CORDOVA® App 24X7
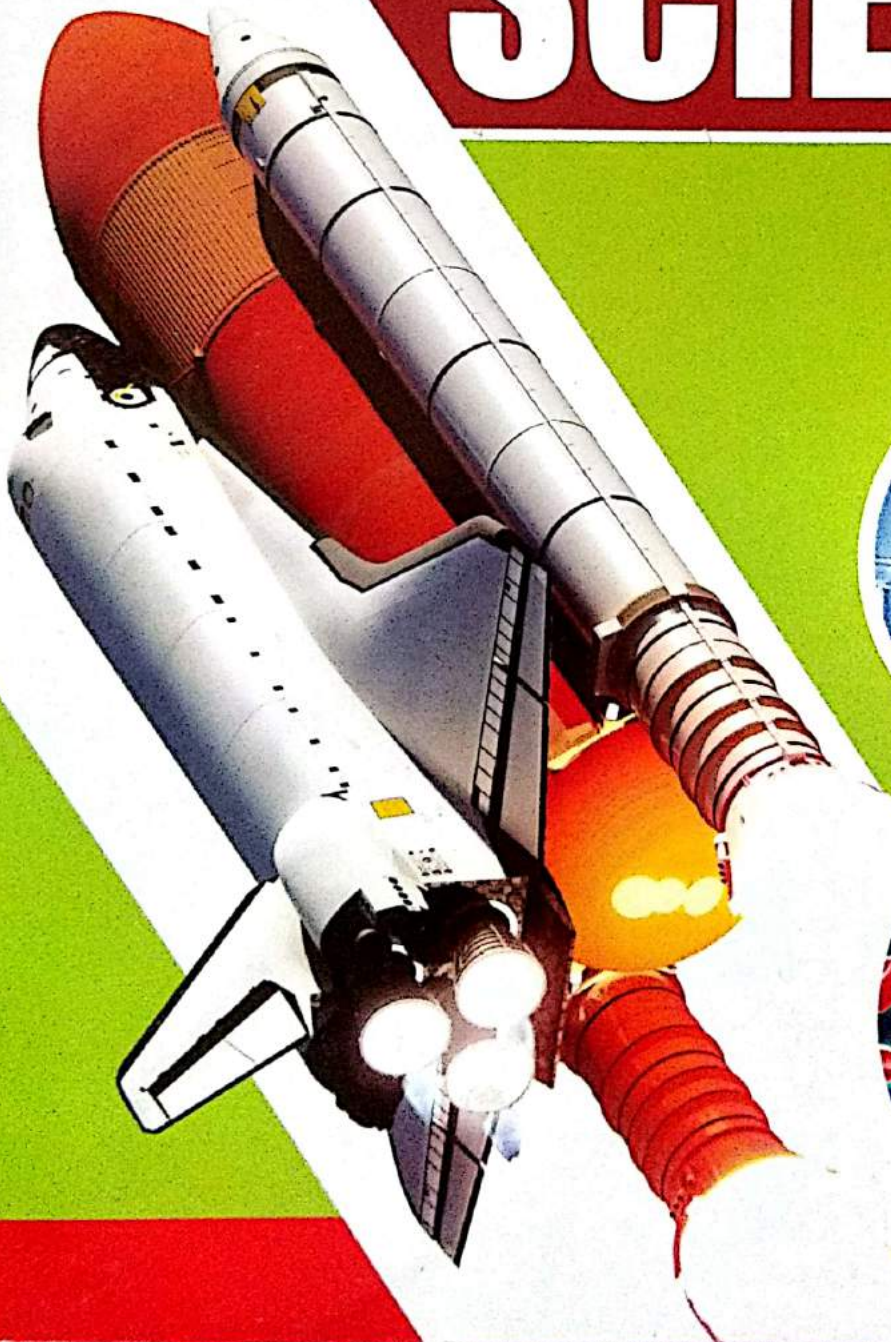For Teachers Only

As Per The Latest Rajasthan State Board Syllabus

My Joyful Book Of
SCIENCE

Textbook
CLASS 6

CORDOVA®

CONTENTS

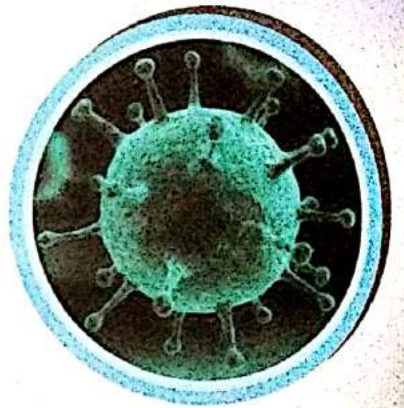# 1 Sources Of Food

Use **Cordova Smart Class Software** on the **smart board** in class to make learning enjoyable.

We eat different kinds of food at different times. We eat sandwiches, bread, butter or *paratha* with milk in our breakfast. We eat *dal*, *sabzi*, salad, chapati and rice in the lunch.

ACTIVITY 1

Organise a class party during lunch break in your school. List all the food items brought by your friends in a tabular form.

Do share your lunch with your friends.

Table 1.1

S.No.	Name of the student	Name of the food items brought
1.		
2.		
3.		
4.		

You observe a variety in the food items.

NEED OF FOOD

All living organisms need energy to grow and perform various activities. Living organisms get energy from the food they eat (Fig. 1.1). Food is the fuel for our body because it provides energy. We use the stored energy of our body to do work and thus we feel tired and hungry. We eat food when we are hungry.

Fig. 1.1 All living organisms need food.

Some important functions of food:

1. It gives energy to work and play.
2. It gives nutrients for the growth of our body.
3. It gives nutrients for the maintenance and repair of the body cells and tissues.
4. It protects from diseases and keeps us fit and healthy.

CLASSIFICATION OF ANIMALS ON THE BASIS OF THEIR FOOD

All animals need food for their survival. Do all animals eat the same type of food? No, all animals do not eat the same type of food. You must have seen that different animals eat different kinds of food.

ACTIVITY 2

Classify the animals listed below according to their food habits. You can collect the information from the books in the library. You can also take help of parents and friends or from internet.

Table 1.2

S. No.	Name of the animal	Items eaten as food	
		Obtained from plants (fodder/grains/fruits/vegetables)	Obtained from animals (meat/fish/insects)
1.	Cat		
2.	Goat		
3.	Squirrel		
4.	Pigeon		
5.	Lizard		

6.	Horse
7.	Lion
8.	Human being

We observe that different animals have different food habits.

Conclusion: Some animals eat only plants. Some animals eat only flesh (meat) of other animals. Some animals get their food from both plants and animals.

On the basis of their food habits, we classify animals into following three categories:
(a) Herbivorous animals or herbivores
(b) Carnivorous animals or carnivores
(c) Omnivorous animals or omnivores

1. Herbivorous Animals

Animals that eat only plants and plant products are called herbivorous animals or herbivores. Cows, goats, rabbits, sheep and deer are some examples of herbivorous animals (Fig. 1.2).

(a) a rabbit (b) a sheep
Fig. 1.2 Herbivorous animals

2. Carnivorous Animals

Animals that eat only the flesh of other animals are called carnivorous animals or carnivores. Lions, tigers, eagles and wolves are some examples of carnivorous animals (Fig. 1.3).

(a) a lion (b) an eagle
Fig. 1.3 Carnivorous animals

3. Omnivorous Animals

Animals that eat both plant products and flesh of other animals are called omnivorous animals or omnivores. Human beings, bears, rats, crows and cockroaches are some examples of omnivorous animals (Fig. 1.4).

(a) a bear (b) a crow
Fig. 1.4 Omnivorous animals

Do You Know?

Some animals and birds eat the flesh of dead animals. Such animals and birds are called **scavengers**. **Jackals, hyenas** and **vultures** are examples of scavengers.

Some living organisms like **fungi** and **bacteria,** feed on dead plants and animals and decompose them. These organisms are called **decomposers.** Scavengers and decomposers help to keep the earth clean.

a jackal (scavenger) bacteria (decomposers)

Multiple Choice Questions (MCQs)

Tick (✓) the correct options.

1. Which of the following is not an example of herbivorous animals?
   (a) cow (b) goat
   (c) rabbit (d) eagle
2. Which of the following is not an example of carnivorous animals?
   (a) lion (b) sheep
   (c) tiger (d) wolf
3. _____ is an omnivorous animal.
   (a) Bear (b) Eagle
   (c) Deer (d) None of these

SOURCES OF FOOD

Have you ever thought where do the ingredients of various dishes come from?

What is the source of rice? Plants, of course!

Where does milk come from? From animals!

Generally, we get food from two main sources—plants and animals.

PLANTS AS A SOURCE OF FOOD

The green plants prepare their own food. Thus, green plants are called **producers.** They prepare more food than they actually require. They store the extra food in their different body parts. **The parts of the plant that can be eaten are called edible parts.** The stored food materials of plants are used by us as food.

