# Contents

# 1 Food Making in Plants

**Learning Objectives**

1. The structure of a leaf
2. Food preparation by the leaf
3. The use of food by plants
4. Relationship between plants and animals
5. Features of some unusual plants

**Let Me Answer**

- How do plants make food?
- Where do plants store their food?


## 'FOOD MAKING' : REQUIREMENTS

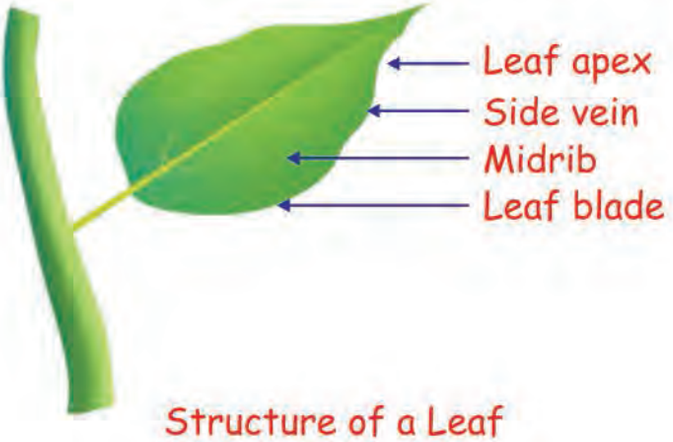
- Sunlight (Sun)
- Respiration (Stomata)
- Water (Soil)
- Minerals (Soil)
- Carbon-dioxide (Atmosphere)

The life on the earth depends upon the presence of plants. We need plants for food and oxygen the food we consume, the juices we drink, even the clothes we wearing – all come from plants. Trees provide us wood for fuel, furniture and tools. Plants range from very small green planktons in the sea to huge coniferous trees, so tall that you cannot see their tops. But what they all have in common is their capability of capturing and using sunlight as an energy source for producing their own food. This process is known as photosynthesis. It provides life and growth to plants.

# LEAF

## Structure of a leaf

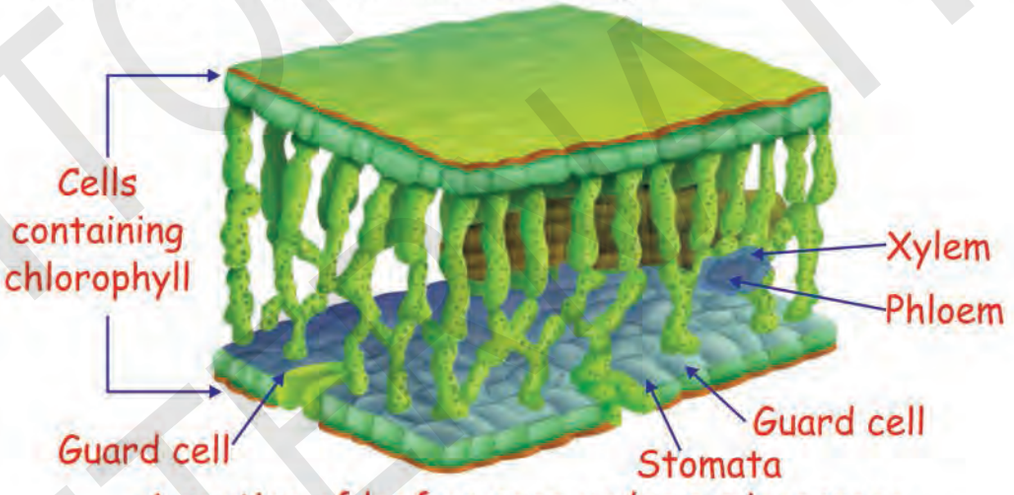
Take the leaf of a plant. The part which is flat and green is called leaf blade. The tip of the leaf is called leaf apex. A mid vein or midrib is seen running through the middle of the leaf. There are a number of side veins emerging from the midrib. The midrib and side veins have small tubes inside them. These tubes are of two types :



Structure of a Leaf

- The tubes that carry water from the roots to the leaves.
- The tubes that help carry the food made in the leaves to all the other parts of the plant.

The inside of a leaf shows many layers of cells. You can see these layers by viewing a section of a leaf under a microscope. These cells contain chlorophyll, which is a green pigment. Chlorophyll makes the leaves look green. The lowest layer of cells has many minute openings, called stomata. The stomata are guarded by the guard cells. They help in the exchange of gases and water vapours between the leaf and the surrounding air.

