

REVISED

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6

CORDOVA

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Sources of Food

Use Cordova Smart Class Software on the smart board in class to observe and understand the sources of food and feeding habits of animals.

A machine or an engine needs energy to work. Our car gets energy from burning petrol or diesel. Similarly, living things also need energy to grow and to do various activities. Living things get energy from the food they eat. Food is the fuel for our body because it gives us energy.

We need food to

1. get energy to work and play
2. get nutrients for the growth, maintenance and repair of body cells
3. protect us from diseases and be fit and healthy

FOOD VARIETY

The food items are made of different materials. The materials needed to prepare food items are called **ingredients**. For example, to cook rice at home, we take raw rice and boil them in water. Thus, rice and water are two ingredients of boiled rice.

Some food items are made with many ingredients. For example, to prepare vegetable curry, we need different kinds of vegetables, salt, spices and oil.

ACTIVITY 1 Use Cordova Smart Class Software on the smart board in class to perform this activity.

Write the ingredients of the following food items.

Table 1.1 Food items and their ingredients

S.No.	Food item	Ingredients
1.	Chapati	atta, water
2.	Idli	
3.	Sandwich	
4.	Dal	

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 do milk, eggs and meat come from? From animals.

So, we get our food from plants and animals.

FOOD FROM PLANTS

We get the major parts of our food from green plants. We get cereals, pulses, vegetables, fruits, spices, oil and sugar from plants (Fig. 1.1).



(a) cereals and pulses



(b) fruits



(c) vegetables



(d) spices

Fig. 1.1 Food items obtained from plants

Various parts of plants such as roots, stems, leaves, flowers, fruits and seeds are used as food by us (Table 1.2). The parts of the plant that can be eaten are called **edible parts**.

animals are called scavengers. Jackals, hyenas and vultures are examples of scavengers (Fig. 1.6).



(a) hyenas



(b) a vulture

Fig. 1.6 Scavengers

Some organisms in nature, like some of the **fungi** and **bacteria** (Fig. 1.7), feed on dead plants and animals and decompose them. These organisms are called **decomposers**.



(a) bacteria



(b) fungi

Fig. 1.7 Decomposers

Scavengers and decomposers help keep the earth clean.

FOOD CHAIN

We know that the ultimate source of energy on the earth is the Sun. Animals cannot utilise the energy radiated by the Sun directly for their activities. Only the green plants can utilise the solar energy to prepare food because the green plants contain a pigment called chlorophyll that traps the solar energy. Animals get energy by eating the green plants. For example, green plants (producers) are

eaten by deer (a herbivore) which in turn, is eaten by carnivores like lion (Fig. 1.8).

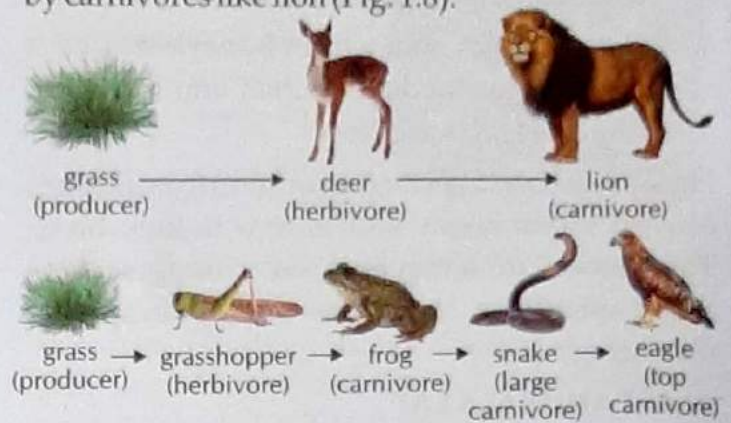


Fig. 1.8 Some food chains

Thus, all animals, whether herbivores or carnivores, directly or indirectly depend on plants for food. This feeding relationship among organisms is called **food chain**.

Thus, food chain can be defined as a **series of organisms linked together by the process of eating and being eaten for food**.

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. We should grow more food crops by using modern methods of farming.
2. We should store the food grains properly, so that they are not eaten by rats, insects and birds, or spoiled by microorganisms.
3. We should not waste food in any way.

EXERCISES

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 not prepared from milk?

(a) butter



(b) cheese



(c) oil







(d) curd



2. The _____ is an edible part of potato plant.
 (a) leaf (b) root (c) stem (d) fruit
3. Which of the following is not an example of omnivore?
 (a) human (b) bear (c) crow (d) deer
4. The sprouted seeds contain more _____.
 (a) carbohydrates (b) fats (c) vitamins (d) water
5. The edible part of the apple plant is _____.
 (a) leaf (b) root (c) stem (d) fruit
6. We eat root of _____.
 (a) mustard (b) rajma (c) chilli (d) radish
7. The colour of the structures grown out from the sprouted seeds is _____.
 (a) black (b) white (c) red (d) green

B. Match the following:

- | | | |
|---|---------------|--|
| 1.  | (a) herbivore | 3.  |
| | (b) carnivore | |
| 2.  | (c) omnivore | 4.  |
| | (d) scavenger | |

C. Fill in the blanks:

1. We get sugar from _____.
2. We get milk from _____ and _____.
3. Honeybees store honey in their _____.
4. _____ and _____ are two ingredients of boiled rice.
5. All animals, directly or indirectly depend on _____ for food.
6. Bacteria and fungi are called _____.
7. We should not _____ food in any way.
8. Honeybees are kept in _____ for rearing.

D. Very Short Answer Questions:

1. What are the animals that eat only plants and plant products called?
2. Name four food items that we get from animals.
3. Name two edible stems.
4. What are the materials needed to prepare food items called?
5. What is the rearing of honeybees on a large scale called?
6. Name two plants whose flowers are eaten as vegetable.

E. Short Answer Questions:

1. Why do we need food?
2. What are edible parts? Give name of one plant whose edible part is seed.

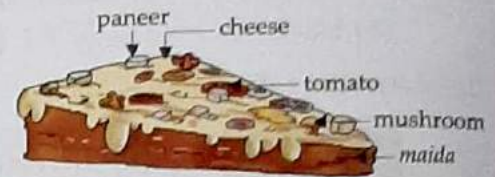
3. Honeybees work hard to collect nectar from flowers.
 - (a) Where is this nectar stored?
 - (b) What value do you learn from honeybees?
4. How can food problem be solved? Give two ways.
5. How are scavengers and decomposers useful to us?
6. What is food chain? Give one example.

F. Long Answer Questions:

1. How will you sprout seeds?
2. Distinguish between
 - (a) herbivores and carnivores
 - (b) scavengers and decomposers

G. HOTS (Higher Order Thinking Skills) Questions:

1. Look at the delicious pizza shown in Fig. (a) and identify the sources from which its ingredients are obtained.
2. Your mother makes food in the kitchen. Is she a 'producer'? Why/Why not? Fig. (a)



ACTIVITY

Home Assignment/Group Activity/Project

Cut the pictures of at least ten plants from which we get food products, from old books, newspapers and magazines and paste them in your scrapbook. Write the edible part/parts of each plant.

