turns into a fruit ?
   (i) Stamen ☐ (ii) Ovules ☐
   (iii) Style ☐ (iv) Ovary ☐

d. What is the other name for seed leaves ?
   (i) Cotyledons ☐ (ii) Scar ☐
   (iii) Seed coat ☐ (iv) Seedling ☐

e. The small root emerging from a germinating seed is called a ..... .
   (i) plumule ☐ (ii) seed coat ☐
   (iii) cotyledon ☐ (iv) radicle ☐

6. Give one word for each one of the following.

a. These are produced by flowering plants to produce new plants. : .....

b. An agent with wings and helps to disperse seeds. : .....

c. A method of growing plants from their parts other than seeds. : .....

7. Match the columns.

Column A		Column B
a. Manure	(i)	Cutting of crop
b. Reproduction by roots	(ii)	Urea
c. Reproduction by stem	(iii)	Radish
d. Harvesting	(iv)	From cow dung
e. Artificial fertilizer	(e)	Ginger

Study the structure of a flower. The teacher should show various parts of a flower to the students and ask the students to study its various parts.

1. Saffron, the world's most costliest plant product, grows in kashmir only, not in any other part of our country like Punjab, Haryana or Madhya Pradesh. Can you tell the reason ?
2. If we put some marigold petals in soil and sprinkle some water daily. After a few days, we can observe small little plants of marigold growing in the soil. How can you justify ?

1. Take an egg shell and write 'root power' on it with a marker. Place a teaspoonful of soil in the egg shell. Then place some germinated seeds in the soil. Place the egg shell in a warm place and keep the soil moist. In less than a week, the roots will come out through the egg shell. Think about the power of roots in the field!
2. Students can collect different types of seeds and draw them in their notebook. In case a seed has special features such as spines or hairs, they should try to find out how these features help in the dispersal of these seeds.
3. Visit a field and ask the farmer about the kind of crops he grows, the kind of manure and pesticides he uses and the methods of irrigation used.

2 Amazing Animals

Learning Objectives

1. Habitats of various animals
2. Body coverings of different animals and birds
3. The peculiar feeding habits
4. Different means for breathing
5. Moving habits of several creatures

Let Me Answer

- What kind of fish is Nemo?
- What is the only animal that can't jump?

HABITAT OF ANIMALS

- Forests
- Deserts
- Polar regions
- Mountains
- Oceans
- Fresh water

HABITATS AND ANIMALS

The variety of animals on our planet is amazing! Animals are found almost everywhere : in hot places like deserts, in very cold places like polar regions, in deep oceans, on the mountain and even in the air. Animals have some special body parts that are suited for the place they live in.

Identify the place where each of these animals live.

....

....

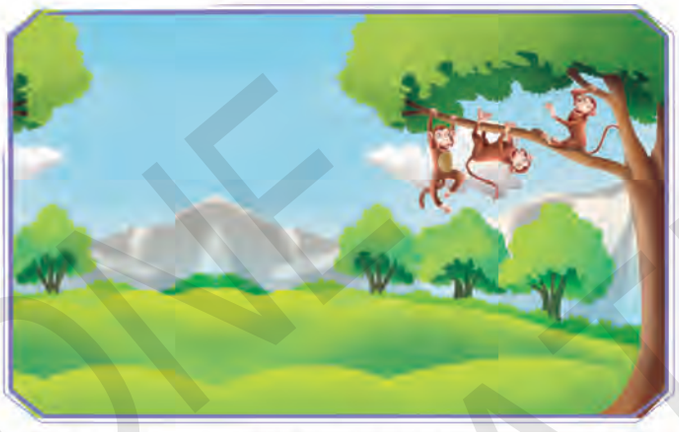
1. Types of Habitats

An area where a particular animals naturally lives is called its habitat. The animal's house provides it, with air, water, food and shelter. The home of an animal is within its habitat. For example, a lion's home is the den and the forest is its habitat. Various animals need different conditions to live and have chosen different habitats for themselves.

There are five main habitats on our planet : forests, deserts, polar regions and mountains (snow), oceans and freshwater (river, sales, ponds etc.). Let us study each of them in detail.

Forests

A forest is a vast area that is covered with trees and plants. Forests provide shelter to a large variety of animals. Animals such as lion, tiger and bear, live in caves. Many forest animals live on trees, e.g. monkeys and birds. Several types of insects also live in the forests.



Deserts

A desert is a dry, often sandy region that receives very little rainfall. Deserts are often very hot during the day and cold during the night. Animals that live in deserts have special features to withstand the hot and dry climate. Many desert animals stay cool during the day by digging underground burrows. It is very hard to find water in deserts. Many desert animals have thick skin to avoid water loss through sweating. Camels can live without water for a long time.