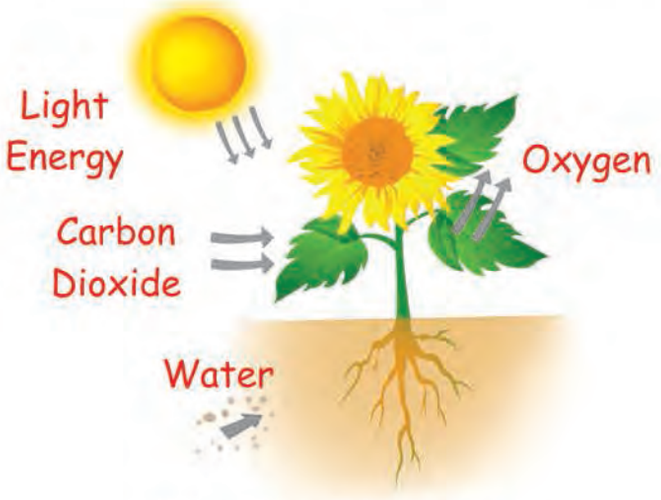


A section of leaf as seen under a microscope

## How do leaves prepare food for a plant?

For making its food, a plant gets water from the soil and absorbs carbon dioxide from the air. It takes the energy needed to produce food from the sun. Water and carbon dioxide are changed into food or sugar with the help of chlorophyll in the presence of sunlight.

The process by which plants prepare their food from water and carbon dioxide in the presence of sunlight is called photosynthesis. (photo means light and synthesis means putting together)




Leaves prepare food

## How do plants use the food made by them?

Plants use the food made by them for various purposes, such as :

- their growth,
- building new cells and
- repairing worn out cells.

Extra food is stored in various plants parts, like the leaves, stems and roots. This stored food is called the starch.

Plants and animals are interdependent on each other

## Relationship between plants and animals

Plants and animals live together in a relationship where one depends upon the other.

Animals get their food from plants. Do you know that the oxygen that animals breathe in, also comes from plants. Oxygen is released by the plants during the process of photosynthesis. We human beings also depend on plants for our food. Animals breathe out carbon dioxide. This carbon dioxide is used by the plants to make their food. This is why, we need to take good care of plants and we should not cut down plants and trees.

## Features of some unusual plants

Plants like mushrooms, moulds and fungi are non-green plants. They do not possess chlorophyll. So, they are unable to prepare their own food. They get their food from the decaying matter.

Mushrooms

Some plants like croton has colourful leaves (mostly red). These plants do have green colour but that is hidden by the other colour. So, these plants are able to prepare their own food in the presence of sunlight.

Croton Plant

Plants like dodder (amarbel), cannot make their own food. They depend on other green plants. They use the food prepared by other green plants.

Dodder Plant

In plants like cactus, leaves are reduced into spiny thorns. So, the process of photosynthesis and storage of food takes place in stems only. Cactus is generally found in the desert area, where very less amount of water is found. Cactus uses the food stored in fleshy stems for its growth and survival in the absence of water.

Cactus

## Facts to know

- Starch is the stored form of sugar.
- Vanamahotsava programme helps to promote the planting of trees.
- 5 june is the World Environment Day, celebrated throughout the world by planting more and more plants.

## LET'S RECALL

1. Plants and animals depend on each other.
2. Green plants make their own food by a process called photosynthesis.
3. Water, carbon dioxide, sunlight and chlorophyll are necessary for the process of photosynthesis.
4. A kind of sugar called glucose is made during photosynthesis.
5. Stomata help in the exchange of carbon dioxide and oxygen. They also give out water vapours.
6. Veins help to distribute water and food within the leaf.
7. Plants use the food which they make for many purposes.
8. There are some unusual plants such as mushroom and cactus.

## Word Power

| | |
|---|---|
| chlorophyll | : a green pigment present in leaves |
| heterotroph | : an organism that obtains its food from other organisms |
| leaf blade | : flat part of the leaf |
| main vein | : double pipe line of cells that runs in the centre of the leaf |
| photosynthesis | : the process of making food in plants |
| side vein | : parallel veins attached to main vein |
| stalk | : attached part of the stem |
| starch | : food stored in plants |
| stomata | : small openings present on the lower surface of a leaf |

# Train Your Brain

## Cross Curriculum Connect

**1. Answer the following questions in short.**

a. Where do plants store their extra food ? ..... .

b. Through which process do plants make their food. ..... .

c. Name one unusual plant. ..... .

