

Class-VI

# The LIVING WORLD

(A Book of Science & Technology)



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## CHAPTER

# 1

## Our Environment

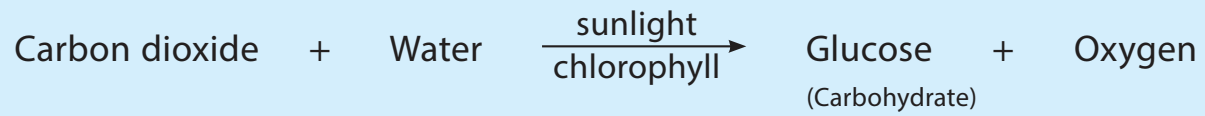
We see a variety of plants and animals around us. They may be similar, or different, depending upon the geographical and climatic conditions. Living objects do not live in isolation. They interact with one another and also with the non-living surroundings in which they live. As a result, both plants and animals get adapted to their surroundings.

We find that there are two types of objects in our surroundings. Plants and animals, including human beings, form the living components. They are also called the **biotic components**. Air, water, soil, light, temperature, etc., are non-living and are also called **abiotic components**. Both biotic (living) and abiotic (non-living) components, taken together constitute our **environment**.

### ► | Biotic Environment

Living organisms, i.e. all plants and animals, including humans, form the biotic environment. Let us try to understand its different components one by one.

1. **Plants (Producers):** We all know that plants, like other organisms, need food. All green plants have the colouring matter, called **chlorophyll**. The chlorophyll, which is present in the leaves, absorbs energy from the sunlight. This energy is used to prepare food. For this, plants also use carbon dioxide from the atmosphere, and water and minerals from the soil. This process of preparing food, by the plants, is called **photosynthesis**. The following equation represents this process.



The green plants, which prepare their own food (glucose), are called **producers** or **autotrophs** (auto = self; troph = food).



Plants prepare their own food using sunlight

2. **Animals (Consumers):** Animals cannot prepare their own food. They have to depend on plants for their food. They are called **consumers** or **heterotrophs** (hetero = other; troph = food).



Cow feeds on grass



A boy eating plant products (fruits)

All animals feed on green plants, either directly or indirectly. Animals, like cattle and goat, directly eat plants, like grass and fodder. They are called **primary consumers** or **herbivores**. Animals, like tiger and lion, feed on these herbivores. In other words, they hunt, and eat, cattle, goat, etc. Such consumers, which feed on plants indirectly, are called **secondary consumers** or **carnivores**. There are some animals which feed on both producers as well as the primary consumers. They are called **omnivores**. Animals, like bears, pigs, etc., are omnivores. We, human beings, are also omnivores.



Herbivore (Deer)



Carnivore (Tiger)



Omnivore (Bear)

- 3. Micro-organisms (Decomposers):** In addition to producers and consumers, there are some organisms which derive their food from dead and decaying plants and animals. They are called **decomposers**. Decomposers breakdown the dead and decaying plants and animals into minerals. These minerals get mixed up with the soil and are then again used by the plants. This process is called **recycling of minerals**.

Fungi and bacteria are the organisms that help in decomposition. These are so small that they cannot be seen with the naked eyes. They are called **micro-organisms**.



Fungus on fruits

Animals and birds, like jackals, crows, vultures and kites, consume dead bodies of animals. This process helps in keeping the environment clean. They are called **scavengers**.

### Do You Know ?

- If dead organisms are not decomposed, their number will go on increasing and there will be no space left for the living organisms.
- Some bacteria, present in air, water and soil can cause various diseases.

## Activity 1

A zoo feeder wants to segregate the animals, listed below, into three groups, on the basis of the types of food they eat.

giraffe | lion | bear | leopard | chimpanzee | tiger | elephant | panda |  
deer | crocodile | rhinoceros | cheetah | hippopotamus | fox | kangaroo

**Help the zoo feeder to organise the animals, into the three groups, listed below.**

Herbivores	Carnivores	Omnivores

There are certain materials that cannot be decomposed in nature. Now let us perform the following activity.

## Activity 2

Take some pieces of a newspaper, a piece of cloth and a used plastic bag. Burry these in the soil. After one month, dig up the soil and check for the three things.

What do you observe? The plastic bag shows no change and is in the same condition as when it was buried. Paper and cloth have changed and are partially decomposed. Why has this difference in these materials occurred? This is due to the difference in the action of decomposers on them.

We observe that paper and cloth are **biodegradable materials** (bio = living organisms; degradable = decomposable). These are materials which can be broken down into simpler substances by micro-organisms. Plastic is **non-biodegradable**, i.e. it cannot be broken down into simpler substances by any micro-organism. Plastic, and other such materials, affect the environment adversely. Their accumulation, in the sewerage system, leads to blocking of drains in our cities. Burning of plastic materials adds to air pollution. We should, therefore, convince our friends and relatives not to use plastic bags!



Children saying 'No' to plastic bags

## Do You Know ?

In some cities, a twin bin system has been introduced for the welfare of environment. Blue dustbins and green dustbins are placed in the localities. In the blue bins, non-biodegradable waste (plastic, aluminium foil, glass, batteries, etc.) are disposed off; in green bins, biodegradable waste (vegetable waste, paper, cloth, cardboard, etc.) are disposed off.

It is important for us to segregate biodegradable and non-biodegradable wastes and dispose them in an environment friendly way. The kitchen waste can be put in a pit dug in the garden which is then covered with soil and dry leaves. This waste, in the pit, is acted upon by micro-organisms and gets converted into useful **compost**. This compost can be used for growing healthy plants in fields and gardens.



Vermicomposting

In order to hasten the process of compost making, a variety of earthworms, called **redworms**, can be mixed with the kitchen waste. They convert it into compost very fast. The process, of forming compost with the help of various worms usually redworms, whiteworms and other earthworms, is known as **vermicomposting**. Vermicompost is an excellent, nutrient rich, organic fertiliser and soil conditioner.



Redworms

### Activity 3

List the things, or items, you throw away as a waste in the dustbin. Don't you think some of them can be recycled, reused or composted?

Try to categorise the items, in your list, into three columns under their appropriate heading. You may find it interesting to note that the names of some of the items can be put in more than one column!