Field Visit

Visit a zoo to find out food habits of herbivores, carnivores and omnivores.

Group Discussion

Discuss in the class: 'Ways to avoid wastage of food'

CROSSWORD PUZZLE

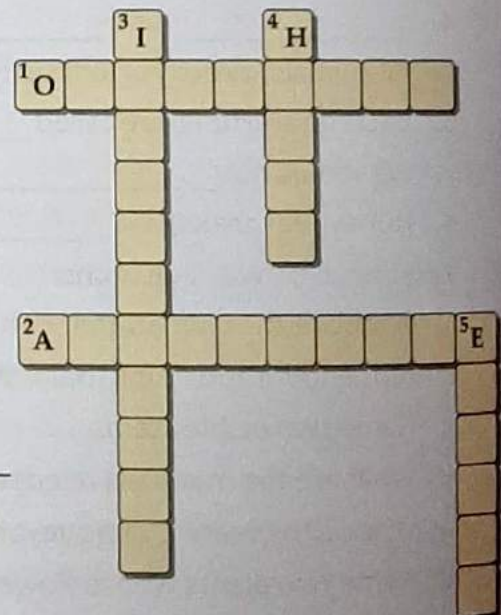
Solve the following crossword puzzle:

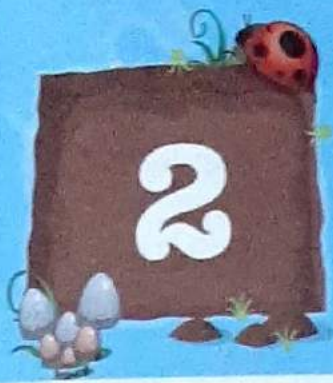
Across (→):

1. animals that eat both plants and flesh of other animals
2. rearing of honeybees on a large scale is called

Down (↓):

3. the materials needed to prepare food items
4. a tasty and nutritious food item we get from honeybees
5. the parts of the plant that can be eaten are called _____ parts





Components of Food

Use **Cordova Smart Class Software** on the **smart board** in class to understand the role of components of food in keeping our body healthy and disease free. Also, to conduct experiments for the presence of nutrients through virtual lab.

We have learnt in the previous chapter that we need food for energy, growth, repair of damaged tissues and to keep us fit and healthy. In this chapter, we will study the components of food and diseases caused due to deficiency of nutrients in our food.

COMPONENTS OF FOOD

The main components of our food are **nutrients**, **roughage** (dietary fibres) and **water**. Nutrients are the substances that an organism needs for growth, repair and maintenance of its body. The main nutrients are **carbohydrates**, **fats**, **proteins**, **vitamins** and **minerals**. Let us now study the components of food, their sources and functions.

1. Carbohydrates

Carbohydrates are the main source of energy for our body. Therefore, they are called **energy-giving foods**. The two main types of carbohydrates are (a) sugars (b) starch.

(a) **Sugars:** Sugars are **simple carbohydrates** found in the form of glucose and fructose. They have a sweet taste. They give instant energy. The main sources of sugar are glucose, cane sugar (commonly called sugar) and fruits such as banana, papaya, mango and grapes.

(b) **Starch:** Starch is a **complex carbohydrate**. It is the reserve food material of plants, i.e.,

plants store energy in the form of starch. Pure starch is a tasteless and odourless white powder. It provides energy comparatively slower than sugars. The main sources of starch are wheat, rice, maize, *bajra*, potato and sweet potato.

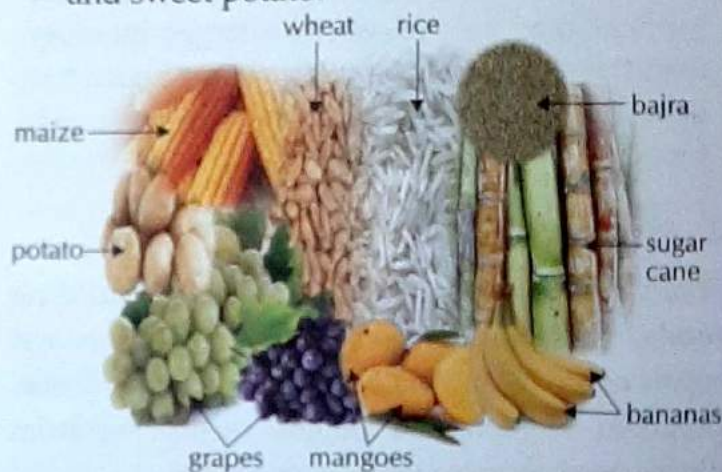


Fig. 2.1 Some sources of carbohydrates

ACTIVITY 1 Use Cordova Smart Class Software on the smart board in class to perform this activity.

To test the presence of starch in a given food sample

Things needed: A raw potato, iodine solution and a dropper

Preparation of iodine solution: Add a few drops of iodine to a test tube half-filled with water.

Method: Take a piece of raw potato and put a few drops of iodine solution on its cut surface with the help of a dropper.

Observation: We observe blue-black colour when the iodine drops fall on the cut surface of potato (Fig. 2.2).



iodine
potato piece
turns blue-black

Fig. 2.2 Testing for starch

Conclusion: Potato contains starch.

Note: Repeat this activity with various food items like boiled potato, powdered pulses, boiled rice, maize, a slice of bread and record your observations.

Most of the food items contain more than one nutrient. However, in a food item, a particular nutrient may be present in a larger quantity than the other nutrients. For example, rice has more carbohydrate so, it is a carbohydrate-rich food.

2. Proteins

Foods rich in proteins are called **body-building foods**. These are necessary for the growth and repair of the body. That is why growing children, pregnant women and people recovering from illness need more proteins in their diet.

Proteins can be obtained from plant and animal sources. The best sources of plant proteins are beans (soya bean and kidney beans), nuts (almonds, cashew nuts and groundnuts), pulses



Fig. 2.3 Some plant sources of proteins

(gram, moong and tuar dal) and cereals (maize and wheat) (Fig. 2.3).

Some of the best sources of animal proteins are lean meat (meat without fat), fish, eggs, milk and milk products (cheese, paneer and curd) (Fig. 2.4).