**2. Unscramble the following words.**

| food | eggs | sunlight | air | stomata | sense organs |
|---|---|---|---|---|---|

a. ugsra : .....

b. hrtsac : .....

c. riibdm : .....

c. xeap : .....

e. ealf : .....

f. moaatst : .....

**3. Answer the following questions.**

a. What is photosythesis ? Draw its picture.

b. Name the materials used by a leaf to make food ?

c. How is food used by plants ?

d. How do the following plants get their food ?

(i) mushrooms

(ii) dodder

(iii) cactus

e. Define the following.

(i) Leaf blade

(ii) Chlorophyll

(iii) Leaf apex

(iv) Stomata

f. Give the functions of the following.

(i) Midrib (ii) Roots

(iii) Stomata (iv) Chlorophyll

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

a. Plants produce their own food in their roots. ☐

b. Photo means 'light'. ☐

c. Non-green leaves cannot prepare their own food. ☐

d. Oxygen is given out during photosynthesis. ☐

## 5. Multiple Choice Questions (MCQs)

### Tick (✓) the correct option.

a. Leaves release ..... into atmosphere during photosynthesis.

(i) carbon dioxide ☐ (ii) oxygen ☐

(iii) hydrogen ☐ (iv) water ☐

b. The tiny pores on the surface of a leaf are known as .....

(i) pistil ☐ (ii) chlorophyll ☐

(iii) stomata ☐ (iv) stamen ☐

c. The green colour of leaves is due to pigment called .....

(i) stamen ☐ (ii) chlorophyll ☐

(iii) pistil ☐ (iv) stomata ☐

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

a. Extra food stored in plants .....

b. The green and flat part of a leaf .....

c. The sugar made in the leaf .....

### Activity Time

To test the seed fo sunlight for plants.
Take two pitted plants. place one in dark room i.e. in the absence of sunlight and the other in an open place. Notice the two plants after fifteen days.
The potted plant kept in the room will turn pale.

Potted plant in the absence of sunlight

Potted plant kept in sunlight

## HOTS

1. A plant kept in dark turns pale. Why ?
2. Do you know about a kitchen garden ? What kind of vegetables are grown in a kitchen garden ?

## project Time

1. Collect pictures of various parts of plant that you eat. Paste on the chart paper under different headings.
2. Test the presence of fungus.
   - Take a slice of bread.
   - Sprinkle drops of water on it.
   - Put it in a plastic bag and close its mouth.
   - Keep it in a dark and warm place for 4 to 5 days.
   - You will notice the growth of grey and hairy substance on it.
   - This is fungus (non-green plant) that grows indise the bag when it gets water, warmth and darkness.

3. Add a drop of iodine solution to each one of the following to check the presence of starch.

Butter

Cooked rice

Chapatis

Bread

2

# Adaptation in Plants

**Learning Objectives**

1. Kind of plants
2. Features of aquatic plants
3. Features of terrestial plants
4. Insect eating plants
5. Usefulness of plants of grass family

**Let Me Answer**

successful in a particular environment are called?

## TYPES OF PLANTS

- **Aquatic Plants**
  - Free Floating plants
  - Under water plants
  - Fixed plants
  - Emergent plants
- **Terrestrial Plants/ Trees**
  - Coniferous trees
  - Mangrove trees
  - Evergreen trees
  - Decidous trees
  - Desert Plants
  - Insectivorous plants
  - Plants of grass family

# DIFFERENT KIND OF PLANTS

Plants grow all over the world. Some can survive in hot deserts while some in cold regions. There are plants that climb up on some support and other that creep on the ground. Plants may be found not only on land but also in water.

We find different kind of plants in different natural surroundings. These plants develop special features to adapt themselves to their surroundings. This process is called adaptation. Plants are generally found on land or in water. Let us give them a closer look and understand them a better.

There are basically two kinds of plants :

- **Aquatic** - those which grow in water are called aquatic plants.
- **Terrestrial** - those which grow on land are called terrestrial plants.