Items that can be—

Recycled	Reused	Composted

## ▶ | Abiotic Environment

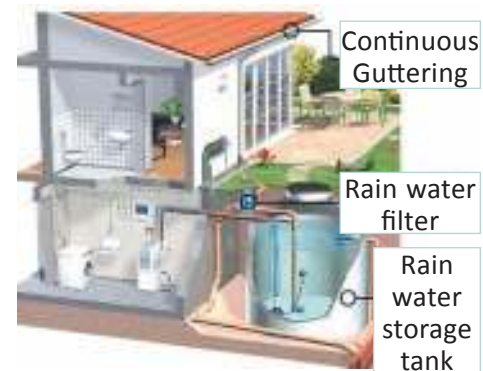
**Abiotic Components** include physical conditions and non-living material that affect the growth, maintenance and reproduction of living components, and can interact with each other. Water, air, light, temperature, soil and rocks, etc., are all examples of non-living or abiotic components. These non-living components form the **physical**, or **abiotic environment** in nature. Let us study about them in detail.

### ■ Water

Water is essential for the survival and growth of all living organisms. It is needed, and used, for drinking, bathing, cooking, etc. Animals and plants cannot survive without water. It is used for irrigation of crops. Humans, and other animals, need water for different activities of their life. Try to think, and list, the various activities for which we use water.

#### ● Rain Water Harvesting

Rain water harvesting is a way to collect rain water when it rains. Rain water can be stored, above the ground, or underground, and then used later. This happens naturally in open rural areas. However, in congested metropolitan cities, we need to create a method to capture the rain water. 'Roof Top Rain Water Harvesting' is one of such methods. Here, rain water can be collected at the roof tops (terrace) of houses. Through pipes, this water can be transferred to tanks, pits or small wells. Since the water is very likely to get impure, it should be used for household purposes only after filtration and purification.



Rain water harvesting can supplement the requirement of water in cities and raise the sub-soil water level. This can help in maintaining, and increasing, greenery in urban areas.

If rain water is not collected, it flows down to the rivers situated far away through the drains and is thus, not available for immediate use.

The rain water, that falls on the roads, or concrete areas, goes into the drains. The rain water, that falls on the untreated ground, seeps into the ground, recharging the groundwater. Innovative water collection methods need to be used in different areas to collect, and use, rain water.



Rain water harvesting



## Activity 4

Think of some innovative ways by which use of water and its wastage, can be minimised at school and at home. Interact with your friends, neighbours and family members. Make a poster on “Harvest Water to Harness Life”.

### ■ Air

We know that all living organisms need air for their survival. Air is a mixture of several gases. Oxygen, nitrogen and carbon dioxide are the important gases present in air. Plants and animals use oxygen for respiration. Plants consume carbon dioxide for photosynthesis and release oxygen back into the atmosphere.

Besides oxygen, nitrogen and carbon dioxide, small amounts of other gases, very many bacteria and viruses, and dust are also present in air. Clean air is essential for our health; as it provides the oxygen that is necessary to sustain life.

### ■ Light

Natural light is provided to us, by the sun during the day and by the moon during the night. The moon, as you know, only reflects the sun’s light. Hence, sun is the ultimate source of natural light. This natural light is used by the plants to grow, and to prepare their food. Life on earth is dependent on sunlight. Plants use sunlight and prepare their own food by photosynthesis.

Light penetrates into the forests as well as into the water bodies. Aquatic plants use sunlight for photosynthesis, just like the other plants. However, the amount of light, reaching these plants, decreases with an increase in the depth of water. That is why very few plants are able to survive in deep waters.

Plants and animals respond to light in different ways. Have you seen a plant called **Morning Glory** (*Ipomoea*)? Its flowers bloom out at sunrise (i.e. morning) and close down after sunset. Similarly, in some plants, the leaves open during the day and close during the night.



Morning Glory (*Ipomoea*)

The sunflower always faces the sun. In the morning, it faces the east; in the evening it turns towards the west.

Animals also show variations in their behaviour with the amount of light available to them. Most of the animals are active during the day when there is light. Some animals, like rats, cockroaches and owls, are active during night.



Owls are active at night

## ■ Temperature

The temperature, at a place, is indicative of the degree of hotness, or coldness, of that place. It can be measured by a device called the **thermometer**. The degree of hotness varies from place to place.

Temperature affects activities of living organisms. It is an important factor that determines the distribution of plants and animals on earth. Each organism has its own tolerance range for temperature.

Most plants and animals grow in warm places but some need a cold climate. Cows can tolerate the hot weather better than buffaloes. We often see buffaloes cooling themselves in ponds during summer. This is because buffaloes are black in colour and do not have efficient sweat glands. Hence, they feel the heat more and need to cool themselves by remaining in water.



Buffaloes cooling themselves in water

On the other hand, camels can tolerate even the extreme heat of the deserts. They have no sweat glands. This helps in reducing the loss of water from their body. They can live without water for many days.

Polar bears and penguins are found only in cold regions; tigers and elephants are found in warm regions.



Polar Bear



Penguins

Cold region animals



Tiger



Elephant

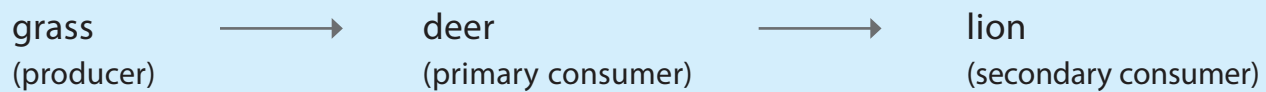
Warm region animals

## ■ Soil

Soil is another important abiotic factor of our environment. Most of the plants cannot grow without soil. Soil provides water and minerals to the plants which are important for their growth. It also provides a home to organisms that live in soil.

## ► Interaction in the Environment

Plants and animals are interdependent in their food relationships. There are animals that feed on plants. Many of such animals are eaten by other animals which, in turn, are eaten by some other animals. There is thus, a **'food chain'** in nature. For example—



It is an example of a terrestrial food chain. When such a chain exists between aquatic plants and animals, it makes up an aquatic food chain.

### Activity 5

For each of the three cases (a), (b) and (c), use the words, given in the box, to make a 'food chain'. Also identify the nature (terrestrial/aquatic) of each of these three food chains.