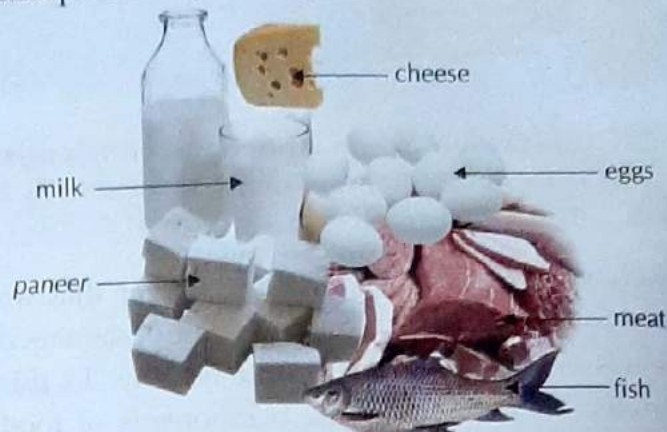


Fig. 2.4 Some animal sources of proteins

ACTIVITY 2

Use Cordova Smart Class Software on the smart board in class to perform this activity.

To test the presence of proteins in a given food sample

Things needed: A boiled egg (white portion), copper sulphate solution, caustic soda solution, a test tube, a dropper and a test tube stand

Preparation of copper sulphate solution: Dissolve 2 g of copper sulphate in 100 mL of water.

Preparation of caustic soda solution: Dissolve 10 g of caustic soda (sodium hydroxide) in 100 mL of water.

Method:

1. Take pieces of a boiled egg (white portion) in a test tube.
2. Add two drops of copper sulphate solution and ten drops of caustic soda solution in the test tube with the help of a dropper.
3. Shake the test tube well and allow it to stand for a few minutes.



food material
turns violet



Fig. 2.5 Testing for proteins

Observation: The content of the test tube turns violet (Fig. 2.5).

Conclusion: The violet colour indicates the presence of proteins in the boiled egg (white portion).

Note: You can repeat this activity by taking powdered pulses and beans or some other protein-rich food instead of egg.

DO YOU KNOW?

Our skin, hair, nails, muscles and even silk from silkworms are made up of proteins.

Multiple Choice Questions (MCQs)

Tick (✓) the correct options:

1. If a food material turns blue-black on addition of iodine solution, it confirms the presence of _____.

- (a) fats (b) proteins
(c) starch (d) vitamins

2. Which of the following provide energy?

- (a) vitamins (b) minerals
(c) carbohydrates (d) water

3. Fats

Fats give us more energy than carbohydrates. Foods rich in fats are also called **energy-giving foods**. Fats are obtained from plants and animals.

Ghee, oil, butter, milk, meat, etc., are some common foods containing fats. Nuts and some seeds also contain fats (Fig. 2.6).

Excess fat is often stored as body fat. The fat stored in the body causes obesity.



Fig. 2.6 Some sources of fats

ACTIVITY 3 Use Cordova Smart Class Software on the smart board in class to perform this activity.

To test the presence of fat in a food sample

Things needed: Peeled groundnuts and a piece of clean paper

Method: Take some peeled groundnuts. Wrap them in a piece of clean paper and crush them. Take care that paper does not get torn.

Remove the crushed groundnuts and straighten the paper. Hold the paper against a light source (e.g., bulb).

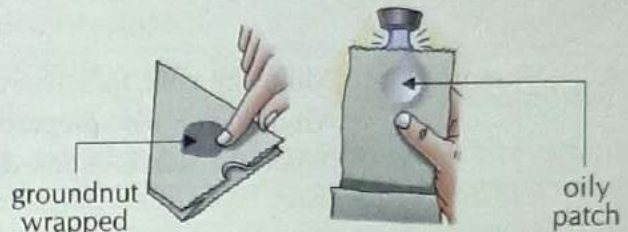


Fig. 2.7 Testing for fat

Observation: You observe an oily patch on the paper (Fig. 2.7).

Conclusion: This shows the presence of fat in the given food sample.

Note: Repeat the activity with butter or a drop of oil and note your observation.

DO YOU KNOW?

Excessive intake of fat increases the amount of cholesterol in the blood. Excess of cholesterol gets deposited in the blood vessels. The thickening of blood vessels leads to the reduction of the flow of blood that may result in high blood pressure and heart disorders.

4. Vitamins

Vitamins are essential nutrients required in small quantities for normal functioning of the body. The foods rich in vitamins are called **protective foods**. Vitamins are of different kinds like A, B (B-Complex), C, D, E and K.

Each vitamin occurs in a particular kind of food and performs a specific function. Let us study the sources and functions of each vitamin given in Table 2.1.

Table 2.1 Some vitamins, their sources and functions

S.No.	Vitamins	Sources	Functions
1.	Vitamin A	Green leafy vegetables, carrots, fish liver oil, papaya, mango	Maintains healthy eyesight, healthy skin
2.	Vitamin B Complex (group of vitamins)	Green vegetables, eggs, meat, milk, whole grain, cereals (rice and wheat), nuts, liver	Helps in proper functioning of the digestive system and also the heart, nerves and the muscles
3.	Vitamin C	<i>Amla</i> , citrus fruits (lemon, orange), tomato, guava, green vegetables, green chilli	Necessary for keeping teeth and gums healthy. It helps body to fight against diseases.
4.	Vitamin D	Milk, egg yolk, fish liver oil, butter, fish. Vitamin D is also prepared in the body when the skin is exposed to sunlight.	Essential for normal growth of bones and teeth

Nowadays, insufficient exposure to sunlight is causing vitamin D deficiency in many people.

proper functioning, normal growth and good health. Minerals do not supply energy to our body.

5. Minerals

Minerals are nutrients required by our body for its

Some important minerals, their sources and functions are given in Table 2.2.

Table 2.2 Some minerals, their sources and functions

S.No.	Minerals	Sources	Functions
1.	Calcium	Milk, cheese, eggs, green vegetables, whole grains, cereals, meat	Essential for the formation and hardening of bones and teeth, plays an important role in the clotting of blood
2.	Phosphorus	Milk, cheese, green vegetables, <i>bajra</i> , nuts, liver, <i>ragi</i>	Formation of strong bones and teeth
3.	Iodine	Iodised salt, seafood, green leafy vegetables	Essential for the formation of thyroxine hormone (secreted by the thyroid gland present in the neck region). This hormone controls physical, mental and sexual development of our body.
4.	Iron	Green leafy vegetables, legumes, spinach, jaggery	Essential for the formation of haemoglobin in the blood.

6. Roughage (Dietary Fibres)

The fibrous indigestible material present in our food is called roughage.

Roughage does not provide any nutrient to our body. Roughage helps us in the following ways:

- It adds bulk to the food. This helps our body get rid of undigested food and thereby prevents constipation.
- It can absorb a great amount of water and helps retain water in the body.

The main sources of roughage are salad, vegetables and fruits, corn (*bhutta*), unpeeled apple, half-crushed wheat (porridge or *dalia*), etc. (Fig. 2.8).



Fig. 2.8 Foods rich in fibres (roughage)



Isabgol is a natural plant product obtained from the husk of *Psyllium* seeds. It is consumed to get rid of constipation.

7. Water

It is the most important component of food. It is essential for life. Our body needs water to perform many vital functions. Some of them are:

- It transports substances and nutrients inside our body.
- It regulates the temperature of our body by sweating.
- It helps our body absorb nutrients from the food we eat.

