

Science Success with Practice Assignments

6
Book

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PREFACE

The series **Science Success** is meant for **Classes 1 to 8**. It fulfills the vision of **National Curriculum Framework (NCF)** meant for the schools affiliated to **CBSE** and other schools affiliated to various **State Education Boards**. This series emphasises meaningful learning of science for the overall development of learners. It focuses on helping children understand their natural environment and correlate science with their everyday experiences in an interesting and comprehensive manner.

The text has been designed with beautiful illustrations to help children develop skills of observation, investigation and scientific attitude.

Components of this Series are:

- **Science Success Textbooks — Books 1 to 8** for Primary and Middle Classes.
- **Science Success Teacher's Resource Books 1 to 8.**
- **Online Support for Books 1 to 8.**

The series has been designed for teaching a basic course in science and includes various **Key Features (Tools)** to fulfill needs and requirements of learners.

A. LEARNING TOOLS (Books 6 to 8)

These Tools help students to gain knowledge, understand concepts thoroughly and retain it in their memory.

- **Learning Objectives** : Gives a view of the main learning objectives to be achieved.
- **Comprehensive Text** : Explains the science concepts in simple and lucid language accompanied with lively illustrations, diagrams and pictures followed by examples from day-to-day life.
- **Science Bits** : Gives extra information about the topics being taught.
- **Activity** : Simple experiments to make the understanding of the concept being taught crystal clear.
- **Keywords** : Contains all the difficult terms along with their meanings/definition from the whole chapter.
- **Summary** : Gives a quick recap of the whole chapter.

B. ASSESSMENT TOOLS (Books 6 to 8)

These Tools test the understanding and knowledge of concepts through Exercises, Revision-practice and Life Skill techniques.

- **Check Your Knowledge** : Provides **in-text exercises** to evaluate the understanding of concept being covered.

- **Exercises** : Provides a variety of graded questions under various heads – **MCQs, Fill in the blanks, Match the columns, True/False, Very short answer questions, Short answer questions, Long answer questions, Flow chart, Label the diagrams, HOTS questions, Value based questions.**
- **Project Ideas** : Enables the students to work on some interesting projects based on the concepts learnt in chapter.
- **Activities to Ponder and Act** : Provides the situations to use the skills and values developed.
- **For the Teacher** : Gives some helpful suggestions to the teacher to make learning lively and more interesting.
- **In the Laboratory** : Gives an opportunity to the children to get practical experience.

Additional Tools

Teacher's Resource Books

- **Plan to achieve the Learning Objectives** to guide the teachers with effective teaching techniques.
- **Overview of the Lesson** to help teachers easily recapitulate the finer points of the lesson.
- **Complete Solution-key** of the Textbooks.

Online Support

- **Chapterwise Assignments for practice**
- **Chapterwise Question Bank with solutions**
- **Animated Lessons**
- **Animated Activities**
- **Science Dictionary**

We hope this series fulfills all the needs and requirements of NCF and the latest syllabi. We look forward for feedback and constructive criticism from the students, teachers and parents, which will be given every consideration in the future.

—Authors

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1



Food—Where Does it Come From?

Learning Objectives

At the end of this chapter, students will be able to understand :

- What is health? • How does food keep us healthy? • What are the functions of food?
- Which ingredients are used to prepare a particular dish? • From where do these ingredients come? • Which part of the plant can be used as food? • Food products (items) that come from animals. • Feeding habits of different animals. • Why are plants known as producers?

You can run, jump, play and study when you are full of energy. You have good deal of energy because you enjoy good health. The question arises here as to what is health and good health at all?

1.1 HEALTH AND FOOD

The **World Health Organisation** (WHO) defines health as “a state of complete physical, mental, social and spiritual well being and not merely the absence of disease or infirmity”.

So, good health allows you to play well and do well in your study and makes you

happy. But, what keeps you in good health? Well, to maintain good health we should do the following jobs :

- (a) Eat a proper and balanced diet.
- (b) Eat at regular intervals of time.
- (c) Exercise regularly.
- (d) Rest adequately.
- (e) Keep ourselves mentally alert but stressfree.