(a)

owl | grass | grasshopper | rat | snake



This is a/an \_\_\_\_\_ food chain. (terrestrial/aquatic)

(b)

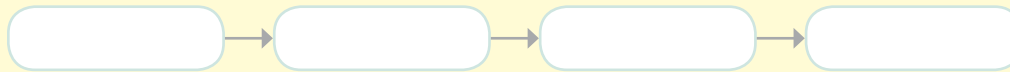
dolphin | snail | tuna | plankton



This is a/an \_\_\_\_\_ food chain. (terrestrial/aquatic)

(c)

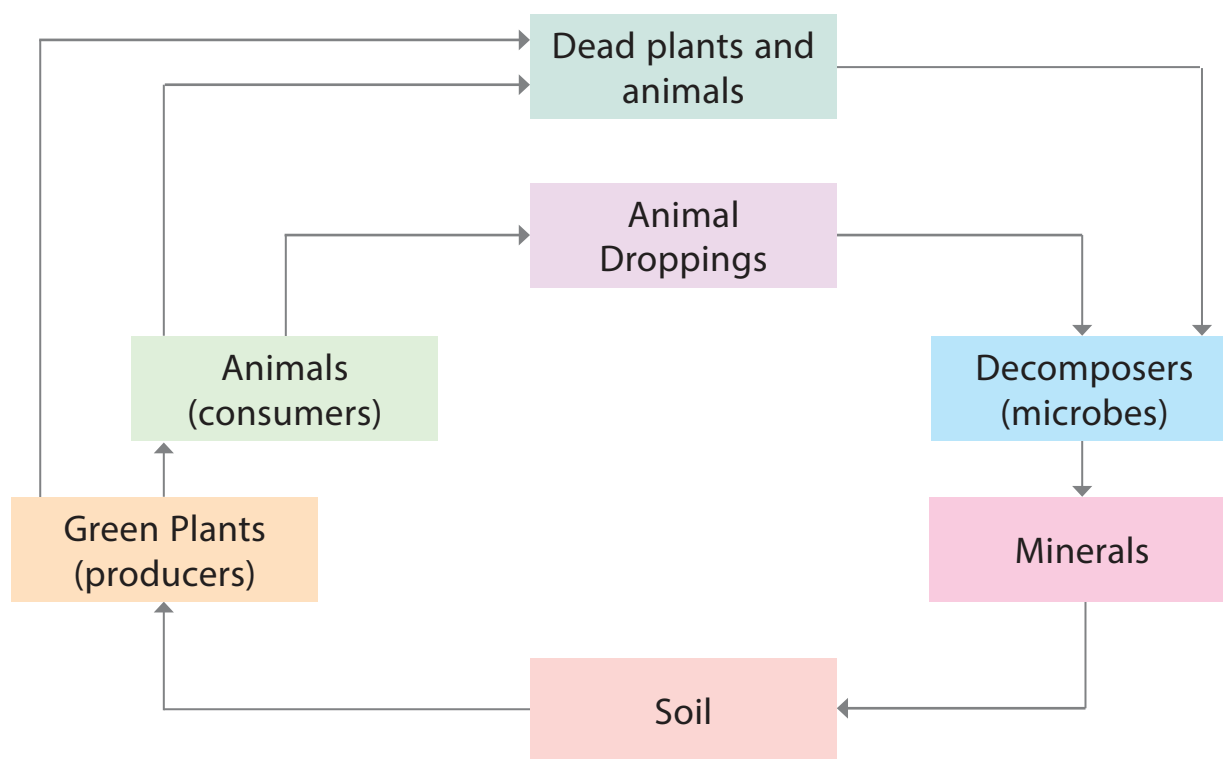
shark | fish | seal | algae



This is a/an \_\_\_\_\_ food chain. (terrestrial/aquatic)

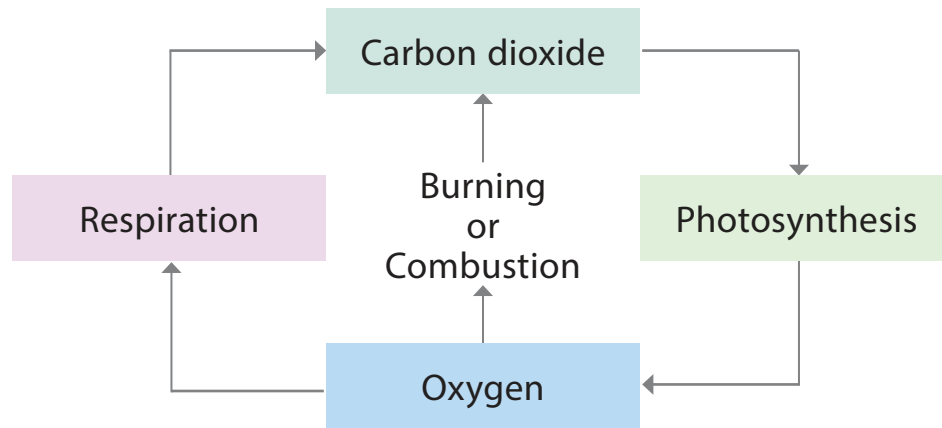
## ■ The Mineral Cycle

There is a relationship between the biotic and abiotic components of our environment. The abiotic substances supply nutrients to the producers. The producers prepare food for the consumers. Both producers and consumers, after their death, are broken down into simpler substances by decomposers. The nutrients return to soil, air and water. These nutrients are again used by the producers. The whole cycle is thus, repeated continuously. This cycling of materials, through biotic and abiotic components, is called the **mineral cycle**.



Inter-relationships among different components of the environment

During the process of respiration, both plants and animals take in Oxygen from the atmosphere and give out Carbon dioxide back into the atmosphere. Carbon dioxide also gets added to the atmosphere when burning of wood, coal and petrol takes place. This increases the level of carbon dioxide in the atmosphere. The plants use up carbon dioxide and give out oxygen during the process of photosynthesis. Thus, a balance is maintained, between the amount of oxygen and carbon dioxide, in the atmosphere.



Nature tries to maintain a balance between Oxygen and Carbon dioxide

We thus, realise that in our environment, its living and non-living components keep on interacting with one another. This makes our environment a dynamic system.

## Keywords

<b>biodegradable</b>	substances that can be broken down into simpler substances by mirco-organisms.
<b>consumers</b>	animals that do not make their own food and are dependent on producers.
<b>decomposers</b>	organisms which derive their food from dead and decaying plants and animals.
<b>food chain</b>	a series of organisms, inter-related sequencely, via their food. One organism gets eaten by another which, in turn, gets eaten by yet another and, so on.
<b>micro-organism</b>	living organisms too small to be seen by the human eye, by itself.
<b>non-biodegradable</b>	substances that cannot be broken down into simpler substances by micro-organisms.