We get cereals, pulses, vegetables, fruits, spices, oil, sugar and beverages from plants.

Cereals: The edible part of cereals is the grains. It is one of the most important plant products used in making our food items. They are the main source of carbohydrates and give lot of energy. Examples of cereals are wheat, rice, maize, millet, barley and sorghum (Fig. 1.5).

(a) wheat (b) rice (c) maize
Fig. 1.5 Cereals

Pulses: Pulses are obtained from the seeds of the leguminous plants (plants having nodules in their roots). The pulses are the main source of proteins in our diet. Proteins are essential for growth and development of the body. That is why, growing children, pregnant women and people recovering from illness need more pulses in their diet. Examples of pulses are pigeon pea (arhar dal), moong, soyabean, pea, gram (chana) and lentil healthy.

(a) arhar dal (b) moong (c) gram (chana)
Fig. 1.6 Pulses

Vegetables: Different parts of the plants such as roots, leaves, stem, fruits and flowers are eaten as vegetables. Vegetables are rich in minerals and vitamins. Vitamins are essential for normal growth, good vision, healthy teeth and bones and for overall good health. We must eat lot of vegetables in our diet to remain healthy (Fig. 1.7).
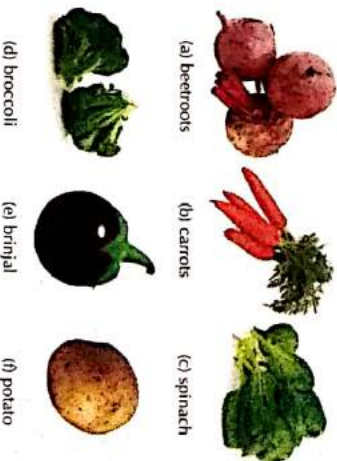
(a) beetroots (b) carrots (c) spinach
(d) broccoli (e) brinjal (f) potato
Fig. 1.7 Different types of vegetables

Table 1.3 Various parts of the plants as the source of vegetables

S. No.	Part of the plant	Name of the vegetable taken as food
1.	Roots	Beetroot, carrot, radish
2.	Leaves	Spinach, cabbage, lettuce
3.	Flowers	Broccoli, cauliflower
4.	Fruits	Ladyfinger, cucumber, brinjal
5.	Stems	Potato, ginger, onion

Fruits: Fruits are also edible parts of plants. Fruits like apple, banana, mango, grapes, papaya and pomegranates are rich in sugar, vitamins and minerals (Fig. 1.8). They help to keep our body healthy.

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Fig. 1.8 Fruits
(a) apples (b) bananas (c) mangoes

Dry Fruits: Dry fruits are fruits from which the majority of the original water content has been removed naturally. Dry fruits like almonds, cashewnuts, walnuts, date and *anjeer* are rich in minerals and proteins (Fig. 1.9). They are necessary for our good health and maintenance of the body.

Fig. 1.9 Dry fruits
(a) almonds (b) cashewnuts (c) anjeer

Sugar: We get sugar and jaggery (*gur*) from sugarcane juice. We also get sugar from sugar beet (Fig. 1.10). Sugar is essential in diet because it gives us energy for doing work. However, we should take less sugar because excess sugar leads to obesity (*motapa*).

Fig. 1.10 Sources of sugar
(a) sugarcane (b) sugar beet

Spices: All spices are obtained from plants. They improve the taste of food and preserve food for a longer period of time. Some spices have medicinal properties also. Spices are obtained from flowers, fruits, seeds, barks, leaves and roots of plants. They are used in very small quantities. Dry ginger, turmeric, clove, black pepper, cardamom, cumin and bay leaf are examples of spices (Fig. 1.11).

Fig. 1.11 Spices
(a) turmeric (b) clove (c) black pepper

Oils: Oil is obtained mainly from seeds and fruits of plants like mustard, coconut, soyabean, groundnut, sesame and sunflower (Fig. 1.12), Oils provide essential nutrients that help to maintain body functions. It also adds taste to the food we eat.

Fig. 1.12 Sources of oil
(a) mustard (b) coconut (c) sunflower

Beverages: We drink beverages like tea and coffee. They give us energy and refresh our mood. Tea is prepared by drying the leaves of tea plant. We get coffee powder by crushing the seeds (beans) of coffee plant (Fig. 1.13).

Fig. 1.13 Beverages
(a) tea (b) coffee

ANIMALS AS A SOURCE OF FOOD

We get milk, eggs, meat and honey from animals.

1. **Milk:** We get milk from **cows, buffaloes, goats** and **sheep.** Milk is used to prepare butter, cheese, *ghee*, curd and ice cream. Milk is a complete food. It is a good source of protein, vitamins and minerals, especially calcium. We must drink milk every day to remain healthy and for our growth and development [Fig. 1.14(a)].

2. **Eggs:** We get eggs from hens, turkeys and ducks. Eggs are a rich source of proteins and vitamins [Fig. 1.14 (b)].

3. **Meat:** We get meat from hens, ducks, goats and fish. It is a rich source of proteins [Fig. 1.14 (c)].

4. **Honey:** We get honey from honeybees. It is sweet in taste. It is a nutritious food item and used to make Ayurvedic medicines [Fig. 1.14 (d)].
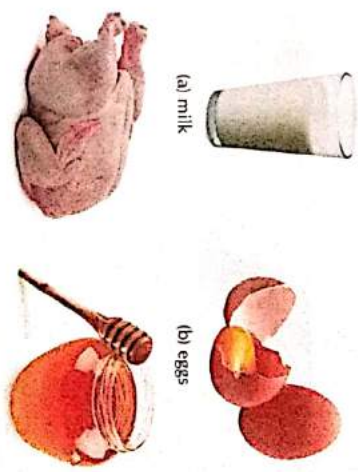

Fig. 1.14 Food from animals
(a) milk (b) eggs (c) meat (d) honey

DO YOU KNOW?
How is honey produced? Honeybees collect nectar (sweet juice) from flowers, convert it into honey and store it in their hives. The rearing of honeybees on a large scale is called **apiculture.**

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Which of the following is obtained from the roots of plants?
   - (a) potato
   - (b) radish
   - (c) turmeric
   - (d) brinjal

2. Which of the following food items is not obtained from plants?
   - (a) cereals
   - (b) spices
   - (c) honey
   - (d) sugar

3. Milk is a good source of
   - (a) proteins
   - (b) vitamins
   - (c) minerals
   - (d) all of these

REGIONAL FOOD

India is a very large country with a number of states. Different states have different climatic conditions and cultures. The climatic condition and culture of a particular region affects the food habits of the people living there. Let us study the regional traditional food of various states (Fig. 1.15).

Table 1.4 States and their traditional foods

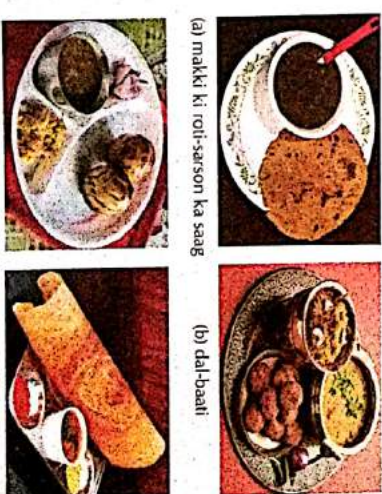| S.No.	Name of state	Traditional foods
1.	Punjab	Makki ki roti-sarson ka saag,
2.	Gujarat	Khandvi, Dhokla, Khakra
3.	Maharashtra	Thalipeeth
4.	Bihar	Litti and chokha
5.	Rajasthan	Dal-baati, Churma
6.	Andhra Pradesh	Hyderabadi biryani
7.	Tamil Nadu	Masala dosa

Fig. 1.15 Regional foods
(a) makki ki roti-sarson ka saag (b) dal-baati (c) litti-chokha (d) masala dosa

FOOD OF RAJASTHAN

Different food items are made in various regions of Rajasthan during different festivals and special occasions.

ACTIVITY 3

Make a list of the special food items or dishes made in different regions of Rajasthan along with the names of the related festivals.

(a) malpua   (b) gatte ki sabji

Fig. 1.16 Some dishes of Rajasthan

Table 1.5 Dishes prepared during various festivals in different regions of Rajasthan

S. No.	Name of the region	Name of the festival	Special dish prepared
1.			
2.			
3.			
4.			
5.			

Let Us Revise

1. All living organisms eat food when they are hungry.
2. Food gives us energy to work and play, nutrients for the growth, maintenance and repair of the body and protection from diseases.
3. On the basis of food habits, there are three types of animals—herbivorous animals, carnivorous animals and omnivorous animals.
4. Animals that eat only plants and plant products are called herbivorous animals or herbivores.
5. Animals that eat only the flesh of other animals are called carnivorous animals or carnivores.
6. Animals that eat both the plant products and flesh of other animals are called omnivorous animals or omnivores.
7. The two main sources of food are plants and animals.
8. The parts of the plant that can be eaten are called edible parts.
9. We get cereals, pulses, vegetables, fruits, sugar, spices, oil and beverages from plants.
10. We get milk, eggs, meat and honey from animals.
11. Climatic conditions and culture affects the food habits of people living in that particular region.
12. Different food items are made in various regions of Rajasthan during festivals and special occasions.