So, food is one of the basic necessities of life.

1.1.1 Functions of food

Food performs four basic functions in our body.

- (a) It provides energy needed for various activities to be performed by us.



Playing

- (b) It is needed to grow and repair the worn out cells.

- (c) It controls various body functions.

- (d) It is required for protecting the body from various diseases and for keeping it fit and healthy.

1.1.2 Variety of food

Generally, an individual eats food 3-4 times a day. The food consumed at a particular time of the day either in the morning, noon or in the evening, constitutes a meal. So, a person normally takes three meals in a day-breakfast, lunch and dinner. There may be so much variety in the food that we eat in a day.

ACTIVITY 1.1

Note down the information about the food items eaten by your friends, belonging to different states, eat in a day. Note this information in a table.

The information you collect from the above activity shows that :-

- ❖ there is a great variety in the food items that human beings eat.
- ❖ the food items eaten in one state may be different from the food items eaten in other states.

Now, you are well aware about the variety

in your food. Do you know what are these food items made of?

Each food item we eat is prepared by different food materials which are called ingredients. Some food items are prepared with only two ingredients such as boiled rice, while some others need many ingredients to get prepared, for example idli.

FOOD ITEM



Cooked Rice

INGREDIENTS



Water



Dry Rice

FOOD ITEM



Idlis

INGREDIENTS



Rice



Salt



Urad dal



Water

CHECK YOUR KNOWLEDGE-1

Fill in the blanks :

- (a) Food provides _____ to perform various activities.
- (b) The materials used for preparing food _____.
- (c) _____ keeps us fit and healthy.
- (d) The food items eaten in one state may be _____ from the food items eaten in other states.
- (e) Dry rice and _____ are used as ingredients for boiled rice.

1.2 SOURCES OF FOOD

ACTIVITY 1.2

Make a group of 4-6 students.

Find out what each student in your group has brought for lunch to school. Make a list of all the food items in your notebook. Find out how the different types of food are prepared. For example, if someone has brought chapatti, it is probably made of wheat flour, water and oil. Make a table of food items with their ingredients on the basis of the information collected above.

You can see that we eat different types of food.

After you complete the table in activity 1.2, you will see that the ingredients of our food which we eat come from plants as well

as animals. For example, the chapattis we eat, are made up of wheat flour (a plant product). Food items like milk, eggs, meat, chicken, fish, prawn, etc., come from animals.

ACTIVITY 1.3

In the same group that was formed for Activity 1.2, discuss what was eaten for lunch by each student the day before. List the food items and their ingredients in the table as given below. List out the ingredients that come from plants and those which come from animals, and write them down.

Name of food item	Ingredients	Sources
Kheer	Milk	Animal
	Rice	Plant
	Sugar	Plant
_____	_____	_____

1.2.1 Plant Parts as Food

The staple foods of most of our people are cereals. Cereals come from the word 'Ceres' the 'Roman goddess of agriculture, grain, crops, fertility and motherly relationship'.

Different parts of plants are consumed as food. These are —

- (a) **Roots** : Beetroot, sweet potato, radish and carrot are roots, which we use as our food items.



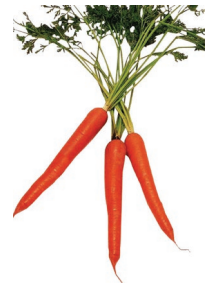
Beetroot



Sweet potato



Radish



Carrot

(b) **Stems** : Stems of some plants are eaten as food items. Asparagus stalks, celery, potato, etc., are

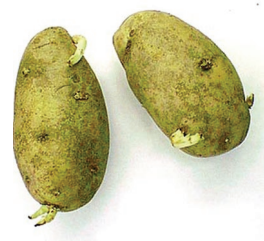
examples of such stems which are used as food.



Asparagus



Celery



Potato

Ginger, turmeric and potato tuber are not the parts of root. They are actually modified stems.