<b>omnivores</b>	animals that feed on both producers as well as consumers.
<b>producers</b>	the organisms (plants) which make their own food.
<b>rain water harvesting</b>	collection and storage of rain water for reuse.
<b>scavenger</b>	a bird, or animal, that feeds on dead animals.
<b>vermicomposting</b>	process of composting with the help of various suitable worms, like the redworms and other earthworms.

## You Must Know

1. Environment consists of biotic (living) components and abiotic (non-living) components.
2. Producers, or Autotrophs, prepare their own food; Consumers, or Heterotrophs, depend directly, or indirectly, upon them.
3. Primary consumers, or Herbivores, feed only on plants.
4. Secondary consumers, or Carnivores, feed on other animals.
5. Animals, which feed on both producers as well as consumers, are called Omnivores.
6. Decomposers break down dead and decaying plants and animals into minerals; these go into the soil and are used again by plants. This process is called recycling of minerals.
7. Biodegradable materials can be decomposed by micro-organisms.
8. Non-biodegradable materials cannot be decomposed by micro-organisms.
9. Vermicomposting is the process of preparing compost from kitchen garbage using redworms and other various worms.
10. The sequence, of one organism eating the other, and then getting eaten by another, and so on, makes up a food chain.
11. The cycling of materials, through biotic and abiotic components, is called the mineral cycle.
12. The balance, of carbon dioxide and oxygen, in the atmosphere, is maintained through the processes of respiration, burning and photosynthesis.

## Something To Know

### A. Fill in the blanks.

1. Plastic is \_\_\_\_\_ as it cannot be broken down into simpler substances in nature.
2. We must say 'No' to \_\_\_\_\_ and use \_\_\_\_\_ or \_\_\_\_\_.
3. The flowers of the \_\_\_\_\_ bloom with sunrise and close after sunset.
4. \_\_\_\_\_ and \_\_\_\_\_ are among the animals found only in cold regions.
5. \_\_\_\_\_ and \_\_\_\_\_ processes help in balancing of carbon dioxide and oxygen in the atmosphere.

### B. Write True or False for the following statements.

1. Herbivores can prepare their own food.
2. Fungi and bacteria are organisms that can be easily seen by the human eye, by itself.
3. The sunflower faces the east in the morning.
4. Camels do not have sweat glands.
5. Soil is an important biotic component of our environment.

### C. Tick (✓) the correct option.

1. Biotic environment includes—
  - only the producers and the consumers
  - only the consumers and decomposers
  - only the decomposers and the producers
  - producers, consumers as well as decomposers
2. The group of organisms, which use light for making food, are called—
  - autotrophs
  - heterotrophs
  - decomposers
  - scavengers

3. Decomposers include—
- |  |  |
|--|--|
| <input type="checkbox"/> bacteria only             | <input type="checkbox"/> fungi only          |
| <input type="checkbox"/> bacteria as well as fungi | <input type="checkbox"/> only the scavengers |
4. Which of the following is not biodegradable?
- |                                     |   |
|-------------------------------------|---|
| <input type="checkbox"/> vegetables | <input type="checkbox"/> fruits         |
| <input type="checkbox"/> earthworm  | <input type="checkbox"/> aluminium foil |
5. Vermicomposting is done by—
- |                                 |  |
|---------------------------------|--|
| <input type="checkbox"/> fungus | <input type="checkbox"/> bacteria        |
| <input type="checkbox"/> worms  | <input type="checkbox"/> aquatic animals |
6. An animal, that is not affected much by the heat of the desert, is the—
- |                              |                                |
|------------------------------|--------------------------------|
| <input type="checkbox"/> rat | <input type="checkbox"/> camel |
| <input type="checkbox"/> cow | <input type="checkbox"/> lion  |

**D. Answer the following questions in brief.**

1. Why should we segregate different types of wastes?
2. Write the meaning of the term 'vermicomposting'.
3. Which component of air gets 'used-up' during the process of photosynthesis?
4. Suggest any five activities that can help to save the environment.
5. How does nature maintain a balance, between the amounts of oxygen and carbon dioxide, in the atmosphere?

**E. Answer the following questions.**

1. Distinguish between—
  - (a) autotrophs and heterotrophs
  - (b) decomposers and scavengers
2. State the difference between biodegradable and non-biodegradable materials. Give one example of each.



3. How does decomposition of dead animals turn out to be useful?
4. Why is Rain water harvesting a 'ray of hope' for overcoming the present 'scarcity of water' in cities?
5. Why do buffaloes cool themselves in water during summer?
6. Draw a diagram that shows the relationship between the biotic and the abiotic components of the environment.

### Value Based Question

**Shuchi's mother did not approve of her idea of taking help from their neighbours for making models for her school exhibition. She told her that she should do her work herself with confidence and honesty. She then helped and guided Shuchi to design very useful, interesting and attractive items from old newspapers. Shuchi's models were very much appreciated as they were in tune with the concepts of 'reuse' and 'recycle'.**

1. State the values conveyed by Shuchi's mother.
2. Give one example of 'recycling' of a material.
3. Have a group discussion with your friends in which each one suggests one or more ideas, in tune with the idea of 'recycling' or 'reuse'.

### Something To Do

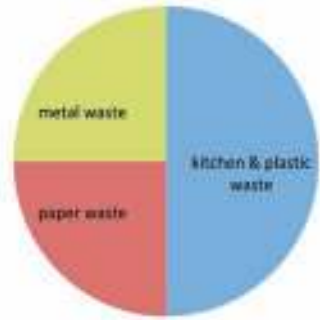
1. **Imagine a scenario**

**The government is planning to ban the use of plastic bags. For a debate over the same, a committee was formed. A meeting of the committee is being called. The members of the committee are:**

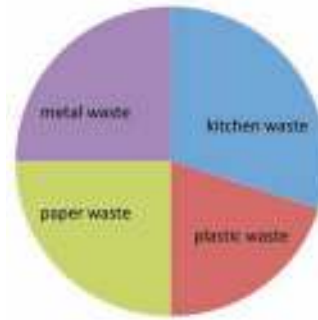
- A government representative
- A head of shopkeepers' association
- A plastic bag manufacturer
- A cloth bag manufacturer
- An environmentalist

**Prepare, and present, a skit projecting the likely views of the members who attended the meeting.**

2. The waste segregation methods, adopted by two neighbours, Ramesh and Suresh, are shown here in the form of the pie charts. Study the pie charts carefully and answer the questions that follow.