Know This Also

FOOD PROBLEM: Many people in our country do not get enough food to eat. This is because (i) there is a shortage of food and (ii) many people cannot buy enough food due to poverty. This is called **food problem.** The food problem of our country can be solved by the following ways:

1. Grow more food crops by using modern methods of farming.
2. Proper storage of the food grains, so that they are not eaten by pests like rats, insects and birds, or spoiled by microorganisms.
3. Avoid wastage of food in any way. Overeating leads to obesity. We should not serve more food than we can eat. We should consume all the food taken on our plate. A large amount of food is wasted due to poor management at parties and other social functions.

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Thalipeeth is a traditional dish of _____.
   (a) Punjab   (b) Gujarat
   (c) Bihar   (d) Maharashtra
2. Which of the following is a traditional dish of Rajasthan?
   (a) khandvi   (b) litti-chokha
   (c) dal-baati   (d) masala dosa

Exercise

(Use *Cordova Smart Class Software* on the *smart board* in class to do these exercises.)

A Tick (✓) the correct options.

1. Which of the following is a herbivorous animal?
   (a) cheetah   (b) deer   (c) lion   (d) dog
2. Which part of the plant is pulse?
   (a) flower   (b) fruit   (c) seed   (d) stem

B Short answer type questions

1. What is an omnivorous animal? Write giving examples.
2. What benefits do living beings get from food?
3. Write the names of five fruit-bearing plants that are grown in your locality.
4. Name the plants from which the food ingredients are obtained from the roots, stem and leaves.
5. Name the food items obtained from milk.

C Long answer type questions

1. Describe the food ingredients obtained from different parts of plants.
2. Describe the food ingredients obtained from animals.
3. Mention some good habits related to food.

D Practical Work

1. Collect different types of edible seeds and display them in your classroom.
2. Complete the table by listing the food provided as lunch in the school.

S. No.	Day	Food Provided
(i)	Monday	
(ii)	Tuesday	
(iii)	Wednesday	
(iv)	Thursday	
(v)	Friday	
(vi)	Saturday	

ADDITIONAL QUESTIONS FOR PRACTICE

A Tick (✓) the correct options.

1. Which of the following animals eat(s) flesh of the other animals?
   (a) lion   (b) wolf   (c) eagle   (d) all of these

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2. Which of the following is not an example of cereals?
   (a) rice ○ (b) maize ○ (c) gram ○ (d) sorghum ○

3. Which of the following is not a dry fruit?
   (a) almond ○ (b) cashewnut ○ (c) anjeer ○ (d) mango ○

4. We get sugar from
   (a) sugar cane ○ (b) sugar beet ○ (c) sweet potato ○ (d) both (a) and (b) ○

5. We get eggs from
   (a) hens ○ (b) turkeys ○ (c) ducks ○ (d) all of these ○

B. Match the following.

Column A	Column B
1. Cereals	(a) almonds and cashewnuts
2. Fruits	(b) tea and coffee
3. Spices	(c) pomegranate and apple
4. Oils	(d) cardamom and turmeric
5. Beverages	(e) sunflower and sesame
6. Dry fruits	(f) wheat and rice

C. Fill in the blanks.

1. All living organisms need _____ to grow and perform various activities.
2. We get food from _____ and _____.
3. The green plants are called _____.
4. The edible part of cereals is the _____.
5. _____ are the main source of proteins in the diet.
6. _____ are obtained from the seeds of the leguminous plants.
7. Eating excess sugar leads to _____.
8. All spices are obtained from _____.
9. Eggs are a rich source of _____.
10. We get honey from _____ and _____.

D. Short answer questions

1. Name two herbivorous animals.
2. How are herbivores different from carnivores?
3. What is meant by edible parts of a plant?
4. List the different food materials that we get from plants.
5. What are the main sources of carbohydrates in our diet?
6. Why is sugar necessary in our diet?
7. Why do growing children, pregnant women and people recovering from illness need more pulses in their diet?

E. Long answer questions

1. What are the functions of food?
2. Classify the animals on the basis of their food habits. Define and give two examples of each type.
3. (a) Name the animals from which we get milk. (b) Why should we drink milk daily?
4. Why do people of different regions have different food habits? (b) Write the traditional food of any five states.

F. Think and answer

Look at the delicious pizza shown in Fig. (a). Identify the sources from which its ingredients are obtained.

Fig. (a)
— paneer
— cheese
— tomato
— mushroom
— maida

Find the following in the given word grid:

• Eight food items we get from plants
• Four food items we get from animals

X	C	E	R	E	A	L	S	H	E	V
N	A	P	M	A	B	C	P	O	D	E
L	S	U	G	A	R	F	I	N	G	G
O	I	L	N	E	G	G	C	E	O	E
P	T	S	O	H	I	L	E	Y	R	T
Q	G	E	M	I	L	K	S	N	S	A
B	K	S	F	J	M	E	A	T	X	B
F	R	U	I	T	S	K	M	U	L	
B	E	V	E	R	A	G	E	S	Q	E
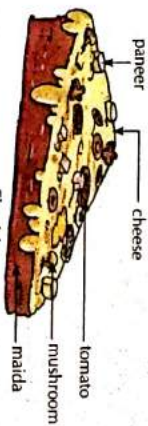
Olympiad Corner

Tick (✓) the correct options.

1. Which one of the following statements is true?
   Statement 1. Animals depend on plants for their food.
   Statement 2. Plants depend on animals for their food.
   (a) Statement 1 ○ (b) Statement 2 ○
   (c) Both statements are true. ○ (d) Both statements are false. ○

2. The animals that eat dead organic matter are called
   (a) herbivores ○ (b) carnivores ○
   (c) omnivores ○ (d) scavengers ○

3. The animal 'crocodile' belongs to which one of the following groups?
   (a) herbivores ○ (b) carnivores ○ (c) omnivores ○ (d) all of these ○

4. Choose the omnivore from the following:
   (a) tiger shark ○ (b) king cobra ○ (c) horse ○ (d) ant ○

5. In which of the following plants stems are the edible parts?
   (a) radish ○ (b) potato ○ (c) carrot ○ (d) apple ○

[Answers: 1. (a) 2. (d) 3. (b) 4. (d) 5. (b)]

2 Nutrition In Plants

Use Cordova Smart Class Software on the smart board in class to make learning enjoyable.

We know that all living organisms need food. Green plants can make their own food. Unlike plants, animals cannot make their food. They depend on plants and other animals for their food. In the previous lesson, we learnt that food gives us energy to work. It is necessary for the growth, maintenance and repair of the body. It also protects us from diseases and keeps us healthy.

The substances present in food that are responsible for providing energy, for growth, maintenance and repair of the body and providing protection from diseases are called nutrients.

Nutrition is the process of intake of nutrients in the form of food by a living organism for maintaining health and its growth and development.

NUTRIENTS

Plants need different types of nutrients to grow and develop. They get these nutrients mainly from soil. These nutrients are essential for the healthy growth and development of plants and are absorbed from the soil. On the basis of the amount required by the plants, these nutrients are divided into two groups—

(a) Macronutrients   (b) Micronutrients

1. **Macronutrients:** The nutrients that are required by plants in larger amounts are called macronutrients. Carbon, hydrogen, oxygen, nitrogen, phosphorus and potassium are examples of macronutrients.

Macronutrients can further be divided into two types —

(a) **Primary macronutrients:** Nitrogen, phosphorus and potassium

(b) **Secondary macronutrients:** Calcium, magnesium and sulphur

Plants get carbon in the form of carbon dioxide present in the air and hydrogen and oxygen in the form of water present in the environment.

2. **Micronutrients:** The nutrients that are required by plants in very small amounts are called micronutrients. Zinc, copper, manganese, molybdenum, iron, boron, chlorine, nickel, cobalt and silicon are micronutrients.

The quantity of micronutrients is less than even 0.02% but they are essential for the healthy growth of plants. The deficiency of any of these nutrients causes diseases in plants like stunted growth and yellowing of leaves.

CLASSIFICATION OF PLANTS ON THE BASIS OF NUTRITION

We find different types of plants in different types of environment on the earth. On the basis of mode of nutrition, plants are of the following five types:

(a) Autotrophs   (b) Saprophytes

(c) Parasites   (d) Insectivorous plants

(e) Symbiotic organisms

AUTOTROPHS

The word 'auto' means 'self' and 'trophos' means 'nutrition'. Thus, autotrophic means 'self-nutrition'. The mode of nutrition in which an organism makes its own food from simple substances like carbon dioxide, water and minerals present in the surroundings with the help of sunlight is called autotrophic nutrition. Organisms having autotrophic mode of nutrition are called autotrophs. All green plants and some bacteria prepare their own food by autotrophic mode of nutrition thus, they are autotrophs.