## Aquatic plants

In the water world, we will see various kind of plants. They adapt themselves to make their food in water. Aquatic plants may be :

### Free floating plants :

- These plants are not rooted to the soil.
- They are very light and float on the surface of water.
- Some common examples are water lettuce and duckweed.
- These plants use sunlight and carbon dioxide from the air to make food.
- They protect small water animals from the hot Sun.

Water lettuce

### Under water plants :

- These are the plants that live under water.
- Their roots are fixed to the soil or to the bottom of shallow ponds and rivers.
- Some Common examples are pondweed and tape grass.
- Their narrow leaves have no stomata at all.
- These plants breathe through their body surface. These plants clean the water by removing carbon dioxide breathed out by aquatic animals.
- We also put such plants in an aquarium.

Tape grass

### Fixed plants :

Water lily

Lotus

- These plants have their roots fixed in the soil at the bottom.
- Common examples are lotus and water lily.
- Their long, hollow stems support the large leaves and flowers that float on the surface of the water.
- These plants have stomata only on the upper surface so that water does not block the pores.
- The broad leaves of such plants provide a nesting place for some tiny birds.

### Emergent plants :

Iris

Cattail

- They line the edge of the water body where the soil is soaked in water.
- They look like land plants.
- Common examples are cattail and iris.

## Terrestrial plants

Plants that grow on land are called terrestrial plants. They are of different types depending upon the type of soil and climate they grow in. They are of the following types :

### Coniferous trees

Pine tree

- We see them in cold and hilly places.
- They have needle-like leaves and have cones instead of flowers. Examples of such trees are pine, spruce, fur and cedar.

Spruce tree

Their (conical) slim and slanting shape makes snow slide off easily. As, they do not shed their leaves in winter, they are called evergreen trees.

### Mangrove trees :

- These plants grow in the marshy areas near the seashore. These places are hot and damp.
- These plants are adapted to live in the soil that is soaked in water.
- These plants have roots that grow above the soil. Since the soil is full of water, the roots do not get air to breathe.

- Roots send special parts to the soil surface to breathe. They are called breathing roots.
- Some examples are cariops and kendelia.

Kendelia plant

## Evergreen trees

- These plants have lots of leaves but they do not shed them, so they remain green.
- Some examples are coconut tree, rubber tree and fields of cotton and rice near the coastal areas.
- These plants need plenty of water and sunlight.

Evergreen tree

## Deciduous trees

- These trees can bear the heat and give shade in summers. These trees shed their leaves in winters.
- This is how they adapt themselves and survive.
- When the season changes, fresh new leaves appear.
- Some examples are rosewood, teak and gulmohar.

Rosewood tree

## Desert plants

- The desert areas have little rainfall, therefore fewer plants grow there.
- These plants live on very little water and store what they get.
- Their roots go deep in search of water or spread widely. As the plants cannot afford to lose water, their leaves are reduced to spines.
- These plants have a green fleshy stem.
- The stem stores food and water. Cactus and prickly pear are examples of such plants.

Prickly pear

## Insectivorous plants

- Some plants grow in soil which is poor in minerals.
- So, they eat insects to get enough nutrition. The leaves of the venus fly trap are like a trap. They can snap shut when an insect sits on them.
- The hollow leaves of the pitcher plant are filled with nectar. When insects come to drink this, the lid closes and they are eaten by the plants.

Pitcher plant

## Plants of the grass family

Cereals like wheat, maize and rice belong to the grass family. These plants are useful to us in many ways :

Different types of plants

- They provide food to human beings and animals.
- Fodder for animals is obtained from such plants.
- Various grasses are used to make paper. Paper was first made by the people of Egypt from a grass called Papyrus. Paper got its name from this grass.
- Bamboo, a giant grass, is used to make brooms, baskets, mats etc.
- Dried grasses are used as packing material.
- They conserve the soil as they hold the soil with their roots and prevent soil erosion.

### Facts to know

- Insectivorous plants are green and can carry out photosynthesis.
- Some climber plants are as thick and strong as a rope, e.g lianas.

### LET'S RECALL

1. Different plants are found everywhere, be it on land or in water.
2. Aquatic plants are plants that live in water. They can be fully under water, fixed, free-floating or emergent.
3. Plants that grow on land are called terrestrial plants. These plants grow in cold areas, marshy areas, coastal areas, plains or deserts.
4. Insectivorous plants eat insects to get nutrition.
5. Plants of the grass family i.e. wheat, rice and maize are useful to men and animals in many ways.