Our body needs about 2-3 litres of water every day. Most of the water needed by our body comes from plain drinking water and beverages like tea and coffee. We also get water from most food items we eat. Fruits, vegetables, meat and fish provide some quantity of water to our body.

Excessive loss of water from the tissues of the body is called **dehydration**. Diarrhoea, vomiting and excessive bleeding cause dehydration. Dehydration causes loss of salts and leads to weakness in the body. One should drink enough water to prevent dehydration.

To treat dehydration, **Oral Rehydration Solution (ORS)** is used. It is available free of cost at primary health centres. ORS can be prepared at home by mixing four spoons of

sugar and one spoon of salt in a litre of water. This mixture is also available at chemist shops.

BALANCED DIET

The food that we eat during the whole day is called our diet. Our diet consists of many food items made from cereals (like wheat and rice), pulses, fruits, vegetables, eggs, milk, meat, fish and so on. The diet



Fig. 2.9 Balanced diet

that contains proper amount of all the essential nutrients, roughage and water for the proper growth and development of the body is called a **balanced diet** (Fig. 2.9).

The composition of a balanced diet depends on sex and age of the person, occupation (type of work done) and special needs (like during pregnancy).

For example,

- A growing child needs more proteins than a grown-up man to develop body tissues needed for growth.
- A pregnant woman needs more proteins in her diet for building the body of the developing baby. A nursing mother (who breastfeeds her baby) needs more proteins, calcium and vitamins to produce milk for her baby.
- Labourers, athletes and rickshaw-pullers need more carbohydrates to obtain more energy to do hard physical work.

LOSS OF NUTRIENTS DURING COOKING

Eating the right kind of food is not enough. The food should also be cooked properly so that its nutrients are not lost.

- If cooking is done in excess of water and the water is thrown away after cooking, many water-soluble vitamins and minerals are lost.

- If cooking is done at a high temperature, many proteins and vitamins (like vitamin C) are destroyed.
- Mostly, thick peels are removed from vegetables and fruits. This results in the loss of nutrients.
- Washing of some peeled and cut vegetables and fruits causes loss of water-soluble vitamins.
- Repeated washing of *dal* and rice also causes loss of water-soluble vitamins and minerals.

Multiple Choice Questions (MCQs)

Tick (✓) the correct options:

- Which of the following minerals is essential for the formation of thyroxine hormone?

(a) calcium	<input type="radio"/>	(b) phosphorus	<input type="radio"/>
(c) iodine	<input type="radio"/>	(d) iron	<input type="radio"/>
- A pregnant woman needs more _____ in her diet.

(a) carbohydrates	<input type="radio"/>	(b) proteins	<input type="radio"/>
(c) fats	<input type="radio"/>	(d) vitamin A	<input type="radio"/>

DEFICIENCY DISEASES

We need to eat a balanced diet for our proper growth and development. If any of the nutrients is less than the required amount in the diet, it causes a disease. Diseases that are caused due to the lack of nutrients (carbohydrates, fats, proteins, minerals or vitamins) in our diet over a long period of time are called deficiency diseases. Deficiency diseases are of the following types:

1. Protein Deficiency Disease – Kwashiorkor

If a child does not get enough proteins in his/her diet for a long time, he/she is likely to suffer from severe malnutrition. A very common protein deficiency disease in children is **kwashiorkor**. This disease is common among children of one to five years of age.

It has the following symptoms (Fig. 2.10).



Fig. 2.10 A child suffering from kwashiorkor

Symptoms: Stunted growth, skin becomes dry and scaly, hair becomes reddish, body swells up due to retention of water (oedema), large pot-like belly, limbs especially legs become thin and bony.

2. Protein, Carbohydrate and Fat Deficiency Disease – Marasmus

The deficiency of proteins, carbohydrates and fats in the diet of children leads to a disease called **marasmus**. This disease generally affects infants under one year of age.

It has the following symptoms (Fig. 2.11).

Symptoms: Body becomes very lean and thin, and so weak that the child may not be able to move, skin becomes dry, thin and wrinkled, ribs become very prominent, sunken eyes, unable to digest and absorb food and may suffer from diarrhoea.





Fig. 2.11 A child suffering from marasmus

3. Vitamin Deficiency Diseases

Diseases caused by the deficiency of certain vitamins are listed in the Table given on the next page (Table 2.3).


Table 2.3 Some vitamin deficiency diseases and their symptoms

S.No.	Vitamins	Deficiency diseases	Symptoms
1.	Vitamin A	Night blindness	Poor vision and loss of vision in darkness (night)
2.	Vitamin B ₁	Beriberi	Extreme weakness, swelling of legs, loss of appetite and weight
3.	Vitamin C	Scurvy 	Spongy and bleeding gums, loosening of teeth, wounds take longer time to heal
4.	Vitamin D	Rickets 	Softened and bent bones (soft bones are more susceptible to fracture), bowed legs due to malformation of leg bones, pain in bones

4. Mineral Deficiency Diseases

Diseases caused by the deficiency of certain minerals are listed in Table 2.4:

Table 2.4 Some mineral deficiency diseases and their symptoms

S.No.	Minerals	Deficiency diseases	Symptoms
1.	Iron	Anaemia (Less haemoglobin produced in blood)	Weakness and fatigue, loss of weight, pale skin, loss of appetite
2.	Iodine	Goitre 	Abnormal enlargement of the thyroid gland (Thyroid gland is present in the neck region.), retarded growth, mental disability
3.	Calcium	Bone and tooth decay	Weak bones, excessive bleeding of gums, stunted growth, tooth decay, weakness
4.	Fluorine	Dental caries	Pain in teeth, sensitivity to hot and cold food or drinks

EXCESSIVE INTAKE OF FOOD

As deficiency of nutrients in our diet leads to diseases, similarly, excessive intake of food also leads to diseases. Overeating of fat-rich foods leads to an overweight condition called **obesity**. Many people, especially children, eat a lot of junk food such as burgers, chips and soft drinks. All these food items contain large amount of fats

and sugars. Due to lack of physical activities, fats get accumulated in the body and cause obesity.

Obese people may suffer from diseases like hypertension and diabetes. We can control obesity and be fit and healthy by regular physical exercises and avoiding fat and carbohydrate rich diet.

EXERCISES

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

A. Tick (✓) the correct options:

- Which of the following is a source of fat?
(a) soya bean oil (b) apple (c) wheat (d) none of these
- For protein test, we add _____ solution along with caustic soda solution.
(a) copper sulphate (b) magnesium sulphate
(c) calcium sulphate (d) iodine
- Which of the following food items shows a positive starch test?
(a) butter (b) egg (c) rice (d) oil
- Obesity is due to excessive intake of _____.
(a) proteins (b) fats (c) minerals (d) vitamins
- Spongy and bleeding gums are symptoms of _____.
(a) beriberi (b) scurvy (c) rickets (d) night blindness
- Which vitamin is essential for proper vision in darkness?
(a) vitamin D (b) vitamin A (c) vitamin C (d) vitamin B

B. Fill in the blanks:

- _____ and fats provide us energy.
- Carrot is a rich source of vitamin _____.
- The fibrous indigestible material present in our food is called _____.
- The diet that contains all components of food in the required proportion is called a _____.
- Excessive loss of water from the tissues of the body is called _____.