PHOTOSYNTHESIS

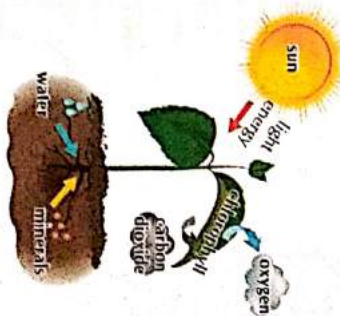Green plants are autotrophs. They make their own food by the process of photosynthesis (Fig. 2.1).

Fig. 2.1 Schematic diagram showing photosynthesis

'Photo' means 'light' and 'synthesis' means 'to build'. Thus, photosynthesis means 'building up by light'. The leaves of a plant are green because they contain tiny green-coloured bodies called **chloroplasts** that contain chlorophyll. The chlorophyll uses the energy of sunlight to prepare food from carbon dioxide and water.

The process by which green plants make their own food (glucose) from carbon dioxide and water in the presence of sunlight and chlorophyll is called photosynthesis. Oxygen gas is released during photosynthesis.

The process of photosynthesis can be represented by an equation given below.

$$Carbon\ dioxide + Water \xrightarrow[\substack{Chlorophyll}]{\substack{Sunlight}} Glucose + Oxygen$$
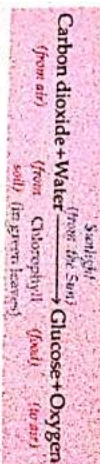
The food prepared by the green leaves of a plant is in the form of a simple sugar called glucose. The extra glucose is changed into another form of food called **starch**. This starch is stored in the leaves of the plant. It is then sent to the different parts of the plant.

Requirements Of Photosynthesis

The process of photosynthesis mainly occurs in leaves. Thus, leaves are called the **food factories of plants**. The materials required by plants for photosynthesis are water and minerals, carbon dioxide, chlorophyll and sunlight.

1. **Water and Minerals:** The water and minerals required by the plants for photosynthesis are absorbed by the **roots** of the plants from the soil.

2. **Carbon dioxide:** Carbon dioxide is a gas which is present in the air. The green plants take in carbon dioxide from the air for carrying out photosynthesis. Tiny pores called **stomata** (singular: **stoma**) are present on the lower surface of the leaves. These pores are surrounded by **guard cells**. The guard cells control the opening and closing of stomata. The carbon dioxide gas enters the leaves of the plant through the stomata (Fig. 2.2).
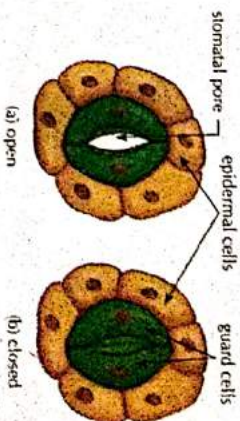

Fig. 2.2 Open and closed stomata

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3. **Chlorophyll:** Chlorophyll is a green pigment present in the cell organelle called chloroplast. The green colour of plants is due to the presence of chlorophyll in them. Chlorophyll traps the energy of the sunlight. This energy is used to synthesise food from carbon dioxide and water during the process of photosynthesis (Fig. 2.3).
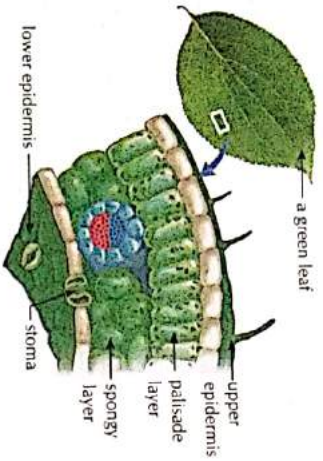

a green leaf

upper epidermis
palisade layer
spongy layer
stoma
lower epidermis

Fig. 2.3 Chlorophyll present in green leaf

Do you know?

The leaves of some plants have chlorophyll, but they appear dark red in colour. This is because the red pigment present in them hides the green colour of the chlorophyll. Such leaves can also make food by photosynthesis.

4. **Sunlight:** The green plants make their food in the presence of sunlight. The chlorophyll present in green leaves traps the energy of the sunlight. The energy of the sunlight is converted into the chemical energy by the process of photosynthesis. This chemical energy is stored in the form of food.

ACTIVITY 1

To show that sunlight is necessary for photosynthesis

Things needed: A potted plant, a beaker, a Bunsen burner, alcohol, iodine solution, a dropper, boiling tube, test tube holder, petri dish, wire gauze and tripod stand

Precaution: Do not heat alcohol directly because it catches fire.

Method:

1. Take a healthy potted plant. Keep it in a dark room for 1-2 days to destarch the leaves. (Since, the leaves do not receive sunlight, they will not be able to prepare food. There will be no food left in the leaves. In this way the leaves are destarched) [Fig. 2.4 (a)].

2. Cover one of its leaves partly with a strip of black paper. Put the plant in sunlight for a few hours [Fig. 2.4 (b)].

3. Pluck this covered leaf. Remove the black strip.

(a) The plant is kept in a dark room.

(b) The plant is kept in sunlight.

portion of leaf exposed to sunlight
black paper (portion of leaf not exposed to sunlight)

(c) Boil it in water.

(d) Boil it in alcohol.

water
alcohol
water

decolourised leaf

blue-black (uncovered portion contains starch)
dropper
iodine solution

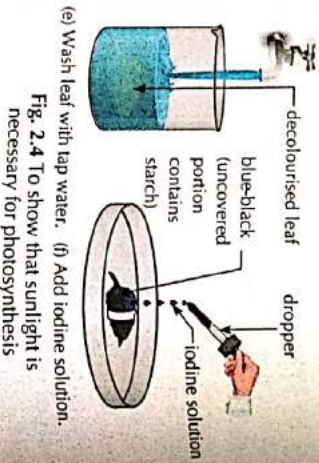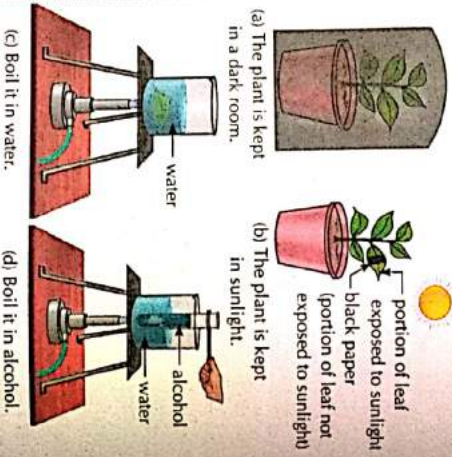(e) Wash leaf with tap water. (f) Add iodine solution.

Fig. 2.4 To show that sunlight is necessary for photosynthesis

4. To remove the chlorophyll from the leaf, first boil it in water and then in alcohol. In this way, we get a decolourised leaf. Wash the leaf with water again [Fig. 2.4 (c), (d) and (e)].

5. Add a few drops of iodine over the colourless leaf. What do you observe?

Observation: The part of the leaf covered with black paper does not turn blue-black, whereas the other part turns blue-black. [Fig. 2.4 (f)]

Discussion: The covered part of the leaf did not get sunlight. Hence, there is no starch in that part.

Conclusion: Sunlight is necessary for photosynthesis.

Importance Of Photosynthesis

Can you imagine the earth in the absence of the process of photosynthesis ? No. Why ?

1. Photosynthesis enables the green plants to prepare their own food. In the absence of photosynthesis, there would be no plants.

2. Animals eat plants. These animals are food for the other animals. Thus, green plants are the source of food to all living organisms.

3. Oxygen is produced during photosynthesis. It is used by all living organisms for breathing.

4. During the process of photosynthesis, plants use carbon dioxide and give out oxygen. In this way, photosynthesis maintains a balance between oxygen and carbon dioxide in the atmosphere.

So, in the absence of photosynthesis, life would be impossible on the earth.

SAPROPHYTES

Some non-green plants obtain the nutrients from dead and decaying organic matter of plants and animals.

The mode of nutrition in which the non-green plants obtain their nutrients from dead and decaying organic matter of plants and animals is called saprotrophic nutrition. Plants that use saprotrophic mode of nutrition are called saprophytes. Examples are Indian pipe and coral root (Fig. 2.5).

---

2. Which of the following is not an example of micronutrients?

(a) nitrogen   (b) copper
(c) iron   (d) nickel

3. All green plants that make their own food are called

(a) autotrophs   (b) saprotrophs
(c) parasites   (d) symbiotic plants

(a) Indian pipe

(b) coral root

Fig. 2.5 Some saprophytic plants

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Which of the following is not an example of macronutrients?