Polar regions and mountains

The polar regions of earth (Antarctica and Arctic) and high mountains are extremely cold regions and covered with snow. Animals that live in these regions have special features to withstand cold. For example : polar bears have thick fur. A layer of fat beneath this fur also helps in keeping them warm. Penguin, seal and walrus are found in polar regions.

Oceans

The ocean is a large, continuous body of salt water that covers two-third of the Earth's surface. It is the world's largest habitat. It is divided into the Pacific Ocean, the Atlantic Ocean, the Indian Ocean, the Arctic Ocean, and the Southern Ocean. A large variety of fishes are found in the oceans. Whale, octopus and jellyfish are some other creatures found here.

Fresh water

Rivers, lakes, ponds etc. are examples of freshwater habitat. Besides oceans, fishes are also found in freshwater. Some animals live inside water, e.g. fish and shrimp. Some animals can live both on land and in water, e.g. frog and salamander. Such animals are called amphibians.

2. Body Coverings

Several types of animals have various body coverings. An animal's body covering helps it to live in a particular habitat. Body covering of some animals are shown below.

Let us find out more about the different type of body coverings.

Scales

Fishes are covered with a layer of flexible and overlapping scales. Bodies of reptiles (e.g. snake, crocodile, and lizard) too are covered with scales. Most reptiles have horny scales that prevent water loss from their bodies. Snakes also shed their skin periodically, which is replaced by a new one.

Shell

Animals such as snail, tortoise, and turtle are protected by a shell. When these animal find danger, they withdraw their head and feet into the shell! Turtle shells can be very tough.

Feathers

Birds are covered with feathers. Feathers help them in flight. They also protect birds from rain and cold.

Fur or wool

Animals such as sheep, bear and human beings are called mammals. However, unlike human beings, sheep and bear do not wear clothes. Sheep and bear have special body coverings like wool and fur respectively, that protect them from rain and cold.

While fish scales are protective, they do not hinder movement. Probably this is what inspired the ancient Romans to design their armour like fish scales! This type of armour is known as scale mail.

The armadillo's body is covered with armour like plates that protect it from enemies.

Feathers of some birds are very brightly coloured. Peacock, the national bird of India, has beautiful feathers with metallic shades of bronze, blue, green, and gold.

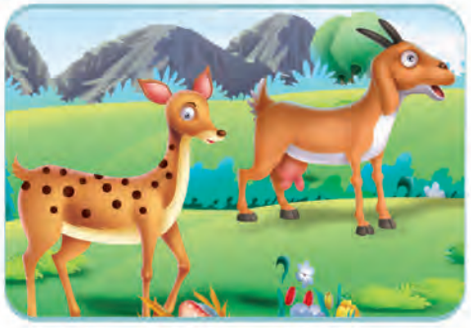
3. Feeding habits

Animals do not need to shop for food like we do. But if they did, what do you think different animals would buy ? See for yourself what our animal friends are buying in the following picture.

Did you notice that different animals are buying different food! Why is that ? Well, this is because different animals have different feeding habits. That is, different animals eat different type of foods. Based on their feeding habits, animals can be herbivores, carnivores or omnivores.

Herbivorous animals or herbivores are those animals that eat only plants.

Herbivores such as rabbit and squirrel are called rodents. They have a pair of sharp front teeth in each jaw.



Deer and goat have wide teeth, which help them in pulling off grass from the ground.

The giraffe's long neck enables it to eat food that is beyond the reach of most herbivores.

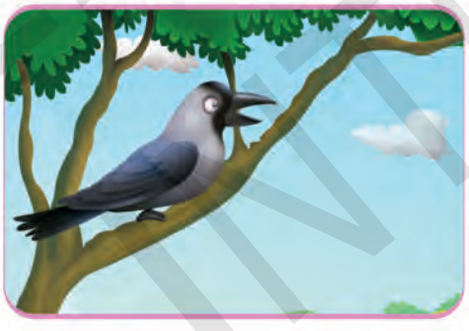
Carnivorous animals or carnivores are those animals that only eat the flesh of others animals.

Lions, tigers and wolves kill other animals and eat their flesh.

A frog catches insects using its long, sticky tongue. A snake gulps down a frog.

Spiders trap insects in their webs.

Omnivorous animals or omnivores are those animals that eat both plants and animals.



Crows, bears and human beings eat both plant and animals.

4. Breathing

Different animals have different organs for breathing.

Some animals breathe though a nose. Human beings and sheep are the examples of such animals, From the nose, air is carried to the special organs called lungs.

Frog and earthworm are the examples of animals that breathe through their moist skin. Frog also breathes through lungs when on land.

Fish breathe with the help of special organs called gills.

Insects breathe with the help of a series of tiny holes along the side of their bodies. These holes are called spiracles.

5. Movement

Different type of animals have different organs for movement.

Animals like dogs and cats move with the help of their legs.