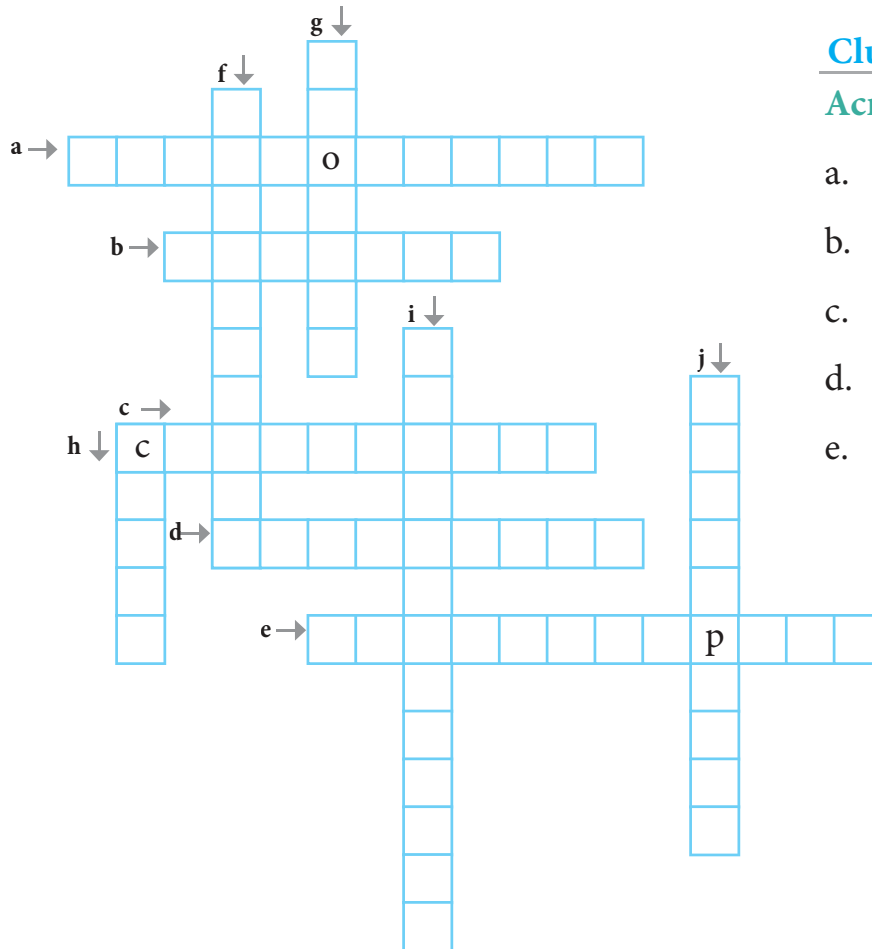


Waste disposed off by Ramesh



Waste disposed off by Suresh

1. Name the two items of waste, disposed off by Ramesh, that needs to be separated from one another.
  2. Identify the biodegradable materials disposed off by Suresh.
  3. Of the two, who, according to you, is more eco-friendly and why?
3. Solve the following crossword puzzle with the help of given clues.



### Clues

#### Across →

- Do not make their own food.
- Non-living components.
- Meat eaters.
- Vulture is a \_\_\_\_\_.
- Compost prepared by worms.

#### Down ↓

- Plant eaters.
- Morning glory.
- A desert animal.
- Decomposable material.
- Helps in recycling of minerals.



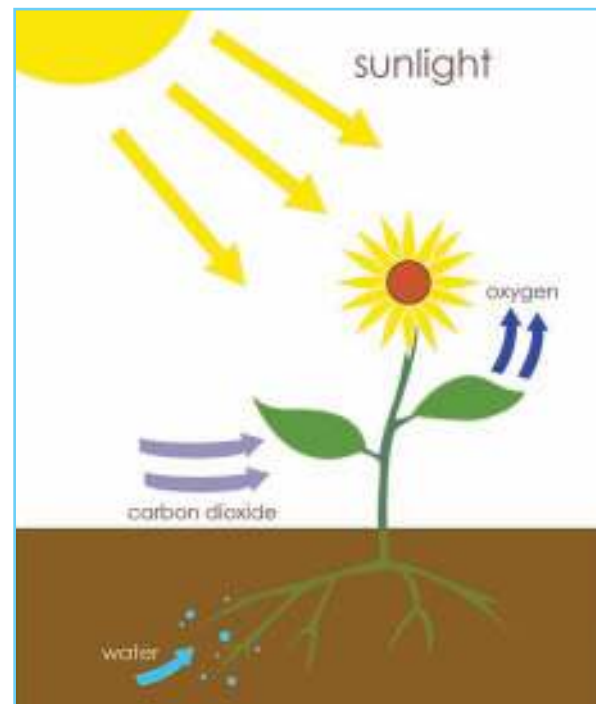
## CHAPTER

# 2

## Food

We know that all living organisms need food to grow and survive. Food provides the energy, needed by living beings, to do work. It also protects us from different diseases and keeps us fit and healthy. Food is the main source that sustains, and nourishes, life.

Green plants make their own food by the process of photosynthesis. Animals and human beings are dependent on plants for their food.



### ► Sources of Food

All living organisms get their food from plants, animals or their products.

## Activity 1



apple



eggs



cheese



nuts



spices



pulses



honey



vegetables



milk



yogurt



icecream



wheat and rice

We get the food items, shown above, from different shops or stores. Let us think: 'Where do they come from?', before arriving at the shops. Their origin may be 'either from plants or from animals'.

Try to sort out the above listed food items into two groups – 'Food from Plants' and 'Food from Animals'. Record your conclusions in a tabular form.

Food from Plants	Food from Animals

Try adding two more examples, of each of these two types of foods, on your own.

## ■ Food from Plants

Plants make their own food by utilising the energy of the sun. Food is prepared by the leaves of the green plants. It is then stored in different parts of the plants. Human beings, and some animals, eat these plants in one form or the other. Cereal grains, like wheat, rice, maize, millets (*jowar* and *bajra*) are important sources of energy; they constitute the major component of our food. Pulses, like green gram (*moong*), gram (*channa*), black gram (*urad*), kidney beans (*rajma*), split red gram (*arhar*), red lentil (*masoor*) and soyabean (*bhatma*), are some of the important sources of proteins in our diet.

Fruits, like mango, apple, banana, orange, watermelon and melon, are good sources of nutrients.