(a) carbon   (b) hydrogen
(c) zinc   (d) oxygen

The roots of saprophytes contain organisms called fungi; The fungi (like mushrooms) secrete digestive juices on the dead and decaying matter and convert it into a liquid that is used as a nutrient by the non-green plants. Fungi (like moulds, mushrooms and yeast) and bacteria are known as saprotrophs. Fungi were earlier considered to be plants but due to the presence of some characteristics different from plants, they are no longer considered as plants and are considered as a separate group.

ACTIVITY 2

To grow fungi

Things needed: A container, a piece of bread, water

Method: Take a piece of bread in a container. Sprinkle some water and close the container. Open the container after two days and observe it carefully.

Observation: You observe some white or brown fluffy patches on the bread. This is a kind of fungi called mould growing on the food item. When you observe these moulds under a microscope with the help of your teacher (Fig. 2.6), you see cotton-like threads on the piece of bread.

Fig. 2.6 Bread infected by mould (saprotroph)

PARASITES

Cuscuta (amarbel) is a non-green plant. It does not have chlorophyll. It cannot make its own food. Its long, yellowish, thread-like stems twine around the stem and branches of a tree on which it climbs. It has a special structure called **haustoria**. Haustoria pierces into the plant's body on which it is climbing for absorbing ready-made food.

The mode of nutrition in which some plants live in or on the body of other living organisms and get their ready-made food from them is called parasitic nutrition.

The plant (like *Cuscuta*) that obtains the ready-made food is called a parasite and the organism from whose body the food is obtained is called the host.

Parasites may be total or partial. *Cuscuta* is a total parasite (Fig. 2.7).

Fig. 2.7 *Cuscuta* (total parasite)

Sandalwood tree is a partial parasite (Fig. 2.8). It has green leaves and prepares its own food. The roots of the tree make contact with the roots of the other nearby plants. They absorb water and minerals from them.

Fig. 2.8 Sandalwood tree

INSECTIVOROUS PLANTS

A few plants feed on insects for fulfilling their nutritional requirements. Such insect-eating plants are called insectivorous plants.

pitcher plant, bladderwort (*Utricularia*), *Drosera* and venus flytrap (*Dionaea*) are examples of insectivorous plants (Fig. 2.9).

(a) bladderwort

(b) venus flytrap

Fig. 2.9 Insectivorous plants

In a pitcher plant, the lamina forms a pitcher-shaped structure (Fig. 2.10). The apex of the leaf forms the lid of the pitcher. It can open and close the mouth of the pitcher. The petiole manufactures the food. Inside the pitcher, there are hair that are directed downwards. The pitcher plant feeds on insects to fulfil its nitrogen requirement. When an insect sits on the rim of the pitcher, the lid closes immediately. The insect is digested by the digestive juices secreted in the pitcher. In India, the pitcher plant is found in Meghalaya (mainly Garo and Khasi hills).

Fig. 2.10 Pitcher plant

SYMBIOTIC ORGANISMS

Some living organisms share food, water, minerals and space of living with other living organisms. This mode of living is called symbiosis. The mutual association in which two different types of organisms live and work together for their mutual benefit from each other is called symbiosis. Lichens show symbiotic relationship or symbiosis (Fig. 2.11).

Fig. 2.11 Lichens

A lichen is composed of two distinct organisms — algae and fungus, living and working together. The algae contain chlorophyll and make their own food. The fungus shares the food made by the algae. The fungus, in return, provides protection, water and minerals to the algae.

Rhizobium bacteria and leguminous plants show symbiosis or symbiotic relationship. Most of the pulses (*dals*) are leguminous plants. They have nodules in their roots. *Rhizobium* bacteria cannot make their own food. They take atmospheric nitrogen and convert it into a soluble form. Plants cannot directly use atmospheric nitrogen. They need nitrogen in a soluble form.

So, *Rhizobium* bacteria live in the nodules of the roots of leguminous plants like gram, peas and *moong*, and provide them nitrogen (Fig. 2.12). In return, the plants provide food and shelter to the *Rhizobium* bacteria. So, both organisms benefit

each other. They show a symbiotic relationship or symbiosis.

Fig. 2.12 Symbiotic relationship between leguminous plants and *Rhizobium* bacteria

Let Us Revise

1. The substances present in food that are responsible for providing energy, for growth, maintenance and repair of the body and providing protection from diseases are called nutrients.
2. Nutrition is the process of intake of nutrients in the form of food by a living organism for maintaining its health, growth and development.
3. Plants need different types of nutrients to grow and develop. On the basis of the amount required by the plants, these nutrients are divided into two groups– macronutrients and micronutrients.
4. The nutrients that are required by plants in larger amounts are called macronutrients. Examples are carbon, hydrogen, oxygen, nitrogen, phosphorus and potassium.
5. The nutrients that are required by plants in very small amounts are called micronutrients. Examples are zinc, copper, manganese, magnesium, iron, boron, chlorine, nickel, cobalt and silicon.
6. On the basis of mode of nutrition, plants are autotrophs, saprophytes, parasites, insectivorous plants and symbiotic.
7. The mode of nutrition in which an organism makes its own food from simple substances like carbon dioxide, water and minerals present in the surroundings with the help of sunlight is called autotrophic nutrition.
8. Green plants are autotrophs. They make their food by the process of photosynthesis.
9. Chlorophyll is the green pigment present in chloroplast.
10. The process by which green plants make their own food from carbon dioxide and water in the presence of sunlight and chlorophyll is called photosynthesis. Oxygen is produced during photosynthesis.
11. Life is impossible on the earth, in the absence of photosynthesis.
12. The mode of nutrition in which the non-green plants obtain their nutrients from dead and decaying organic matter of plants and animals is called saprotrophic nutrition.
13. Plants that use saprotrophic mode of nutrition are called saprophytes. Indian pipe and coral root are examples of saprophytes.
14. The mode of nutrition in which some plants live in or on the body of other living organisms and get the ready-made food from them is called parasitic nutrition. Cuscuta and sandalwood are parasitic plants.

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Which of the following is an example of saprotroph?
   (a) Indian pipe   (b) coral root
   (c) fungi   (d) all of these
2. Haustoria is present in
   (a) Cuscuta   (b) pitcher plant
   (c) mistle toe   (d) venus flytrap
3. Lichens are an example of
   (a) saprotrophs   (b) symbiosis
   (c) parasites   (d) autotrophs

15. Plants that trap and feed on insects to fulfil their nutritional requirement are called insectivorous plants. Pitcher plant, bladderwort and venus flytrap are insectivorous plants.
16. The mutual association in which two different types of organisms live and work together for their mutual benefit from each other is called symbiosis. Lichens (algae + fungi) and *Rhizobium* bacteria and leguminous plants show symbiosis.

Exercise

(Use *Cordova Smart Class Software* on the *smart board* in class to do these exercises.)

A **Tick (✓) the correct options.**

1. It is a saprotrophic plant.
   (a) neem   (b) Drosera
   (c) mucor   (d) Cuscuta
2. Those plants that depend on other plants for their food are called
   (a) parasites   (b) autotrophs
   (c) saprotrophs   (d) insectivorous plant
3. Which of the following is not an insectivorous plant?
   (a) Drosera   (b) Dionaea
   (c) Cuscuta   (d) Utricularia

B **Fill in the blanks.**

1. In lichen, _____ and _____ live together.
2. In pitcher plant, pitcher is the modified form of _____.
3. The mode of taking essential nutrients in the form of food by an organism for its health and physical growth is called _____.

C **Short answer type questions**

1. What is photosynthesis?
2. What is symbiosis?
3. What is the difference between the host and the parasite?

D **Long answer type questions**

1. Describe insectivorous plants with suitable example.
2. Write short notes on the following:
   (a) symbiotic plants   (b) saprotrophic plants   (c) parasitic plants   (d) photosynthesis

E **Practical Work**

1. Collect leaves of plants found in your locality and prepare a scrapbook.
2. Visit a greenhouse present in your locality. Look, how plants are grown there. Find out how light, water and carbon dioxide are regulated there for healthy growth of the plants.