Birds fly with the help of their wings. They also have two legs for hopping and moving about.

Most snakes move with the help of scales on the underside of their body.

Frogs hop around using their strong back legs. Their webbed feet help them in swimming.

Fish, dolphins and whales swim with the help of their fins.

Penguins and seals have flippers, which help them in swimming.

Facts to know

- A box turtle's shell can support a weight 200 times greater than the weight of the turtle.
- Ever heard of a fish that could fly? The flying fish is able to leap through the air for a long distance. It does not have wings like birds. It flies with the help of two wing-like fins attached to either side of its body.
- Killer whales sometimes, can be found peeping out of the water surface, as if spying on someone! Nobody is quite sure why they do that. Scientists call this "a strange behaviour".
- Some animals and birds move from one region to another in response to climatic migration. Arctic terns fly over 35,000 kilometres during their annual migration. This is thought to be the longest migration among birds.

LET'S RECALL

1. There are five main habitats on our planet : forests, deserts, polar regions and mountains, oceans and freshwater.
2. Scales, shell, feathers and fur are the main type of body coverings in animals.
3. Animals can be herbivores, carnivores and omnivores, based on their feeding habits.
4. Nose, skin, gills and spiracles are the main type of breathing organs in animals.
5. Animals move with the help of legs, wings, scales, fins, flippers etc.

Word Power

flexible	:	that can be bent or moved easily
migration	:	to change the place from one part of the world to another part at the same time every year
overlapping	:	part of one covering part of other
shelter	:	a safe place
withstand	:	to be too strong to break

Cross Curriculum Connect

1. Answer the following questions in short.

a. Define the following in one line :

(i) Fur (ii) Fins (iii) Scales

(iv) Gills (v) Lungs

2. Fill in the blanks.

scales fish amphibians digging burrows

a. Many desert animals stay cool during the day by ..... .

b. ..... are the animals that can live both on land and in water.

c. The body of ..... is covered with scales.

d. Most snakes moves with the help of ..... .

3. Answer the following questions.

a. What is a habitat ? What does a habitat provide an animal with ?

b. Name the five main habitats on earth.

c. What is a desert ? How do an animal living in a desert withstand the hot climate ?

d. How do polar bears withstand the cold of their habitat ?

e. What are the amphibians ? Give two examples.

f. Write short notes on the following :

(i) scales (ii) shells

(iii) fur or wool (iv) feathers

g. What is the difference between herbivores and carnivores ?

h. How do the following animals move ?

(i) Birds (ii) Snakes

(iii) Frogs (iv) Dolphins

(v) Penguins

Formative Assessment

4. Tick (✓) the right and cross (×) the wrong statements.

a. The fish breathes with the help of gills. ☐

b. The natural habitat of rabbit is a hole. ☐

c. The snake moves with the help of fins. ☐

d. An animal's habitat provides it with food only. ☐

f. A bear's body has scales on it. ☐

5. Multiple choice questions

a. Which animals moves with the help of scales?

(i) Fish ☐ (ii) Tortoise ☐

(iii) Snake ☐ (iv) Crocodile ☐

b. 'Den' is the home for which animals?

(i) Cow ☐ (ii) Lion ☐

(iii) Rabbit ☐ (iv) Dog ☐

c. Which of the following has scales on its body ?

(i) Fish ☐ (ii) Fins ☐

(iii) Wool ☐ (iv) Fur ☐

d. Who is the ship of desert?

(i) Monkey ☐ (ii) Bear ☐

(iii) Randier ☐ (iv) Camel ☐

e. The seasonal movement of some birds and animals is called .....

(i) Transfer ☐ (ii) Movement ☐

(iii) Migration ☐ (iv) Rotation ☐

6. Give one word for each one of the following.

a. Herbivores such as rabbit and squirrel are called : .....

b. Insects breathe with the help of a series of tiny holes along the sides of their body, which are called : ..... .

7. Match the columns.

	Column A		Column B
a.	Frog	(i)	Breating through nose
b.	Carnivores	(ii)	Breating through skin
c.	Man	(iii)	Plant eaters
d.	Spider	(iv)	Flesh eaters
e.	Herbivores	(v)	traps insets in its web

Go and visit to a nearby zoo with your parents. Record in the information on any 5 animals in the format given below :

1. A snap or drawing of the animal
2. Name of the animal
3. What does the animal look like ?
4. What is the animal's natural habitat ?
5. What kind of body covering does the animal has ?

1. Most of the birds fly in V-shape formation. What do you think could be the reason behind this?
2. A red cloth waved in from of a bull, makes it angry. But in actual, cloth of any colour say black or blue, can make the bull angry in the same way. Do you know, why?

1. Make a chart on different animals and their body coverings.
2. Make a chart on the different type of habitats of animals.
3. Make a chart on different organs of movement in animals. Collect their pictures and paste them.