Green leafy vegetables, like spinach, mustard, fenugreek, and many other vegetables, like reddish, lady finger, turnip, carrot, brinjal and potato, are all obtained from plants.

We use oils, like mustard oil, sesame oil, sunflower oil, groundnut oil and coconut oil, to cook our food. These oils are obtained from plants and are the sources of fats.

Spices, like cumin (*jeera*), turmeric (*haldi*), black pepper (*kali mirch*), cardamom (*elaichi*), chilli (*mirch*), carom seeds (*ajwain*) and clove (*laung*), give flavours to our food and make it tasty.

## ■ Food from Animals

Animals are also an important source of our food. We get the following food items from animals.

- **Milk**

Milk is considered a complete food. Milk-giving animals are called **milch animals**. Cows and buffaloes are the two main milch animals. Goats and camels also give us milk.

- **Eggs**

Hens, ducks and fowls lay eggs. These birds are known as **poultry birds**. Their eggs are a rich source of proteins and vitamins and are eaten by many of us.

- **Meat**

Fish, goat, sheep, pig and chicken are important sources of meat. Prawns, crabs and shrimps constitute the sea food. All these are good sources of proteins.

Have you ever noticed honeybees hovering over the flowers? They collect nectar from the flowers. They make a beehive in which they live and store the nectar, collected from flowers, as honey. We use honey in our food and in several medicines.

## ► | Food and Its Components

Carbohydrates, Proteins, Fats, Vitamins and Minerals are the important components of food. They are called **nutrients**.

Roughage (dietary fibres) and water are also important components of our food. Different food items are classified into the following categories on the basis of the nutrients present in them and their functions in our life.

1. Energy giving foods — Carbohydrates and Fats
2. Body building foods — Proteins
3. Protective foods — Vitamins and Minerals

Let us discuss the various nutrients in detail now.

### ■ Carbohydrates

Carbohydrates are made up of carbon, hydrogen and oxygen. In our food, these are present in the form of sugar and starch. Carbohydrates, in our diet, are a source of energy. Fruits, like mango, banana, litchi, melon, etc., are rich in sugar. Cereals, like wheat, rice and maize, are rich sources of starch. Some vegetables, like potato, and sweet potato, also contain starch.



Sources of Carbohydrates

#### Test for Sugar

**Materials Required:** Benedict's solution, test tube, dropper, test tube holder, gas burner or spirit lamp.

**Procedure:** Take the given food sample. Add a few drops of Benedict's solution. Carefully heat the test tube. Notice the colour change, if any. If sugar is present, it will turn orange.

#### Test for Starch

**Materials Required:** Iodine solution, test tube, dropper.

**Procedure:** Take the material which is to be tested. Add iodine solution with the help of a dropper. If it turns blue-black, it indicates the presence of starch.

## ■ Proteins

Proteins are made up of carbon, hydrogen, oxygen, nitrogen; and a small quantity of both sulphur and phosphorous. Proteins help in building up the developing tissues of a growing child. They also take care of the 'wear and tear' of the body tissues at all ages.



Sources of Proteins

### Do You Know ?

One of the richest sources of protein is soyabean. It contains twice as much proteins as meat and four times as much as eggs.



## Test for Protein

**Materials Required:** Mortar and pestle, test tube, dropper, concentrated nitric acid.

**Procedure:** Crush some bean seeds in a mortar and pestle. Make a suspension using water. Take a little of this suspension in a test tube. Very carefully, add a few drops of concentrated nitric acid to it. If the colour of this suspension changes to yellow, it indicates the presence of proteins.

## ■ Fats

Fats are also made up of carbon, hydrogen and oxygen. However, they contain much less oxygen in comparison to the carbohydrates. They provide more than double the amount of energy provided by the same weight of carbohydrates. Vitamins A and D are soluble in fats. Hence, fats are essential for their absorption in our body.

Fats can be obtained from plant as well as animal sources. Vegetable oils, like mustard oil, coconut oil and groundnut oil, are obtained from plants. Dry fruits and nuts are also rich sources of fat. Milk and milk products, such as butter, ghee, along with meat, fish and eggs, are sources of fats that are obtained from animals.



Sources of Fats

## Test for Fat

**Material Required:** Paper.

Take the given food item and rub it on a dry paper. If fat is present in it, it will leave a translucent mark on the paper.

## ■ Vitamins

Vitamins are essential for maintaining good health and proper growth of the body. They are needed in small quantities only. They do not provide energy. However, they play an important part in most of the biochemical changes within our body.



Sources of Vitamins

Plants are the main source of vitamins. They are found in all fresh foods. However, some vitamins get destroyed by cooking. Vitamins help us to keep our eyes, bones, teeth and gums healthy. If our diet lacks vitamins, many biochemical reactions, in our body, will not take place and we may suffer from deficiency diseases.

Different vitamins have been named as **Vitamin A**, **Vitamin B-complex**, **Vitamin C**, **Vitamin E** and **Vitamin K**. Vitamin B-complex is actually a group of vitamins. These vitamins are of two kinds: **water-soluble vitamins** and **fat-soluble vitamins**. Vitamin A, D, E and K are soluble in fat, whereas, Vitamin B and C are water-soluble.

### Do You Know ?

Indian gooseberry (*amla*) is the richest source of Vitamin C.





Let us now learn about the different vitamins, their sources and the role they play in our body functions.

### Vitamins, their Sources, Functions and Deficiency Diseases

Vitamin	Sources	Functions	Deficiency Disease and its Symptoms
Vitamin A	Cod liver oil, shark liver oil, milk, butter, ghee, yellow vegetables, fruits.	Needed for healthy eyes, skin and tissues.	Night blindness and dryness of skin.
Vitamin B	Wheat, rice, yeast, liver, milk and yoghurt, green leafy vegetables, fermented food and sprouted pulses.	Needed for making muscles strong, getting energy to do work.	Beri-Beri, weak muscles and weakness.
Vitamin C	Citrus fruits like orange, lemon, and guava, green chillies and Indian gooseberry.	Needed for healthy gums and teeth, bones and bone joints.	Scurvy, spongy and bleeding gums.
Vitamin D	Milk and its products, cod-liver oil, shark-liver oil and eggs. Some Vitamin D is made by the skin in sunlight.	Needed for healthy bones and teeth.	Rickets, curved and deformed bones, bow legs.
Vitamin E	Vegetable oils, liver, green vegetables and tomato.	Smooth functioning of reproductive system.	Sterility.
Vitamin K	Green leafy vegetables.	Helps in blood clotting.	Prolonged and profuse bleeding due to delayed clotting of blood.