(c) **Leaves** : The leaves of some plants are eaten as vegetables. The leafy vegetables such as spinach, fenugreek (methi), lettuce, cabbage, spring

onion, etc., are rich in minerals and vitamins. Tea, a beverage is prepared from tea leaves.



Cabbage



Spinach



Lettuce



Spring onion

(d) **Flowers** : Some flowers or inflorescence such as cauliflower, broccoli, etc., are eaten as vegetables and raw

salad. Clove is a floral bud which is used as a spice.



Cauliflower



Broccoli



Clove

SCIENCE BITS!

- Excessive intake of tea and coffee when the stomach is empty, may harm our health. Theophyllin in tea and caffeine in coffee, act as a stimulant.
- Turmeric has some substances that can protect us from cancer.
- Sugar beet, a type of beet root, is grown commercially for obtaining sugar.

(e) **Fruits** : A flower after pollination, converts into a sweet and fleshy edible structure, called fruit. Mango,

banana, guava, berry, apple, water-melon, etc., are some examples of fruits.



Guava



Mango



Apple

(f) **Seeds** : Wheat and rice are nothing but seeds, which we use as our main food. Oil is obtained from

seeds of mustard, peanuts, neem, coconut, sunflower, etc.



Wheat



Mustard seeds



Coconut

SCIENCE BITS!

There are some plants of which two or more parts are used as food. A few of them are :-

- Banana



- Fruit, floral part (vegetable)



and stem.



- Mustard



- Leaves



and seeds.



- Coriander



- Leaves



and seeds.



- Fenugreek



- Leaves



and seeds.



ACTIVITY 1.4

Make a list of any five food items that you like to eat and name their sources as well as mention the plant part from where you get them (one is done for you):

Food items	Plant part from which you get them
Potato curry	Potato (stem), Chillies (fruit), Oil (seeds)

CAUTION! Do not try to eat unknown plants. Some plants could be poisonous.

Sprouted seeds of some pulses are also good source of energy.

ACTIVITY 1.5

Aim : To prepare sprouts.

Requirements : Dry seeds of moong and chana (black gram), water, cotton cloth.

Method : Take a handful of each of moong and chana in two separate large bowls. Fill the bowls with water and leave them overnight. Next day, drain out the water and leave the wet seeds, cover them with cotton cloths and observe after 18-24 hours.

Observation : You will observe small white structures grown out of each seed. The seeds have sprouted. These sprouted seeds can be used as a food item. These are rich sources of protein and roughage.



Sprouted chana



Sprouted moong

CHECK YOUR KNOWLEDGE-2

True or False :

- (a) Stem of sweet potato is used as food.
- (b) Sugar is obtained from animals.
- (c) Fruit is a sweet and fleshy edible structure.
- (d) Tea is a beverage prepared from tea fruits.
- (e) Pumpkin and broccoli flowers are eaten as vegetables.

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1.2.2 Animal Products as Food

Animals have been classified on the basis of the product they yield as food for human beings.

- (a) **Milk :** Cows and buffaloes come at the top of the list of milk yielding animals. Goat, camel, etc., are also domesticated for the same purpose.

Buffalo's milk is generally used for producing various milk products.

- (b) **Meat :** Meat of animals such as goat, chicken and fish is eaten by human beings.
- (c) **Eggs :** The poultry birds provide both meat as well as eggs. Hen, duck, turkey, etc., are some poultry birds.

SCIENCE BITS!

- The animals which produce milk are called milch animals for example cow, buffalo, goat, etc.
- 30.44 percent of world cattle population lives in India. But, you will be amazed to know that they yield only about 9.5% of the total milk produced in the world.
- In Rajasthan the people use camel's milk.
- In hilly areas, the people use reindeer's and yak's milk.

(d) **Marine food** : A large number of people, especially living in coastal regions fully depend on fish as their main food source. Prawns, shrimps

and crabs also add to marine food sources apart from a large number of fishes found in the seas and rivers.