### Word Power

| | | |
|---|---|---|
| adaptation | : | adjustment in a new living condition |
| fodder | : | food given to farm animals |
| marshy | : | an area of soft wet land |
| shallow | : | not deep |
| stomata | : | small pores in the leaves |

# Train Your Brain

## Cross Curriculum Connect

**1. Answer the following questions in short.**

a. What are insectivorous plants ?
b. List four uses of plants of the grass family.
c. What can we make from bamboo ?

**2. Fill up the blanks with suitable words.**

terrestrial coniferous cactus prickly pear aquatic deciduous

a. ..... trees usually grow in the plains.
b. Plants that grow fully under water are called ..... plants.
c. A pine tree is a ..... type of evergreen tree.
d. The plants that grow in a desert are ..... and ..... .
e. ..... plants grow in marshy areas.
f. ..... trees shed their leaves with the change of season.

**3. Answer the following questions.**

a. Why do we find plants everywhere ?
b. Name the four types of aquatic plants. Give one example of each.
c. What are terrestrial plants ? Give any four examples.
d. Where do we usually find coniferous trees ? Why are they mostly evergreen?
e. What are mangroves ? What do they store in their leaves ?
f. How does a cactus survive in the desert ?

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

a. Coniferous trees do not shed their leaves. ☐
b. Cotton and rice plants are found in hilly areas. ☐
c. Duckweed is a fixed water plant. ☐
d. No plant grows on snowy mountains. ☐
e. Conifers can be found in the plains. ☐
f. Underwater plants are used in aquariums. ☐
g. No plant is found in the deep waters of oceans and seas. ☐
h. Insectivorous plants eat insects to get nutrition. ☐

## 5. Multiple Choice Questions (MCQs)

**Tick (✓) the correct option.**

a. Which is the correct statement ?
   (i) Aquatic plants grow in water.
   (ii) Aquatic plants grow on land.
   (iii) Aquatic plants grow in water and on land.

b. Which is the wrong statement ?
   (i) Terrestrial plants grow on land.
   (ii) Terrestrial plants grow on land and in water.
   (iii) Aquatic plants grow in water.

c. Which is the correct statement ?
   (i) Evergreen trees shed their leaves.
   (ii) Evergreen trees do not shed their trees.
   (iii) Evergreen trees are aquatic.

d. Which series of plants pertain to grass family ?
   (i) Wheat, rice, maize, bamboo
   (ii) Aquatic plants
   (iii) Desert plants

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

a. The plant which grows in water .....

b. The plant which grows on land .....

c. The plant with breathing roots, which grows in marshy areas .....

## 7. Match the columns.

| Column A | | Column B |
|---|---|---|
| a. Coniferous trees | (i) | water soaked soil |
| b. Emergent plants | (ii) | deserts |
| c. Mangroves | (iii) | evergreen |
| d. Cactus | (iv) | marshy areas |
| e. Deciduous trees | (v) | coastal areas |
| f. Coconut tree | (vi) | hot plains |
| g. Evergreen trees | (vii) | soil poor in minerals |
| h. Insectivorous plants | (viii) | places with enough sunlight |

## Activity Time

Divide the students into groups and give each group a thick and a thin sponge. Ask them to put each sponge in a dish. Tell the students to pour equal amounts of water over each sponge. Allow the sponges to remain in the water for a minute or so. Have the students squeeze the thin sponge into a measuring cup. How much water does it hold? Repeat with the thick sponge. Put the measuring cups next to each other. Which cup has more water ? Which sponge dries out faster ?
Remind the class that some plants live in places with lots of water, while others live in places with very little water. Where would thick leaves and thin leaves be better? Why?

## HOTS

A cactus plant can grow in urban areas but a paddy plant cannot grow in deserts. Why ?

## project Time

1. Visit a pond or lake with your teacher. Observe the different kinds of aquatic plants.
2. Take a nature walk during the winter season and make a note of trees that shed their leaves in winters.
3. Make your own indoor garden.

   Take a large glass jar. Take some clear pebbles, some garden soil, sand, small plants and water. Put a layer of pebbles on the bottom of the jar. Carefully cover the pebbles with garden soil and then with sand. Arrange our plants in the soil and sand. Keep the glass jar in the sun. Put a little water. Cover the jar with a lid. This type of garden is called terrarium.