A. Tick (✓) the correct options.

1. Which of the following is not an example of primary macronutrients?
   (a) phosphorus ◯   (b) potassium ◯   (c) sulphur ◯   (d) nitrogen ◯

2. Which of the following is not an example of secondary macronutrients?
   (a) calcium ◯   (b) magnesium ◯   (c) sulphur ◯   (d) nitrogen ◯

3. Chlorophyll is present in
   (a) stoma ◯   (b) mitochondria ◯   (c) chloroplast ◯   (d) chromoplast ◯

4. Which of the following gases is released during photosynthesis?
   (a) carbon dioxide ◯   (b) nitrogen ◯   (c) starch ◯   (d) none of these ◯

5. The food prepared by plants is stored in the form of
   (a) glucose ◯   (b) minerals ◯   (c) starch ◯   (d) none of these ◯

6. Starch gives blue-black colour with
   (a) oxygen ◯   (b) nitrogen ◯   (c) starch ◯   (d) chlorine ◯

7. _____ are the sources of food to all living organisms.
   (a) alcohol ◯   (b) water ◯   (c) iodine ◯   (d) sunlight ◯

   (a) Plants ◯   (b) Green plants ◯   (c) Animals ◯   (d) Bacteria ◯

B. Match the following.

Column A		Column B
1. Insectivorous plant		(a) Indian pipe ◯
2. Symbiosis		(b) Cuscuta ◯
3. Parasite		(c) pitcher plant ◯
4. Saprophyte		(d) lichen ◯

C. Fill in the blanks.

1. Plants need different types of _____ to grow and develop.

2. _____ and some bacteria are autotrophs.

3. The food prepared by the green leaves of a plant is in the form of a simple sugar called _____.

4. Stomata are tiny pores surrounded by _____ cells.

5. _____ cells control the opening and closing of stomata.

6. _____ traps sunlight energy.

7. Sandalwood tree is a partial _____.

D. Short answer questions

1. What are nutrients?

2. From where do plants get nutrients?

3. (a) Why do we boil the leaf in alcohol during starch test?
   (b) Which chemical is used to detect the presence of starch in leaves?

4. How do plants get water, minerals and carbon dioxide?

5. Why are leaves green in colour?

6. Define autotrophic mode of nutrition. Give two examples of autotrophs.

7. Why do insectivorous plants trap insects?

E. Long answer questions

1. Differentiate between macronutrients and micronutrients.

2. Draw labelled diagrams of
   (a) leaf   (b) stomata

3. Write an activity to show that sunlight is necessary for photosynthesis.

4. What is the importance of photosynthesis?

5. Draw a labelled diagram of pitcher plant. Describe its structure and write how does it trap insect.

F. Think and answer

Rimsha places a potted plant in a completely dark room. After 3 days, she takes out the plant and tests one of its leaf for the presence of starch. Will she get a positive starch test? Give reason to support your answer.

Do you know me?

1. I eat insects to fulfil my nitrogen requirement. My leaf is pitcher shaped. I am _____. (PRITCHE PANTL)

2. I grow on bread. I look like cottony threads. I am _____. (BEARD LMOUD)

3. I am yellow in colour. I twine around the stem and branches of a tree. I get food from them. I am _____. (CCUSUAT)

4. I share my food with fungi. It gives me water, minerals and protection. I am _____. (GLIAAE)

Olympiad Corner

Tick (✓) the correct options.

1. Which of the following is an insectivorous plant?
   (a) cactus plant ◯   (b) babool plant ◯   (c) pitcher plant ◯   (d) all of these ◯

2. Which of the following is essential for the growth of plants?
   (a) proper amount of water ◯   (b) suitable soil ◯
   (c) sunlight ◯   (d) all of these ◯

3. Sugar is the product of which one of the following processes?
   (a) respiration ◯   (b) photosynthesis ◯   (c) transpiration ◯   (d) transportation ◯

4. Which of the following tissues carries water from root to leaves?
   (a) xylem ◯   (b) phloem ◯   (c) chlorophyll ◯   (d) chloroplast ◯

[Answers: 1. (c) 2. (d) 3. (b) 4. (a)]

3

Nature Of Things

You Will Learn About
- Grouping of objects— Classification, and its importance
- Materials
- Properties of materials (lustre, texture, hardness, magnetic or non-magnetic, state, soluble or insoluble, density and transparency).

Use *Cordova Smart Class Software* on the *smart board* in class to make learning enjoyable.

OBJECTS AROUND US

When you look around e.g., in school you see a large number of things like desks, chairs, blackboards, doors, fans, water bottles and pencil boxes. At your home also, you find many things like furniture, utensils, toys, mobiles, clothes, shoes, computers and so on. All these things are called an object. **Anything that we can see or touch is called an object.**

All objects differ in shape, size, colour and many other aspects. But all objects are made up of different materials and have different properties. To study all the objects around us, we need to classify them.

GROUPING OF OBJECTS– CLASSIFICATION

A grocery shop has many things. Imagine, if all the things were dumped together at one place, the shopkeeper would never be able to find the things that the buyers want. But in most grocery stores, things are arranged systematically (Fig. 3.1).

Fig. 3.1 Things arranged systematically in a shop

For example, all kinds of toiletries are placed together at one place. These are further sorted

out and grouped. For example, toothpastes of different brands are placed together at one place and soaps at another. **The advantage of sorting and placing things in groups is that it becomes very easy to locate a particular thing.**

Grouping different objects on the basis of certain similarities and dissimilarities is called classification.

ACTIVITY 1

To classify the given objects on the basis of given criteria of fruits, vegetables, cereals, fibres and spices

Objects: potato, wheat, cotton, black pepper, apple, silk, lady's finger, maize, chilli, orange, wool, turmeric, rice, tomato, mango

Fruit	Vegetable	Spice	Cereal	Fibre
apple	potato	chilli	wheat	cotton
......	......	......	......	......

Importance Of Classification

Classification has the following advantages:
1. It helps in systematic study of objects.
2. It helps in identifying and locating things.
3. It helps to study the properties of objects of one category and also observe any pattern in these properties.
4. It helps us know how the objects of a group differ from those of the other groups.

MATERIALS

A substance (or a thing) that is used in making different objects is called a material. All the objects are made of one or more kinds of materials. For example, a chair is made of wood, so wood is a material. A spoon is made of steel, so steel is a material. Some more examples of materials are cotton, silk, coal, iron, plastic and glass.

Classification Of Materials – On The Basis Of Sources

Materials are generally of two types— natural and human-made. **The materials that are obtained from nature (plants and animals) are called natural materials.** The materials that do not occur in nature, but are made by humans in factories by combining two or more materials are called human-made materials. For example, wood is obtained from nature, so wood is a natural material and plastic is made in factories, so, it is a human-made material.

An Object Made Of Different Materials

The same object may be made of different materials. For example, we use a plate in our daily life. A plate may be made of different materials like plastic, glass, stainless steel, brass and silver.

ACTIVITY 2

To find different materials from which the given objects can be made

Object	Materials they are made of
chair	wood, iron, plastic
clothes	......
coins	......
utensils	......
shoes	......
pen	......

Hints: cotton, copper, iron, polyester, leather, wool, silver, plastic, nylon, gold, silk, aluminium, rubber, steel, canvas

Whenever you see an object, try to identify the material used in it. In case of difficulty, take the help of your friends, teachers and parents.

Different Types Of Objects Made Of The Same Material

Plastic is a material. It can be used to make different kinds of objects. For example, it can be used to make objects like toys, utensils, bags, mugs, tumblers, buckets and toothbrushes (Fig. 3.2).

Fig. 3.2 Different objects made of plastic

ACTIVITY 3

To find different types of objects that can be made from the same material

Object	Objects made of these materials
wood	table, chair, door, window
glass	......
iron	......
copper	......
leather	......
paper	......

Hints: utensils, nail cutter, mirrors, shoes, belts, pipes, books, machines, tumblers, coins, newspapers, jackets, calendars, boilers

PROPERTIES OF MATERIALS

We use steel or aluminium to make utensils for cooking purposes. But, we never use paper for making such utensils. It is because paper utensils catch fire, when placed on the burner of a gas stove. Hence, we choose a material to make an object depending on its properties and the purpose for which the object is to be used. Let us study some of the properties of materials that would be important for their uses.

Appearance (Shine/Lustre)

Materials usually look different from each other. Sand looks very different from wood. Wood appears quite different from plastic. Plastic looks different from aluminium. Aluminium looks different from copper or iron. Aluminium, copper and iron have some common characteristics that are not present in sand, wood and plastic.

The special kind of shine present on materials (or shine that appears when materials are freshly cut) is called lustre (*chamak*). Materials like iron, copper and aluminium, that have lustre (shining surface), are called lustrous materials. Materials like paper, wood, plastic and cotton, that do not have lustre, are called non-lustrous materials. Most of the metals, like gold and silver, are lustrous materials. Due to their lustrous nature, gold and silver are used in making jewellery.

Some metals often lose their shine and appear dull, because of the action of air and moisture on them. We, therefore, notice the lustre only on their freshly cut surfaces.

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Grouping different objects on the basis of certain similarities and dissimilarities is called _____
   (a) separation   (b) classification
   (c) identification   (d) nomenclature

2. Cooking utensils are made from
   (a) clothes   (b) paper
   (c) steel   (d) rubber

3. Which of the following is a lustrous material?
   (a) iron   (b) copper
   (c) aluminium   (d) all of these

Texture

When we touch different materials, we find that some are rough and some are smooth. Rough materials have bumps and ridges on their surfaces that can be felt. For example, wood, rocks and bark of tree are rough to touch. Smooth materials have no bumps or ridges and have a plain surface, so they feel smooth. For example, glass sheet and flower petals

Hardness

Take a piece of sponge and an iron rod. Try to compress both. What do you observe? You can easily compress sponge but an iron rod cannot be compressed.