Different Food items and their Sources

Food Items	Sources (Animals)
Milk	Cow and buffalo
Egg	Hen
Meat	Fish and goat
Sea food	Prawn, Shrimp, Crab
Honey	Honeybee

Rearing and management of fish on large scale is called **pisciculture**.

(e) Food can be obtained even from **insects**. Honeybee is an example of such insects which collects nectar from the flower and converts it into honey. Honey is used as food,

as medicine and for nourishment. It is also used as an antiseptic. **Apiculture** is a process of rearing of honeybees at large scale.

Whatever we eat comes either from the plants or from the animals.

CHECK YOUR KNOWLEDGE-3

Match the following :

Food items	Animal sources
1. Meat	(a) Bees
2. Egg	(b) Cow
3. Sea food	(c) Hen
4. Milk	(d) Goat
5. Honey	(e) Prawn

1.3 FOOD-HABITS OF ANIMALS

Plants and animals have different ways of getting food. Animals cannot produce their own food. They directly or indirectly depend on plants for their food.

Green plants prepare (produce) their own food with the help of air, water, chlorophyll and sunlight. They are known as **producers**.

Animals depend on plants for their food. Therefore, they are called **consumers**.

If you observe carefully, you will notice that different animals have different **feeding habits**. They eat different kinds of food. Their body parts are adapted to the kind of food they eat.



Herbivorous animals

(b) **Carnivores** : The animals who eat the flesh of other animals are called carnivores. Lion, tiger, wolf, snake, eagle, and vulture, etc. are examples of carnivores. They have



Carnivorous animals

(c) **Omnivores** : The animals which eat both plants and animals are called omnivorous animals. Cockroach, human being, crow, bear, dog, etc., are omnivorous animals.



Omnivorous animals

Based on their feeding habits, animals are divided into three groups:

- (a) Herbivores, (b) Carnivores, and (c) Omnivores.

(a) **Herbivores** : Plant eating animals are called herbivores. Buffalo, cow, goat, deer and horse are some herbivorous animals. They have sharp cutting teeth in front and flat grinding teeth at the back.

Herbi – Plant; vore – eater

The world's largest herbivore is the African elephant.

sharp canines for tearing flesh.

Carni – meat; vore – eater

Birds such as eagles and vultures have sharp pointed beaks for tearing flesh.

Omni — all; vore — eater

Since omnivores eat both plants and animals, their teeth are modified accordingly. They have four different kinds of teeth :



Incisor (to cut food), premolar and molar (to grind food) and canine (to tear food). These types of dentition allow omnivores to eat both plants and animals.

- ❖ Some carnivores and omnivores are known as **scavengers**, because they mainly consume decaying bodies of animals and help to keep the environment clean. Examples : Crow, jackal, vulture, etc. They are also called natural sweepers of the environment.

- ❖ There are certain microorganisms and other living things in nature that feed on dead and decaying plants and animals. **Fungi** and **bacteria** are examples of such organisms. These organisms are called **decomposers**. They return the nutrients back to the environment.

Parasites : These are small animals who live on the body of other living animals and plants, and obtain their food. For e.g., tapeworms live in our stomach and suck blood from our body.

ACTIVITY 1.6

Look at the following list of animals and write the type of food the animals (listed) eat and also mention whether they are **herbivores, carnivores or omnivores**.

Animals — Cat, Buffalo, Crow, Rat, House lizard, Lion, Spider, Butterfly, Cow, Human being, Tiger.

CHECK YOUR KNOWLEDGE-4

Fill in the blanks :

- (a) The world's largest herbivore is _____.
- (b) The carnivores have sharp _____ for tearing flesh.
- (c) Omnivores eat both _____ and _____.
- (d) _____ and _____ are decomposers.
- (e) Crow and vulture are _____.