C. Match the following:

- | Column A | Column B |
|---------------------------|-------------------|
| 1. Fluorine | (a) beriberi |
| 2. Iron | (b) rickets |
| 3. Vitamin B ₁ | (c) kwashiorkor |
| 4. Protein deficiency | (d) dental caries |
| 5. Vitamin D | (e) anaemia |

D. Look at the pictures and identify the diseases. Write their names in the spaces provided:



1. _____



2. _____



3. _____



4. _____

E. Very Short Answer Questions:

1. Name two food items that are rich in (a) phosphorus (b) calcium.
2. Name two sources of roughage.
3. Which mineral is essential for the formation of bones and teeth?
4. Which component of food plays an important role in transporting substances and nutrients inside our body?
5. Name one disease from which obese people may suffer.
6. Name one source of iodine.

F. Short Answer Questions:

1. Give two cooking practices that lead to the loss of nutrients in food materials.
2. Name the disease caused by the deficiency of dietary iodine and give its symptoms.
3. How do we get most of the water needed by our body?
4. Differentiate between the two types of carbohydrates found in food.
5. Why is roughage important for us?

G. Long Answer Questions:

1. What is marasmus? What are the symptoms of marasmus?
2. What are deficiency diseases? Name three deficiency diseases and also write their causes and symptoms.

H. HOTS (Higher Order Thinking Skills) Questions:

1. Mrs Sharma suggested her maid to wash the vegetables before chopping and not after chopping. Does it make a difference? Comment.
2. Radhika likes to carry bread and jam every day in her lunch. Is this justified? Comment.

I. Practical Skill Based Questions:

1. How will you test the presence of starch in a piece of potato?
2. How can you test the presence of proteins in egg?

ACTIVITY

Home Assignment/Group Activity/Project

1. **Test Your Food:** Test three different food items which you eat, for the presence of starch, proteins and fats. Record your observations in the following table:

S. No.	Food items	Starch Present (Yes/No)	Proteins Present (Yes/No)	Fats Present (Yes/No)
(i)	Milk			
(ii)	Banana			
(iii)	Ghee			

2. Prepare a balanced diet chart for a twelve year old child. The diet chart should include inexpensive food items that are commonly available in your area.

Group Discussion

Discuss in class the effects of excess intake of fats. Also, discuss whether too much proteins or vitamins in the diet are also harmful for the body.



Fibre to Fabric



Use Cordova Smart Class Software on the smart board in class to observe various types of fibres and the process of making fabric from fibres.

Clothes are one of our basic needs. We wear clothes mainly to protect our bodies from heat, cold and rain. We wear different types of clothes according to the climate, occupation, culture, traditions and daily needs. The clothes that we wear daily, the towels, the curtains, bed sheets, blankets, table cloths, etc., are made from different types of fabrics. Fabric is commonly called cloth.

FIBRES AND THEIR TYPES

Fabrics are made from fibres. Fibres are long, strong and flexible thread-like materials. There are three types of fibres— natural, synthetic and mixed fibres (Fig. 3.1).

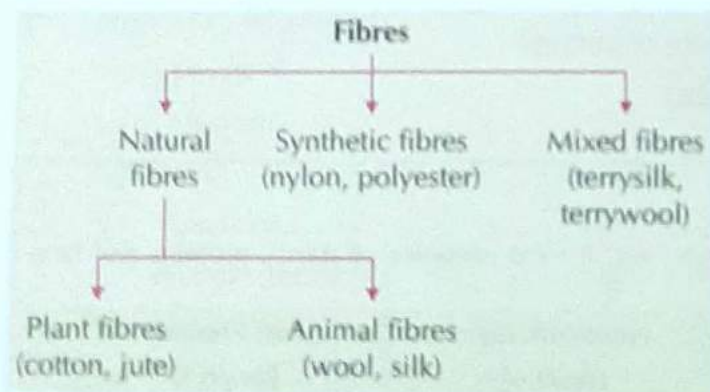


Fig. 3.1 Types of fibres

1. Natural Fibres

The fibres that are obtained from plants and animals are called natural fibres. Cotton, jute, coir, hemp and flax are examples of fibres obtained from plants. Wool and silk fibres are obtained from animals (Fig. 3.2). Wool is obtained from the fleece of sheep or goats. It is

also obtained from the hair of rabbits, yaks and camels. Silk fibre is drawn from the cocoon of the silkworm. The fabric made from natural fibres is called natural fabric.



(a) cotton fibres



(b) wool

Fig. 3.2 Some natural fibres

Advantages of natural fabrics

1. These fabrics absorb more water and sweat.
2. They allow air to pass through them.
3. They are biodegradable and do not affect the environment.

Disadvantages of natural fabrics

1. They do not retain their crease for long.
2. They may shrink on ordinary washing.
3. They can easily be attacked by moths and moulds.
4. They do not dry rapidly.
5. Natural silk is very expensive and not quite affordable.

2. Human-made or Synthetic Fibres

The fibres that are made by humans from different chemicals in the industries are called human-made or synthetic fibres.

Some of the common synthetic fibres are nylon (Fig. 3.3), polyester and acrylic. The synthetic fibres are mostly obtained from petroleum.

The fabric made from synthetic fibres is called synthetic fabric.

Advantages of synthetic fabrics

1. Synthetic clothes are more durable and easy to maintain.
2. They do not absorb much water, dry up fast and are wrinkle-free.
3. Synthetic clothes are not attacked by moths and moulds.

Disadvantages of synthetic fabrics

1. They do not allow the air to pass through them and hence are not good for summers.
2. They do not absorb sweat.
3. They easily catch fire.
4. They are non-biodegradable.



Fig. 3.3 Nylon cloth is made from synthetic fibres.

DO YOU KNOW?

The chemicals used in the manufacturing of synthetic fibres find their way in water bodies and pollute them. So, they are harmful for the environment.

3. Mixed Fibres

The fibres made by blending natural fibres with synthetic fibres to obtain superior and useful fibres are called mixed fibres. Terrycot



(a) terrysilk



(b) terrywool

Fig. 3.4 Clothes made of mixed fibres

(terylene + cotton), terrysilk (terylene + silk) and terrywool (terylene + wool) are some examples of mixed fibres (Fig. 3.4).