3

# Reproduction in Animals

**Learning Objectives**

1. Need of reproduction among animals
2. Ways of reproduction
3. Parental care
4. Life cycle of frog

**Let Me Answer**

- What are three adaptations of plants?
- What is the main function of reproduction?

**REPRODUCTION IN ANIMALS**

- By lying eggs
- By giving birth

## INTRODUCTION

On this earth, every creature or living being has to live for a very short time. For survival on the earth, the each living being has to leave behind one of its own kind otherwise the kind of race would die out. The process by which the living beings produce young ones of their own kind is known as of reproduction.

## REPRODUCTION IN ANIMALS

Puppy with its parent dog

Have you seen a kitten or a puppy following its parents ? Have you seen cute little chicks following the mother hen ?

Animals are able to produce more of their own kind by a process known as of reproduction. Reproduction is important for life to be continued on the Earth.

## Animals reproduce in two ways.

- Some animals give birth to the young ones.
- While some others lay eggs from which the young ones hatch out.

Frog

Fish

Pigeon

Butterfly

Butterfly

Goat

Monkey

Snake

Look at the animals in the above picture. Encircle the animals with blue colour that lay eggs and encircle the ones with green colour that give birth to their young ones.

### Animals that give birth to their young ones

There are animals which do not lay eggs.

They give birth to their young ones.

Animals that give birth to their young ones and produce milk to feed them are called their mammals.

These animals are the most highly developed among all animals. Their body is covered with hair.

These animals carry the young ones within their bodies till they are fully developed to be born.

Mammals take good care of their young ones. They feed them, clean them and keep them safe until they have learn to look after themselves.

Tigers, elephants, horses, dogs and cats are mammals.

The bat is the only mammal that can fly. It also gives birth to young ones. It does not make a nest and lives in old buildings or caves. The mother bat feeds and takes care of the baby bats.

### Animals that lay eggs

Some animals that lay eggs are fishes, insects and birds. Some young ones, that come out after hat k like the parent animals. Some look very different at birth. But as they grow, they look like their parents.

A woman bathing her baby

A bitch feeding its puppies

A bat feeding its young one

A mare feeding its colt

## Birds

Birds build nests only when they want to lay eggs. A nest keeps the eggs and the baby birds safe.

A bird in the nest


Structure of a bird's egg

A bird's egg has a hard, outer shell to protect the chick growing inside. The mother keeps the egg warm by sitting on it. This is called incubation. The embryo or the growing chick lies in the yellow part of the egg called yolk. The embryo feeds on the yolk as it grows. The watery white part is called albumen. It protects the embryo. The air sac contains air which the developing chick breathes in while it is inside the egg.

## Fishes

Fishes lay eggs in water. The mass of eggs produced is called spawn. Fish eggs do not have shells. They are covered with a kind of jellds that protects them from water. Out of thousand of eggs, only few hundred develop into young fishes. Bigger fish eat up many eggs and the young fishes. Only a few of them grow to become adult fishes.

A fish laying eggs

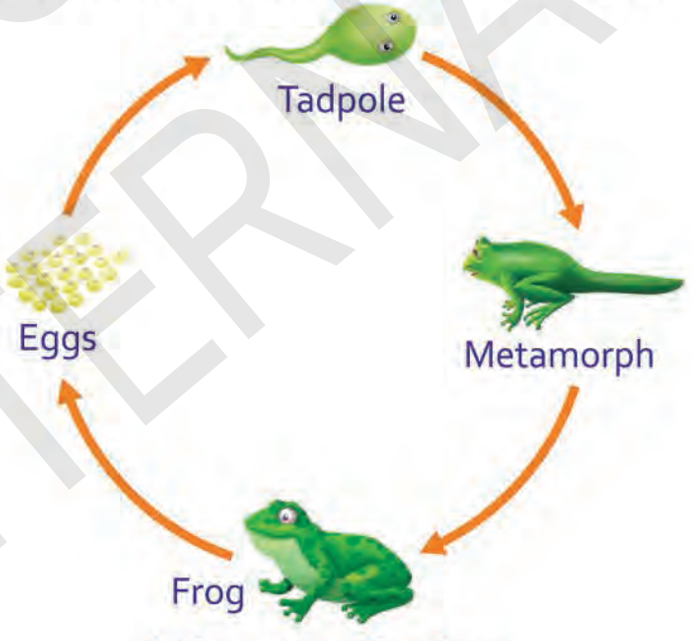
## Reptiles

Reptiles like snakes, crocodiles, lizards and turtles lay eggs on the ground. Their eggs are protected by shells which are like thick leather. As a result, these eggs do not break when laid on the ground. The eggs are warmed by the heat of the sun. Most reptiles do not care for their eggs or babies. Many eggs and young ones are eaten up by other animals.