Materials that can be compressed are called soft materials. Foam, melted wax and sponge are some examples of soft materials [Fig. 3.3 (a) and (b)]. Materials that cannot be compressed are called hard materials. Most metals, such as iron, copper and aluminium, are hard [Fig. 3.4 (a) and (b)]. Because of this quality of hardness, metals are used to make household utensils and factory equipment.
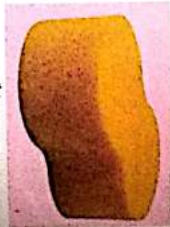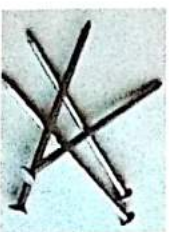
(a) foam   (b) sponge
Fig. 3.3 Soft materials

(a) iron nails   (b) an aluminium can
Fig. 3.4 Hard materials

DO YOU KNOW?
Diamond is the hardest known natural substance. So, diamonds are used as tools for cutting glass and grinding rocks.

Magnetic Or Non-magnetic

You might have observed that when you bring iron nails near a magnet, they get attracted towards the magnet (Fig. 3.5). However, when you bring a pencil or a paper near a magnet, they do not get attracted towards the magnet.

The objects that are attracted towards a magnet are called magnetic objects. The objects made of iron are examples of magnetic objects. The objects that are not attracted to a magnet are called non-magnetic objects. The objects made of wood and plastic are examples of non-magnetic objects.

iron nails   magnet
Fig. 3.5 Iron nails get attracted to the magnet.

ACTIVITY 4

Take saw dust and iron nails in a bowl. Now, bring a powerful magnet near it. What do you observe? You observe that iron nails are attracted to the magnet, whereas saw dust does not. This shows that iron nails are magnetic and saw dust is non-magnetic.

State

Most of the materials are grouped on the basis of their physical state, i.e., solid, liquid or gas. The main differences between these three states are given in Table 3.1.

Table 3.1 Differences between solid, liquid and gas

S. No.	Parameters	Solid	Liquid	Gas
1.	Shape	Definite	Not definite	Not definite
2.	Volume	Definite	Definite	Not definite
3.	Compressibility	Cannot be compressed	Can be compressed to some extent	Can be compressed to a large extent
4.	Arrangement of particles	Particles are very closely packed.	Particles are less closely packed in comparison to a solid.	Particles are loosely packed.

Soluble Or Insoluble

Take a glass or a beaker and fill three-fourths of it with clean, drinking water. Add half a spoonful of sugar in it. Stir the contents with a spoon. Wait for a few minutes and observe. You find that sugar has disappeared. This shows that sugar dissolves in water. We say that sugar is soluble in water (Fig. 3.6).

sugar   water
Stir the sugar in the water.   Sugar has dissolved.
Fig. 3.6 Sugar is soluble in water.

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Which of the following is not a hard material?
   (a) iron nail   (b) foam
   (c) copper jug   (d) aluminium rod

2. Which of the following has a definite shape and volume?
   (a) solid   (b) liquid
   (c) gas   (d) all of these

3. Particles are very closely packed in
   (a) solids   (b) liquids
   (c) gases   (d) all of these

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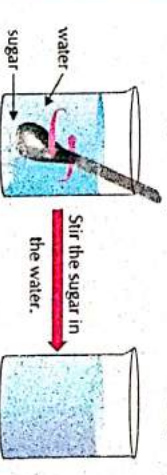
Now, taste the water. What do you find? The water tastes sweet.

This is because the sugar is still there in the water but its particles have become so small and spread uniformly in water that we cannot see them.

Now, take another beaker and fill three-fourths of it with water. Add half a spoonful of sand in it. Stir the contents with a spoon and observe. You find that the sand settles down at the bottom of the beaker. This shows that sand does not dissolve in water. Hence, sand is insoluble in water (Fig. 3.7).
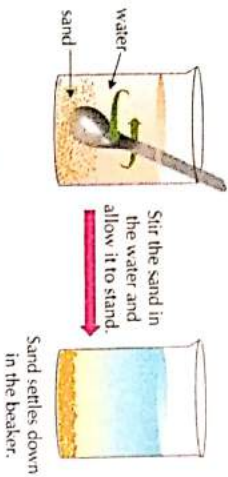

Stir the sand and allow it to stand.

Sand settles down in the beaker.

Fig. 3.7 Sand is insoluble in water.

Solubility of Solids in Water

Solid substances that dissolve in water are said to be **soluble in water**, whereas those that do not dissolve in water are said to be **insoluble in water**.

ACTIVITY 5

To observe the solubility of various solid substances in water

Things needed: Five test tubes, a test tube stand, water, common salt, chalk powder, plastic, copper sulphate, washing soda and a spoon

Method: Take five test tubes and fill half of each test tube with water. Add a small amount (half teaspoon) of common salt to the first test tube. Similarly, add the same amount of chalk powder to the second test tube, plastic to the third test tube, copper sulphate crystals to the fourth test tube and washing soda to the fifth test tube. Shake each test tube vigorously and keep them in the test tube stand. Observe them after a few minutes. What do you observe?
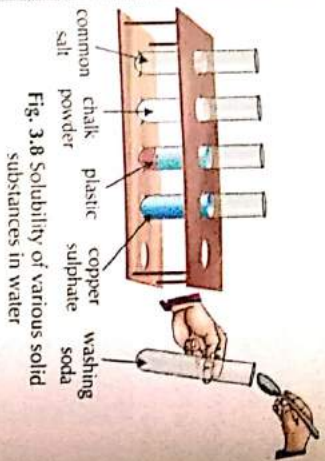

common salt   chalk powder   plastic   copper sulphate   washing soda

Fig. 3.8 Solubility of various solid substances in water

Observation: Common salt, copper sulphate crystals and washing soda dissolve in water, whereas chalk powder and plastic do not dissolve in water (Fig. 3.8).

Conclusion: Some solid substances are soluble in water and some are not.

Solubility of Liquids in Water

Some liquids like glycerine, lemon water, vinegar and alcohol get completely mixed with water. They are **miscible in water**. Some liquids like kerosene oil and mustard oil do not mix with water and form a separate layer. They are **immiscible in water**.

Solubility of Gases in Water

Some gases are soluble in water, whereas some are not. Usually, water contains small quantities of some gases like oxygen and carbon dioxide in dissolved state. Nitrogen gas is partially soluble in water, whereas gases like hydrogen and marsh gas (methane) do not dissolve in water. They are insoluble in water.

DO YOU KNOW?

Cold drinks contain carbon dioxide gas dissolved in water. These drinks are also called carbonated drinks.

Density

Take a coin and a leaf. Put them in a beaker filled with water. What do you observe?

You observe that the coin sinks in water, while leaf floats on it.

Coin is denser/heavier than water, that is why, it sinks in water. Leaf being less denser/heavier than water, floats on it (Fig. 3.9).
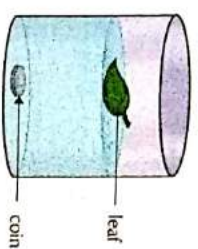
Let us perform the following activity to show that the thing that has more mass in a fixed volume has high density.

coin   leaf

Fig. 3.9 Leaf floats on water, while coin sinks in water.

or

leaf   coin

ACTIVITY 6

To show that thing that has more mass in a fixed volume has high density

Things needed: Two identical glasses, water, kerosene and beam balance

Method:

1. Fill one glass with water and the other with kerosene. The level of the liquid in each glass should be same.

2. Place one glass on one pan and the other glass on the other pan of an ordinary beam balance (Fig. 3.10).
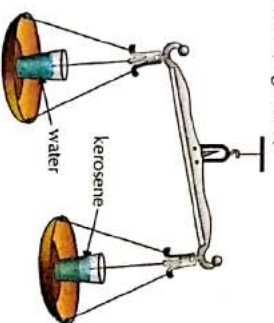

water   kerosene

Fig. 3.10 Equal volumes of water and kerosene have different masses.

Observation: The pan with glass containing water goes down. This show that the glass containing water has more mass than the glass containing kerosene despite the fact that their volumes are the same. Water is denser/heavier than kerosene.

Conclusion: Thing that has more mass in a fixed volume has high density.

Density of a substance is its mass per unit volume.

$$\text{Density (D)} = \frac{\text{Mass (m)}}{\text{Volume (V)}}$$

$$D = \frac{m}{V}$$

ACTIVITY 7

Take a stone, iron nails, a plastic ball, a piece of wood, a piece of wax, and a few drops of honey. Find out which of these float on water and which of these sink. Also, observe what happens when these materials are placed in another liquid like oil.