We will now discuss in detail the diseases caused due to deficiency of Vitamin C and Vitamin D.

- (a) **Vitamin C:** It is a water-soluble vitamin. Deficiency, in intake of Vitamin C, affects bones, joints, teeth and gums and leads to a deficiency disease called **Scurvy**. A person, with scurvy, tends to become weak and anaemic and develops spongy and bleeding gums.



Scurvy

- (b) **Vitamin D:** It is a fat-soluble vitamin. It can be synthesised by our skin in the presence of sunlight. Its inadequate intake may affect the bones of our body leading to a disease known as **Rickets**. Rickets develops mainly among young children, though its effects, may persist throughout life. It is most common among children of six months of age. Vitamin D stimulates the absorption of minerals like calcium and phosphorus in our body. Hence, a deficiency of Vitamin D, can also cause calcium and phosphorus deficiency in the body. Vitamin D deficiency is more common among economically poor sections of the society. Bones become weak to such an extent that the ability of the child to sit, crawl and walk gets delayed. Leg bones get bent. The deficiency causes deformation, such as bow-legs and knock-knees. The chest is deformed, due to weakening of ribs, and protrudes out as in a pigeon. This deformation is, therefore, often called **pigeon-chest**.



Child suffering from Rickets



Pigeon-chest

Pregnant, and lactating, mothers are advised to take rich sources of Vitamin D for proper growth of the bones of their children.

## ■ Minerals

The important minerals, needed by our body, are sodium, potassium, magnesium, calcium, iron, manganese, copper, chloride, iodine, phosphorous and sulphur. They are needed in very small quantities for proper growth and maintenance of the body.

Let us now learn about sources and functions of some of these minerals.

## Sources and Functions of Some Minerals Needed by Our Body

Mineral	Sources	Functions
Calcium	Milk and its products, green leafy vegetables.	To build healthy bones and teeth.
Phosphorus	Milk, cereals, pulses, fish and meat.	Growth of bones and teeth.
Iron	Green leafy vegetables and other green vegetables, nuts and jaggery.	Formation of haemoglobin in the blood. Its deficiency causes anaemia.
Iodine	Fruits and vegetables, sea food, iodised salt.	Proper functioning of thyroid gland. Its deficiency causes goitre.

### ■ Water

Water is essential for all vital processes of the body. It forms 70 per cent of our body weight. Some of the important functions of water are:

- It is essential for all reactions taking place in the cells of our body.
- It helps in the removal of waste products, in the form of urine, from our body.
- Blood contains a large amount of water. Because of this, blood is able to circulate in arteries and veins and transport oxygen, carbon dioxide, nutrients, hormones and minerals to all parts of the body.
- Water helps in maintaining a uniform body temperature by distributing heat. In summer, our body produces sweat which, on evaporation from the skin, helps to keep the body cool.

### ■ Roughage

Green vegetables, fruits and whole grains contain a large amount of cellulose, that cannot be digested by our body. Cellulosic dietary fibres constitute the **roughage**. Roughage helps in bowel movement and prevents constipation.

## ■ Mineral Deficiencies

Let us now learn about the deficiency diseases caused by the lack of some of the minerals.

- (a) **Calcium Deficiency:** The requirement of calcium is much more in growing children and in pregnant, and lactating, mothers. It is important for bone and teeth formation. Due to its deficiency, bones become weak and fragile. A large amount, about 94 per cent, of calcium is used for the development of bones and teeth in our body. Blood, muscles and nerves also use it in small quantities. Due to its deficiency in the diet, contraction of heart becomes faulty and crampy pain may be felt in various parts of the body, particularly, in the large muscles of the legs. Tooth decay, and general irritability, are other symptoms of its deficiency.
- (b) **Phosphorus Deficiency:** Phosphorus, along with calcium, is needed for proper development of nerve cells, bones and teeth. It is also essential for the digestion of carbohydrates and fats. Loss of weight, retarded growth and general weakness occur due to iron and phosphorus deficiency.
- (c) **Iron Deficiency:** Iron is an essential element for the formation of haemoglobin of red blood cells, which plays an important role in the transport of oxygen. An inadequate intake of iron leads to a condition known as **Anaemia**.

An anaemic person appears pale and weak. The body shows fatigue, loss of appetite, whitening of nails and swelling of hands and feet.

- (d) **Iodine Deficiency: Goitre** is an iodine deficiency disease which is widespread in many parts of our country. Iodine is needed for the synthesis of a hormone, called **thyroxin**, which is produced by the thyroid glands. A person, with goitre, shows swelling in the neck region. Iodine deficiency, during foetal stage, may lead to mental retardation and retardation of growth in later life. It is not prevalent among the people of coastal areas, as they get iodine from the sea food they eat. Deficiency of iodine is common in mountainous regions where the soil and water are poor in iodine. One of the well-tested approach, to control iodine deficiency diseases, is the use of iodised salt by the affected population.



Iodine deficiency causes goitre

## ► | What Should We Eat?

The term '**diet**' refers to the food eaten by human beings. A **balanced diet** consists of all the nutrients which are important for the proper growth and development of the body.

Food is required to provide energy for doing work and for providing nutrients, essential for growth, for repair of tissues and for reproduction. Food also protects our body against infections. Energy, obtained from food, is also needed for all the metabolic activities of the body like respiration, circulation and digestion.

A balanced diet can be vegetarian or non-vegetarian. A balanced simple meal is more nourishing than an imbalanced, greasy or junk food. Deep fried foods lose their nutritive value. Oily and spicy foods may have a good taste but they may not be quite nutritive. Stale and rotten food can be harmful to health. Eating lots of fried items, like *samosas*, *kachories*, or bread *pakor*s, may not provide you the essential nutrients.

## ► | Factors Responsible for Poor Health

### ■ Malnutrition

Among the poor families, children eat a large amount of starchy food without adequate amount of proteins in their diet. Sometimes they cannot even get one square meal a day. This can result in starvation, i.e. deficiency of proteins, carbohydrates and fats. These conditions are termed as **Protein-Energy-Malnutrition (PEM)**, also called **PCM (Protein-Calorie-Malnutrition)**.

Such conditions can result in two problems in children, namely **Kwashiorkor** and **Marasmus**.