Baby snake coming out of egg

## Frogs

Frogs also lay eggs. They lay eggs in water in safe places. Their eggs are covered with jelly. The life cycle of a frog has four stages. The eggs hatch into tadpoles. Tadpoles look like little fishes. After a few days, they start growing legs. A tadpole grows into a young frog which looks more like its parent. The adult frog does not have a tail. It lives on land and reproduces in water.




Life-cycle of a frog

## Insects

All insects develop from eggs. Some insects like grasshoppers and cockroaches pass through three stages in their life cycle. Other insects like houseflies and butterflies pass through four stages in their life cycle.


Housefly


Butterfly


Grasshopper


Cockroach

### Facts to know

- A frog can live on land but its babies cannot.
- The smallest living mammal is a shrew with a body about 2 inches long.

### LET'S RECALL

1. All animals produce young ones of their own kind.
2. Some animals give birth to young ones and others lay eggs.
3. Life cycle of animals that lay eggs have different stages.
4. Some animals take care of their young ones while others do not.
5. Animals need care and protection.

### Word Power

| | |
|---|---|
| embryo | : a young organism in the first stage of development |
| hatching | : to lay eggs and keep them warm |
| maggot | : the larva of a house fly |
| metamorphosis | : the rapid transformation from larva to adult form |
| nymph | : when an insect that comes out from an egg |
| tadpole | : larva of frog |

# Train Your Brain

## Cross Curriculum Connect

**1. Answer the following questions in short.**

a. What is albumen?

b. What is incubation?

c. What do you mean by 'yolk'?

**2. Fill in the blanks.**

| ecdysis | chick | pupa | chrysalis | tadpoles |
|---|---|---|---|---|

a. An egg contains a tiny growing baby is called ..... .

b. The larva of a butterfly is called ..... .

c. The larva of a housefly is called ..... .

d. The young one of a frog is called ..... .

e. The process of shedding of old skin and growing a new one by a nymph, is called ..... .

**3. Answer the following questions.**

a. What do you understand by 'reproduction'?

b. Why do animals reproduce?

c. What are the different ways by which animals reproduce?

d. Describe the structure of an egg with the help of a diagram.

e. Describe the life cycle of a butterfly.

f. How do mammals take care of their young ones?

## Formative Assessment

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

a. Reproduction is the process through which new living beings resembling the parents, are produced. ☐

b. Animals lay eggs.

c. Birds give birth to young ones.

d. Animals need care and protection.

e. Animals do not save themselves from danger.

## 5. Multiple choice questions

a. Which statement is wrong about mammals?

(i) Animals give birth to their young ones.

(ii) Animals produce milk to feed their young ones.

(iii) Animals lay eggs and do not give milk.

b. Which statement is wrong about birds?

(i) Birds build nests.

(ii) Birds lay eggs and hatch them.

(iii) Birds give birth to young ones.

c. Which statement is not correct ?

(i) The larva of a butterfly is called the caterpillar.

(ii) The larva feeds on leaves.

(iii) The larva does not become a worm.

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

a. How many stages are there in the life cycle of a cockroach ?

b. Write the name of the young one of an insect that resembles the parent-nymph.

c. What are those animals called that give birth to their young ones and nourish them with their milk ?

## 7. Match the columns.

| Column A | | Column B |
|---|---|---|
| a. Nymph | (i) | albumen |
| b. Eggs | (ii) | grasshopper |
| c. Pupa | (iii) | first stage |
| d. Larva | (iv) | third stage |

## Activity Time

Take an egg and a bowl. With the help of a knife or the handle of a spoon, gently crack the egg shell. Pour the contents carefully into the bowl. You will be able to see the yolk and albumen. Now try to know which is yolk and which is albumen.

## HOTS

1. Why do you think, cute little chicks follow their mother hen?
2. Most of the reptiles do not care for their eggs or babies. Why?

## project Time

Study the given life-cycle of a frog and write your comments.