Transparency

Hold a glass tumbler in front of your eyes. See through it. You can see all the objects through it. The materials through which we can see the objects clearly are called transparent materials and this property of materials is called **transparency**. Glass is a transparent material [Fig. 3.11 (a)].

glass (transparent)   cardboard (opaque)
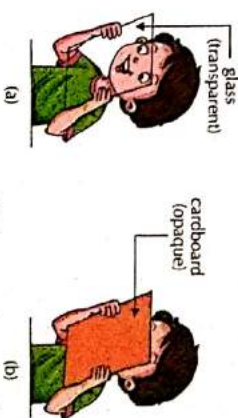
(a)   (b)

butter paper (translucent)

(c)

Fig. 3.11 Looking through transparent, opaque and translucent materials

Some other examples of transparent materials are water, alcohol, air and cellophane paper. Some kinds of plastic bottles are also transparent.

Hold a cardboard in front of your eyes. Can you see through it? No, you cannot. The materials through which we cannot see the objects are called opaque materials and this property of materials is called opaqueness. Metals, books, cardboard and wood are some examples of opaque materials [Fig. 3.11 (b)]. We keep our things in closed iron almirahs, so that they cannot be seen.

Hold a butter paper in front of your eyes, you can see partially through it. **The materials through which we can see the objects partially are called translucent materials and this property of the material is called translucency.** Butter paper is a translucent material [Fig. 3.11 (c)]. Grounded glass, frosted glass, tissue paper, dust-laden air, fog and mist are other translucent materials.

Science In Life

Shopkeepers usually prefer to keep biscuits, sweets and other eatables in transparent glass jars and transparent plastic containers so that buyers can easily see these items.

MULTIPLE CHOICE QUESTIONS (MCQs)

Tick (✓) the correct options.

1. Sugar is _____ in water.
   (a) soluble   (b) insoluble
   (c) miscible   (d) immiscible

2. Density of a substance is represented by
   (a) $m \times V$ (b) $\dfrac{V}{m}$
   (c) $\dfrac{m}{V}$ (d) $m + V$

3. Which of the following is not an example of transparent material?
   (a) water   (b) alcohol
   (c) frosted glass
   (d) cellophane paper

Let Us Revise

1. Anything that we can see or touch is called an object.
2. Grouping different objects on the basis of certain similarities and dissimilarities is called classification.
3. A substance that is used in making different objects is called a material.
4. The materials that are obtained from nature are called natural materials.
5. The materials that do not occur in nature, but are made by humans in factories by combining two or more materials are called human-made materials.
6. Different materials have different properties.
7. An object can be made of different materials. Different types of objects can be made of the same material.
8. A material is used to make an object on the basis of its properties and the purpose for which the object is to be used.
9. Some objects have lustre, while some do not have. The materials that have lustre are called lustrous materials. The materials that do not have lustre are called non-lustrous materials.
10. Some objects are smooth, whereas some are rough.
11. Materials that can be compressed are called soft materials. Materials that cannot be compressed are called hard materials.
12. The objects that are attracted to a magnet are called magnetic objects. The objects that are not attracted to a magnet are called non-magnetic objects.
13. On the basis of physical state, materials can be classified as solids, liquids and gases.

14. Some substances dissolve completely in water, they are said to be soluble in water. Some substances do not dissolve in water, they are said to be insoluble in water.
15. The liquids like glycerine and vinegar, in water are miscible liquids. The liquids, like kerosene and mustard oil, that do not mix with water are immiscible liquids.
16. Density of a substance is its mass per unit volume. The materials that have more mass in a fixed volume have high density.
17. The materials through which we can see the objects clearly are called transparent materials.
18. The materials through which we cannot see the objects are opaque materials.
19. The materials through which we can see the objects partially are called translucent materials.

Exercise

(Use Cordova Smart Class Software on the smart board in class to do these exercises.)

A Tick (✓) the correct options.

1. Which material has lustre?
   (a) wood   (b) chalk powder   (c) kerosene   (d) gold
2. Which one from the following is soluble in water?
   (a) wooden dust   (b) chalk powder   (c) glucose powder   (d) iron dust
3. Which one has magnetic properties from the following?
   (a) wood   (b) iron   (c) glass   (d) plastic
4. Which one floats in water?
   (a) wooden block   (b) pebbles   (c) iron nail   (d) gold ring

B Fill in the blanks.

1. Those things which get attracted towards magnets are called _____
2. Cotton has _____ density than iron.
3. Through _____ object, we can clearly see.
4. Those things which cannot be compressed easily are called _____

C Short answer type questions

1. Classify following things on the basis of their compressibility into hard or soft: sponge, hammer, marble, cotton, rubber, chair, *gulab jamun*
2. Write names of three natural things.
3. What do you mean by magnetic objects?
4. Which property of carbon dioxide made it useful to be used in soft drinks?

D Long answer type questions

1. Define transparent, translucent, and opaque objects. Explain with examples.
2. A bronze mug loses its shine when kept in an open environment. Why?
3. Explain the magnetic properties of a substance with example.
4. Iron nail sinks in water, while paper boat floats in water. Why? Explain.

ADDITIONAL QUESTIONS FOR PRACTICE

(A) Tick (✓) the correct options.

1. Which of the following gases is soluble in water?
   - (a) carbon dioxide
   - (b) oxygen
   - (c) both (a) and (b)
   - (d) none of these

2. Glass is an example of _____ material.
   - (a) transparent
   - (b) translucent
   - (c) opaque
   - (d) soluble

3. _____ is an opaque material.
   - (a) Wood
   - (b) Water
   - (c) Alcohol
   - (d) Fog

(B) Match the following.

Column A	Column B
1. Miscible in water	(a) iron
2. Immiscible in water	(b) fog
3. Translucent	(c) glycerine
4. Magnetic object	(d) kerosene oil

(C) Fill in the blanks.

1. The special kind of shine present on materials or the shine that appears when materials are cut is called _____.
2. _____ materials have bumps and ridges on their surfaces that can be felt.
3. Wax can be compressed, so it is a _____ material.
4. Particles are loosely packed in _____.
5. _____ can be compressed to a large extent.
6. _____ gas is partially soluble in water.
7. Mustard oil is _____ in water.
8. _____ of a substance is mass per unit volume.

(D) Short answer questions

1. What is an object?
2. Define material.
3. What are natural and human-made materials?
4. Why is gold used for making jewellery?
5. Why are metals used to make household utensils and factory equipment?
6. Name two magnetic objects.
7. What are non-magnetic objects? Give two examples.
8. Give two examples each of substances that are soluble and insoluble in water.
9. Name a gas that is insoluble in water.

(E) Long answer questions

1. What are the advantages of classification?
2. (a) Differentiate between lustrous and non-lustrous materials.
   (b) Why do some metals often lose their shine and appear dull?

3. Classify materials on the basis of their physical state. Also, compare them on the basis of their shape, volume, compressibility and arrangement of particles.
4. Write an activity to show that the thing that has more mass in a fixed volume has high density.

(F) Think and answer

A person wants enough light during daytime in his room and he also wants that the inside of the room should not be visible from outside. What type of glass should he choose for his window?

(G) Activity/Project

1. Make a list of natural and human-made objects you use in your day to day life.
2. Classify wood, mirror, paper, scissors, knife, pen, seed, apple, spoon, sponge, bulb, cotton, shoes, doll, tumbler and wool on the basis of their appearance, hardness, transparency and solubility.
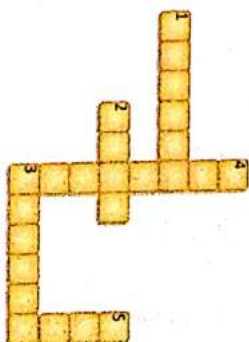
FUN TIME

Solve the following crossword puzzle:

Across (→):
1. anything that we can see or touch
2. materials that cannot be compressed
3. the state of matter that has fixed volume but not fixed shape

Down (↓):
4. a substance that is used in making different objects
5. a lustrous material

Olympiad Corner

Tick (✓) the correct options.

1. Which of the following objects has shiny appearance?
   - (a) copper
   - (b) gold
   - (c) silver
   - (d) all of these

2. Which of the following statements is correct?
   Statement 1. The materials that sink in the water have higher density than water.
   Statement 2. The materials that sink in the water have lower density than water.
   - (a) Statement 1
   - (b) Statement 2
   - (c) Both statements are correct.
   - (d) Both statements are wrong.

3. Choose the non-magnetic material from the following:
   - (a) iron
   - (b) copper
   - (c) nickel
   - (d) cobalt

4. Which one of the following acts as a translucent medium?
   - (a) water
   - (b) alcohol
   - (c) muddy water
   - (d) wood

   [Answers: 1. (d) 2. (a) 3. (b) 4. (c)]