Kwashiorkor is seen in infants, up to three years of age, when their diet does not contain enough milk. As a result, there is a deficiency of proteins. The growth of the child gets retarded and the face, feet and abdominal region get swollen due to water retention. Discolouration of hair and diarrhoea are also common in such children.



Kwashiorkor

Marasmus

A child suffers from Marasmus when she/he is starving, i.e. not getting enough food. As a result, there is a deficiency of proteins, carbohydrates and fats. These deficiencies cause a wasting of muscles and the child becomes very thin. This results in general weakness and retarded growth.

## ■ Obesity

The weight of an individual must be in proportion to her or his height. Some individuals have a tendency to eat more than what is needed by their body. As a result, the body gets extra calories. These extra calories get stored below the skin. The person becomes obese. Improper food habits, like eating fried food (high energy and high fat food) is one major reason for obesity. Eating throughout the day, and lack of exercise, are two other important reasons for obesity. Obesity leads to many health problems.



An obese child

## Keywords

<b>balanced diet</b>	a diet that contains all the nutrients in right proportion.
<b>beri-beri</b>	a disease caused by deficiency of Vitamin B.
<b>carbohydrate</b>	component of food that provides energy to the body.
<b>fats</b>	major source of energy in the diet.
<b>goitre</b>	an iodine deficiency disease.
<b>minerals</b>	nutrients needed in small amount for growth and maintenance of the body.
<b>nutrients</b>	components in food that we need to grow and survive.
<b>proteins</b>	nutrients needed for growth and repair of damaged tissues.

<b>PCM</b>	Protein-Calorie-Malnutrition.
<b>PEM</b>	Protein-Energy-Malnutrition.
<b>ricket</b>	a disease caused by deficiency of Vitamin D.
<b>roughage</b>	fibrous matter in food which does not get digested.
<b>scurvy</b>	a disease caused by deficiency of Vitamin C.
<b>vitamins</b>	vital nutrients required in limited amounts.

## You Must Know

1. Living organisms need food to grow and survive.
2. The sources of our food are plants and animals.
3. Carbohydrates, proteins, fats, minerals, vitamins, water and roughage are the important components of our food.
4. Carbohydrates and fats mainly provide energy to our body.
5. Proteins and minerals are needed for the growth and maintenance of our body.
6. Vitamins help in protecting our body against diseases.
7. Deficiency of vitamins and minerals, in our diet, may result in deficiency diseases.
8. A diet which contains all the essential components of food, in right proportions, is called a balanced diet.
9. The lack of some of the essential nutrients in the diet is known as malnutrition.
10. Eating, more than the requirement of one's body, can make the person obese.

## Something To Know

### A. Fill in the blanks.

1. Living organisms need food to \_\_\_\_\_ and \_\_\_\_\_.
2. Vitamins A, D, E and K are soluble in \_\_\_\_\_, whereas Vitamin B and C are \_\_\_\_\_ soluble.
3. The deficiency of \_\_\_\_\_, in the diet, causes a disease called Beri-Beri.
4. Vitamin K helps in \_\_\_\_\_ of blood.
5. The dietary fibres constitute \_\_\_\_\_.

### B. Write True or False for the following statements.

1. Vitamins and minerals are body building foods.
2. Our skin makes Vitamin E in the presence of sunlight.
3. Deficiency of phosphorous can lead to anaemia.
4. We should eat food that has all its essential components in the right proportions.
5. Kwashiorkor occurs due to the deficiency of fat in the diet.

### C. Tick (✓) the correct option.

1. When a drop of iodine solution was put on the cut surface of a potato, it turned blue-black in colour. This indicates the presence of—  
 vitamin  fat  
 protein  starch
2. The deficiency of Vitamin A, in the diet, causes a disease known as—  
 scurvy  rickets  
 nightblindness  beri-beri



3. Iron is essential for—

- growth of teeth and bones
- formation of haemoglobin
- functioning of the thyroid gland
- making muscles strong

4. A child, who has bow legs, is suffering from a deficiency disease, known as—

- scurvy
- rickets
- goitre
- anaemia

5. The deficiency of proteins, in the diet of children, can cause a disease known as—

- marasmus
- rickets
- kwashiorkor
- anaemia

**D. Answer the following questions in brief.**

1. Name the important sources of our food.
2. State the importance of carbohydrates in our diet.
3. Name the vitamin whose deficiency causes the disease of—
  - (a) nightblindness
  - (b) beri-beri
  - (c) scurvy
  - (d) rickets
4. Name any three of the minerals needed by our body.
5. State the role of calcium in our body.
6. Write the full forms of the terms PEM and PCM.

**E. Answer the following questions.**

1. Name two sources of each of the following:
  - (a) Carbohydrates
  - (b) Proteins
  - (c) Fats
  - (d) Roughage
  - (e) Vitamin A
  - (f) Vitamin C
2. Describe one test each for detecting the presence of the following in food:
  - (a) proteins
  - (b) starch
  - (c) fats
3. Why do we need proteins and how do they affect our health?
4. A mineral 'X' is essential for the formation of a component 'Y', in the blood of a person. The function, of component Y, is to transport oxygen in the body.  
The deficiency of mineral 'X', in the diet of a person, causes a disease Z. Identify X, Y and Z. Also mention the symptoms of disease Z.
5. Deficiency of iodine is more common in mountainous regions. Why?
6. What is a balanced diet? Why should we take a balanced diet?

**Value Based Question**

**Rohini had to go to a remote village for one of her photographic assignments. She observed that a large number of the villagers there had swelling in their neck regions. She advised the villagers to use iodised salt and to include fruits and vegetables in their diet, whenever possible. On her way back, she contacted the relevant authorities and ensured that the villagers get a regular supply of iodised salt.**

1. State the values displayed by Rohini.
2. Iodine is needed for the synthesis of a hormone. Name this hormone and the gland that produces it.
3. Ask the elders in the family, or the seniors in the school/locality, of any incident in which a person has helped a large number of people in solving, or minimising, a general problem. Share your findings with your classmates.

## Something To Do

1. List examples of food items, belonging to the different food groups, listed in the following table.

Carbohydrate Rich Food Items	Protein Rich Food Items	Food Items Rich in Fats	Dairy Products	Food Items that provide Minerals and Vitamins

2. Prepare your own meal plan, by choosing the food items from the above table, so that they form a balanced diet for you.

Breakfast Meal

Lunch Meal

Dinner Meal

3. Perform a test to find out if there is any starch in the sweets prepared from milk/milk products like curd, etc.