KEYWORDS

- ◆ **Ingredients** : The materials which are used in the preparation of a particular dish.
- ◆ **Nectar** : A sweet liquid, produced by flowers and collected by bees and other insects.
- ◆ **Herbivore** : An animal that eats only plants or plant products.
- ◆ **Pisciculture** : Rearing and management of fish on large scale.
- ◆ **Carnivore** : An animal that eats only other animals.
- ◆ **Omnivore** : An animal that eats both plants and animals.
- ◆ **Scavenger** : Animal that eat only dead animals.
- ◆ **Decomposers** : The living organisms that feed on dead and decaying plants and animals.

- ◆ **Parasites** : The small animals which live on other animal's body for their food.
- ◆ **Apiculture** : The rearing of honeybees in large scale.

SUMMARY

- ❖ Food provides us energy, helps in the growth and replacement of worn-out cells of the body and protect them from diseases.
- ❖ Each food item is made of different food materials (ingredients).
- ❖ A balanced diet is very essential for a good health.
- ❖ Different food ingredients come from plants as well as animals.
- ❖ Different parts of plants like roots, stems, leaves, flowers, fruits and seeds are eaten as food.
- ❖ Sprouted seeds of some pulses are good source of energy.
- ❖ Milk, meat, eggs, honey, etc., are animal products.
- ❖ Honey is used as food, medicine and for nourishment.
- ❖ Green plants prepare their own food and are known as producers.
- ❖ Animals directly or indirectly depend on plants for their food.
- ❖ Based on their feeding habits, animals are divided into three groups : (a) Herbivores, (b) Carnivores and (c) Omnivores.
- ❖ Some carnivores and omnivores are known as scavengers.
- ❖ Fungi and bacteria are decomposers.

EXERCISES

A. Multiple Choice Questions :

Select the correct option

1. The carnivores have

a. sharp teeth	b. claws	c. both (a) and (b)	d. only broad teeth
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2. Human beings are

a. herbivores	b. carnivores	c. scavengers	d. omnivores
---------------	---------------	---------------	--------------
3. Premolars and molars are the kind of teeth to

a. cut food	b. grind food	c. tear food	d. none of these
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4. When we eat a carrot, we eat _____ part of a plant.

a. stem	b. leaf	c. root	d. all of these
---------	---------	---------	-----------------
5. Fungi and bacteria are called

a. omnivores	b. herbivores	c. decomposers	d. scavengers
--------------	---------------	----------------	---------------
6. Vultures belong to a special class of carnivores called

a. scavengers	b. decomposers	c. omnivores	d. none of these
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B. Fill in the blanks :

1. Turnip is the _____ of a plant.
2. The green plants produce food, so they are called _____.
3. Two main sources of our food are _____ and _____.

4. Tiger is a _____ because it eats only meat.
5. Deer eats only plant products so, it is called a _____.
6. The _____ that we drink comes from cows, buffaloes and goats.

C. Match the items of Column A with those of Column B :

Column A	Column B
1. Bacteria	a. Scavenger
2. Tiger	b. Herbivore
3. Human being	c. Carnivore
4. Vulture	d. Omnivore
5. Goat	e. Decomposers

D. State True (T) or False (F) against the following statements :

1. Lion and tiger eat other animals.
2. Milk, curd, paneer and ghee are all animal products.
3. Animals which eat both plants as well as other animals are called carnivores.
4. Green plants prepare their own food so they are known as producers.
5. The animals that depend on other living beings for their food are called scavengers.
6. Herbivores depend on other living animals for their food.

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E. Encircle the odd-one out :

1. Spinach, Lettuce, Cabbage, Apple.
2. Cereals, Pulses, Black pepper, Eggs.
3. Butter, Cheese, Honey, Ice cream.
4. Cow, Deer, Elephant, Dog.
5. Turnip, Arbi, Potato, Onion.

F. Differentiate between the following :

1. Carnivores and herbivores.
2. Scavengers and decomposers.
3. Apiculture and pisciculture.

G. Short-answer type questions :

1. Name five plants and their parts that we eat.
2. Name any two root-vegetables.
3. Name any two animal products that serve as sources of food for human beings.
4. Define pisciculture?
5. Identify whether the given animals are herbivores, carnivores or omnivores :-

(a)



(b)



(c)



(d)



H. Long-answer type questions :

1. Why do we need food? Do all the living things need food?
2. What do you understand by carnivores? Give two examples.
3. Why do we call green plants as producers? How are the producers different from herbivores?