COTTON

Cotton is a soft fibre that grows around the seeds of the cotton plant. The cotton plants are usually grown at places having black soil and warm climate. In our country, cotton is cultivated in Maharashtra, Madhya Pradesh, Punjab, Rajasthan, Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka. Cotton plants need a temperature of about 25 °C and a rainfall of about 60 cm to 100 cm for their growth. The cotton plant is bushy and about 1-2 metre in length.

Cultivation of Cotton

In India, the growing period for cotton is from March (spring) to November (winter) (Fig. 3.5).

1. Cotton seeds are planted in the early spring.
2. Cotton seeds grow steadily. The fruits of the cotton plant are called **cotton bolls**.
3. The cotton bolls grow slowly. Small seeds and cotton fibres develop. A fully mature cotton boll is of the same size as that of lemon. It is brown in colour.



(a) a cotton plant



(b) cracked cotton bolls revealing white fluffy fibres



(c) hand-picking of cotton bolls



(d) a cotton-picking machine

Fig. 3.5 Cultivation of cotton

- After maturation, the cotton bolls burst open and the seeds covered with cotton fibres can be seen.
- The heat of the Sun dries these fibres, turning them fluffy and as white as snow. During this time, the cotton field looks like a field covered with snow.
- Now, it is the time of harvesting. Cotton crop is mostly hand-picked. In big fields, machines are used for picking cotton.

Uses of Cotton

- Cotton fibres are used for manufacturing clothes and linen. For example, socks, T-shirts, bed sheets, etc., are generally made from cotton. Cotton clothes are comfortable in hot and humid conditions because they are soft to touch, absorb sweat and let the air in. The sweat absorbed by cotton cloth evaporates more quickly due to the air it 'breathes'. It results in cooling down of the body.
- Cotton is blended with other fibres to make mixed fibres like **terrycot**.
- Cotton is used to absorb blood and pus from wounds and for other medical purposes.

DO YOU KNOW?

The earliest written reference of cotton is from India. Cotton has been growing in India for more than 3000 years. But, cotton was used by Egyptians as early as 14,000 years ago.

Multiple Choice Questions (MCQs)

Tick (✓) the correct options:

- Which of the following is not a natural fibre?

(a) silk	<input type="radio"/>	(b) wool	<input type="radio"/>
(c) terylene	<input type="radio"/>	(d) jute	<input type="radio"/>
- Which type of soil is good for growing cotton plants?

(a) loamy soil	<input type="radio"/>	(b) red soil	<input type="radio"/>
(c) black soil	<input type="radio"/>	(d) laterite soil	<input type="radio"/>

FROM FIBRE TO FABRIC

1. Ginning

Ginning is the process of separating cotton fibres from their seeds. It was traditionally done by hands using steel combs. These days, a machine called 'roller gin' is used for ginning (Fig. 3.6).

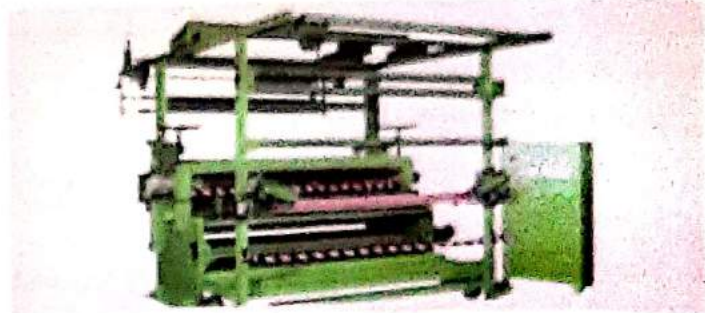


Fig. 3.6 Roller gin

2. Spinning

It is the process of changing fibre into yarn. Spinning draws out short fibres from the cotton wool and twists them together into a long, continuous thread called **yarn**.

Hand spindle or *takli* (Fig. 3.7) and *charkha* are two hand-operated devices used for spinning. In rural areas, people still use *charkha* for making thread or yarn from cotton. Spinning of yarn on a large scale is done on spinning machines (Fig. 3.8).



Fig. 3.7 Takli



Fig. 3.8 Spinning machine

ACTIVITY 1

Use Cordova Smart Board or smart board in class to perform this activity.

To make yarn from cotton

Things needed: Cotton

Method: Hold some cotton in one hand. Pinch some cotton between the thumb and the forefinger of the other hand. Now, gently start

pulling out the cotton, while continuously twisting the fibres (Fig. 3.9).



Fig. 3.9 Making yarn from cotton

Observation: The fibres from cotton are drawn and at the same time twisted to form cotton yarn. This process is called spinning. Spinning increases the strength of the fibre.

We do this regularly to prepare wick for the 'earthen lamp' (*diya*) from cotton.

DO YOU KNOW ?

Mahatma Gandhi, the father of our Nation, popularised the use of *charkha*. He wore only *khadi* clothes woven from the yarn that he himself spun on a *charkha*. During the independence movement, he encouraged people to wear *khadi* clothes made of homespun yarn and boycotted the imported clothes made in the textile mills of Britain. To popularise the use of *khadi*, the Government of India constituted **Khadi and Village Industries Commission** in 1956.



Mahatma Gandhi using *charkha*

3. Weaving

It is the process to convert yarn into cloth. The process of arranging two sets of yarns together to make a fabric with the help of a handloom or powerloom is called weaving. Weavers weaving on a small scale, use handlooms (Fig. 3.10). On a large scale, cotton fabrics are made by big machines that run on electricity. These machines are called **powerlooms**.

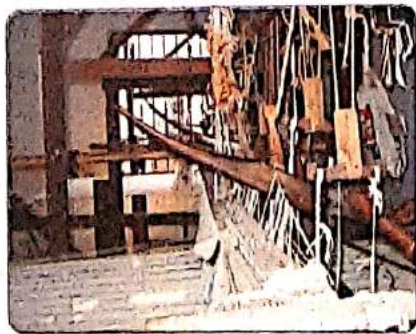


Fig. 3.10 Weaving of a fabric on a handloom

To understand weaving, let us do the following activity:

ACTIVITY 2

Use Cordova Smart Class Software on the smart board in class to perform this activity.

To make the weaving pattern from paper

Things needed: Three sheets of stiff paper of different colours, a scale and a pair of scissors

Method: Cut square pieces of 30 cm from each paper. Take one square and fold it into half [Fig. 3.11 (a)]. Draw a light pencil line across the end opposite to the fold, about one inch from the edge. Make a series of cuts, one inch apart from the folded edge to this line [Fig. 3.11 (b)]. Cut strips of paper one inch apart from the other coloured square papers [Fig. 3.11 (c)]. Take a strip and weave it alternately over and under the strips in the first sheet [Fig. 3.11 (d)]. Weave the remaining strips one by one through the cuts in the sheet of paper [Fig. 3.11 (e)]. We obtain this pattern after weaving all the strips [Fig. 3.11 (f)].

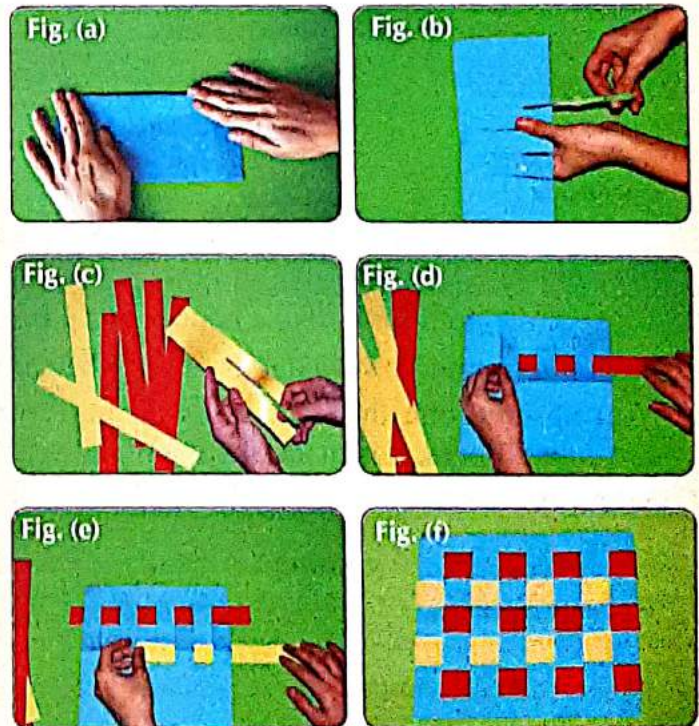


Fig. 3.11 Weaving with paper

In the same way, two sets of yarn are woven to make a fabric. The yarns are much thinner than the paper strips.

Knitting

You must have seen a lady knitting a sweater or muffler with the help of two knitting needles (Fig. 3.12). In knitting, a single yarn is used to make a piece of fabric. Knitting can be done by hands using knitting needles. Nowadays, most of the knitting is done with the help of machines.



Fig. 3.12 Knitting

ACTIVITY 3

Use Cordova Smart Class Software on the smart board in class to perform this activity.

To obtain fibres from a fabric

Things needed: Cotton fabric, a magnifying glass

Method:

1. Take a piece of cotton fabric. Look at it.
2. Now, with the help of a magnifying glass, observe this piece [Fig. 3.13(a)].
3. Now, find a loose thread or yarn at one of the edges and pull it out. If no loose yarns are visible, gently pull out a yarn with a pin or a needle [Fig. 3.13 (b)]. Place the piece of yarn on the table. Now, press one end of the yarn with your thumb. Scratch the other end of the yarn along its length with your nail [Fig. 3.13 (c)].



(a) enlarged view of fabric using a magnifying glass



(b) pulling a thread from a fabric



(c) pressing the yarn at one end and scratching the other end



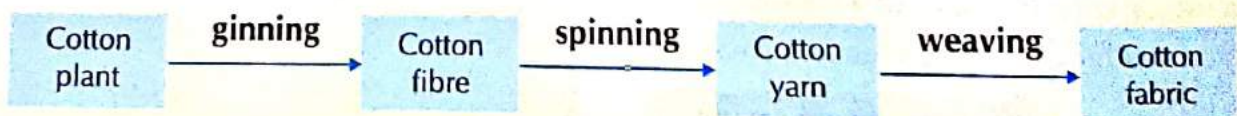
(d) Yarn splits into thin strands called fibres.

Fig. 3.13 Steps to obtain fibres from fabric

Observation:

1. The cotton cloth looks like a continuous piece.
2. When you observe with a magnifying glass, you find that it is not a continuous piece.
3. You observe that the yarn splits up into thin strands [Fig. 3.13(d)]. These thin strands of thread are called **fibres**. It is made up of a number of threads interwoven with each other [Fig. 3.13(a)].

Conclusion:



JUTE

Jute is a long, soft, shiny fibre obtained from the stems of the jute plant (called *patsum* or *paat* in Hindi). It is also called 'golden fibre'. Jute is biodegradable, durable and strong. In our

country, jute is cultivated in West Bengal (India's largest producer of jute), Assam and Bihar, in the low-lying areas around the River Ganga and River Brahmaputra. It needs a well-drained fertile soil like alluvial soil.

Jute cultivation needs hot and humid climate, and high rainfall during the growing period.

DO YOU KNOW ?

India is the largest producer of jute products in the world followed by Bangladesh. About 85% of the world's jute cultivation is concentrated in the Sunderban delta in India (West Bengal) and Bangladesh.

Cultivation of Jute

1. The seeds are sown in March or April. It is a rainy season crop.
2. Jute plant grows 6 to 12 feet in height. It bears yellow flowers. The plants are cut during the flowering stage. It is because good quality jute is obtained from its young stem. The old stem becomes very hard and it is difficult to remove fibres from it.
3. After harvesting, the stalks of the plants are tied into bundles and left in stagnant water (pond) for about 20 days.
4. Bacteria grow in stagnant water. The sticky matter that holds the fibres to the inner part of the stem is eaten away by bacteria. This process is called **retting**.
5. When the stems rot, the fibres are separated by hands (Fig. 3.14).
6. The fibres so obtained are dried in the Sun and tied into small bundles. These bundles are sent to the mills.

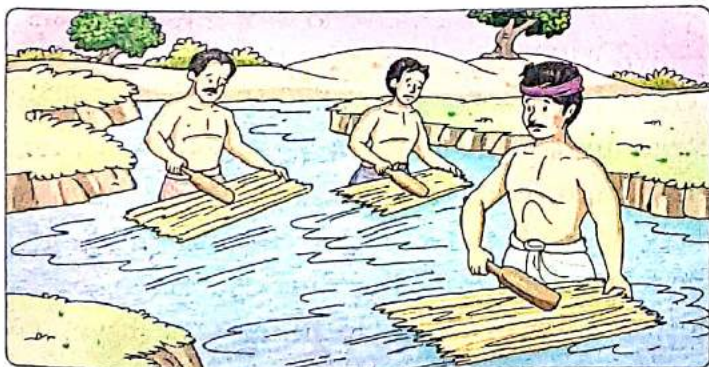


Fig. 3.14 Breaking the jute plants and stripping the fibre

7. They are then spun and woven into textiles at the mills.

Uses of Jute

1. Jute is one of the most important fibres after cotton. It is used for making gunny bags or sacks.
2. High quality jute is woven into curtains, carpets, chair coverings and packing for linoleum.
3. Shopping bags, table mats, jute baskets and jewellery are also made up of jute (Fig. 3.15).
4. Jute bags are also extensively used in packing cereals like wheat, *jowar* and maize.



(a) a jute bag



(b) jute baskets

Fig. 3.15 Articles made from jute

ACTIVITY 4

Collect samples of different fabrics like cotton, wool, jute, silk, nylon and terylene. Observe them carefully and note down your observations on the following criteria:

- (a) light or heavy
- (b) smooth or coarse
- (c) shiny or dull appearance

ACTIVITY 5

Use Cordova Smart Class Software on the smart board in class to perform this activity

Note: To perform this activity, take the help of your teacher or any other adult.

To observe the effect of burning on different cloth materials

Things needed: A candle, a pair of tongs and some cloth pieces

Method: Collect some pieces of cotton, wool, silk and synthetic clothes.

Cut some strips from these pieces. Hold each piece of cloth with a pair of tongs over a burning candle (Fig. 3.16). Observe the parameters given in the following table. What difference do you see between these and why?

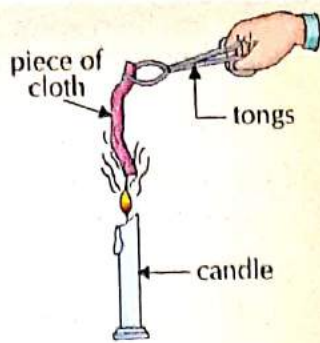


Fig. 3.16 Burning a piece of cloth

Observation:

Table 3.1 Effect of burning on different fabrics

Type of cloth	Burning		Smell	Remains of burning
	Slow	Fast		



We should not wear synthetic clothes while cooking or working with fire. On burning, the synthetic fibres melt, shrink and become sticky. In case of fire, they stick to the skin and worsen the burn injuries.

SOME OTHER USEFUL FIBRES

Wool

Wool is obtained from the fleece of sheep (Fig. 3.17) or goats. Removing the fleece from sheep is called shearing. After shearing, the wool is cleaned and then combed by a machine. Thereafter, the wool is spun into fibres that are then, knitted to make woollen clothes either by hand or by machines.



Fig. 3.17 Wool is obtained from sheep.



Fig. 3.18 Cocoon

Silk

Silk was first developed in China. It is obtained

from the cocoon of the silkworm (Fig. 3.18). Each silkworm spins a thread upto 800 m long to make a cocoon. The cocoon is boiled in water to kill the worm. It is then unwound to get the silk fibre. The rearing of silkworms for production of silk is called sericulture.

Multiple Choice Questions (MCQs)

Tick (✓) the correct options:

- The process of separating cotton fibres from their seeds is called _____ .
 (a) spinning (b) ginning
 (c) weaving (d) wearing
- The process of changing fibre into yarn is called _____ .
 (a) spinning (b) weaving
 (c) ginning (d) knitting

HISTORY OF CLOTHING MATERIAL

The early humans did not know much about clothes. They used the bark of trees and large leaves to cover themselves (Fig. 3.19). Later, they started using animal skins for clothing. They wore animal skins and wrapped fur around their bodies to keep themselves warm during winters.



Fig. 3.19 Early humans used to wear large leaves and animal skins as clothes.

When people began to settle in agricultural communities, they learnt to weave twigs and grass into mats and baskets. Later, humans developed the technique for spinning and weaving cloth from the fluffy substance of the cotton plant. The clothing was invented thousands of years ago. In ancient Egypt, cotton

and flax plants were cultivated near the River Nile and used for making fabrics. In India, the use of cotton spread around 3000 BCE. In China, silkworms were domesticated to produce silk fibres. The domestication of silkworms in China started around 3000 BCE. The fibres were then spun into threads, that were woven to make silk cloth.

Earlier, stitching was not known. Women used to wear sari and men used to wear *dhoti* (Fig. 3.20).

These clothes were not stitched. They were just wrapped around the body. Even today, sari, *dhoti*

and *lungi* are used as unstitched clothes. With the invention of the sewing needle, people started stitching fabrics to make clothes.

Today, various stitched clothes such as jeans, suits, shirts and trousers are very popular. At present, there is a large variety of fabrics to choose from.



Fig. 3.20 *Dhoti* and sari are traditional dresses.

EXERCISES

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

A. Tick (✓) the correct options:

- Which of the following is obtained from the stem of a plant?
 (a) jute (b) cotton (c) wool (d) polyester
- The processing of fibres from cotton bolls into cotton fabric has the following sequence:
 (a) ginning → knitting → weaving (b) ginning → spinning → weaving
 (c) combing → yarning → knitting (d) ginning → combing → spinning
- The fibres that are obtained by blending natural and synthetic fibres are called _____.
 (a) artificial fibres (b) joint fibres (c) mixed fibres (d) real fibres
- Roller gin is used for _____.
 (a) weaving (b) spinning (c) ginning (d) stitching
- Which of the following is used for making gunny bags?
 (a) cotton (b) jute (c) wool (d) polyester
- Which of the following is a mixed fibre?
 (a) terycot (b) cotton (c) silk (d) none of these

B. Match the following:

Column A

- Ginning
- Plant fibre
- Weaving
- Animal fibre
- Spinning

Column B

- silk
- converting yarn into cloth
- making yarn from fibres
- separation of cotton fibres from seeds
- cotton

C. Fill in the blanks:

1. Fabrics are made from _____.
2. _____ fibres are non-biodegradable.
3. _____ is also called golden fibre.
4. Weaving on small scale is done by _____.
5. A machine called _____ is used for ginning.

D. Very Short Answer Questions:

1. Name two natural fibres obtained from plants.
2. Which traditional device was used by Mahatma Gandhi for making thread or yarn?
3. Which part of the cotton plant is called cotton boll?
4. Name two synthetic fibres.
5. What is the rearing of silkworms called?
6. From which animal wool is obtained?

E. Short Answer Questions:

1. What is shearing?
2. Nitika sees a poor man shivering in the cold outside her house. She takes permission from her mother and gives him an old blanket.
 - (a) Name the fibres used for making blanket.
 - (b) Which value is shown by Nitika?
3. Classify the following fibres into natural and synthetic—nylon, wool, cotton, silk, polyester, jute
4. Write two advantages of synthetic fibres.
5. Why are the cotton fabrics more comfortable in summers?
6. What is retting?

F. Long Answer Questions:

1. Discuss the advantages and disadvantages of natural fabrics.
2. Discuss the uses of jute.

G. HOTS (Higher Order Thinking Skills) Questions:

1. Aman's mom leaves for her office early in the morning. She takes a metro to the office and returns late in the evening. What type of fabric should she use for her dress?
2. Mansi is planning to visit Jaipur and Jodhpur during her summer vacation. What should she keep with her—nylon leggings or cotton pants with *kurtas*? Why?

H. Practical Skill Based Question:

We prepare wick for the earthen lamps. How do we prepare it? Name the process also.

ACTIVITY

Home Assignment/Group Activity/Project

Visit a tailor's shop and collect small pieces of different varieties of fabrics. Take a piece of chart paper, stick the fabric pieces on it and label them.

Field Visit: Visit a handloom or a powerloom unit. Observe the working carefully. Prepare a report in about 200 words.

Group Discussion: Discuss in the class: 'The role of machines in converting fibre to fabric'