I. HOTS questions

1. The food items eaten in one state often differ from the food items eaten in other states. Why?
2. Snakes have no limbs still then they move very fast. How?

J. Value based questions :

Seema went to a party. People were enjoying different food items and also left a large quantity of food uneaten in their plates. She herself took only that much food which she could eat. The left over food was thrown in waste bins kept outside. Some small poor children were taking out the food from the waste bins and eating them.

Answer the following questions based on above information :

- (a) Why did Seema take only that much food in her plate which she could eat?
- (b) Why do people leave food uneaten?
- (c) What is the message which Seema's action gives to the people in general?

PROJECT IDEAS

1. Name 10 plants that are grown by a farmer in fields and which are eaten by us as food.
2. Make a list of everything you have eaten in a particular week. Record the information related to each food item in a table.

ACTIVITIES TO PONDER AND ACT

(Life Skill and Value Development)

1. Take a physical map of India and mark various regions. Prepare a statewise list of the main food items eaten by people. Paste the list or pictures on the respective states on the map.

Objective : To increase the knowledge related to various food items eaten by people of India.

Skill and Value Development : To increase knowledge about various food items, positive attitude towards India and its various food items.

2. Poverty, unemployment and overpopulation are the order of the day in India. The poor people are not able to provide sufficient food to their families, which causes several deficiency diseases. In India food problem can be overcome by growing more cereal, avoiding wastage of food, eradicating poverty and unemployment, and controlling human population. Make a list of kind of wastage of food from storage to cooking.

Also, find out how wastage of food can be avoided.

Objective : To increase awareness related to wastage of food.

Skill and Value Development : Positive attitude towards nation, survey and collection of data and empathy towards lower sections of society.

FOR THE TEACHER

1. The teacher needs to discuss about the various kinds of food culture of different regions or states of India with the help of map.
2. Students can be asked to make a list of various kinds of foodstuff and to name the plant and the plant parts or animal from which each of them is obtained.
3. The teacher can organise a group discussion on “How can we stop or minimise the wastage of food”?

IN THE LABORATORY

To prepare sprouts

Materials Required : Dry seeds of *moong* and *chana* (black gram), water, cotton cloth.

Procedure : Take a handful of each of *moong* and *chana* in two separate large bowls. Fill the bowls with water and leave them overnight. Next day, drain out water and leave the wet seeds, cover them with cotton cloths and observe after 18-24 hours note down your observations.





2



Components of Food

Learning Objectives

At the end of this chapter, students will be able to understand :

- Why do we need food? ● What does food contain to make our body healthy? ● What are the various kinds of components of food? ● What are the roles of these components? ● What are the sources of these components? ● What is a balanced diet? How does it keep us healthy?
- What happens when your food is deficient in one of these nutrients?

We discussed in the previous chapter that food provides us energy to work and play, it helps us to grow and also enable us to fight against diseases and repair wounds. Do you think, all types of food perform all these functions for us? Have you ever wondered what is 'inside' the food that does so many wonderful things for us?

2.1 VARIOUS COMPONENTS OF FOOD

Food contains special components called nutrients.

Every time we eat a kind of food, certain types of nutrients enter our body. These

nutrients can be categorised into the following classes :

- ❖ Carbohydrates, ❖ fats, ❖ proteins,
- ❖ vitamins, ❖ minerals, ❖ water, and
- ❖ roughage.

Different food contains different nutrients. All the nutrients cannot be present in one kind of food.

2.1.1 Carbohydrates

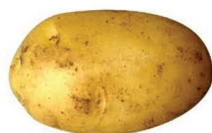
A car or any vehicle requires fuel to run, likewise carbohydrates are most essentially needed by our body. Carbohydrates are easily digestible. They provide energy to our body so that we are able to perform various

activities. Carbohydrates are called energy-giving food. They are the primary source of energy.

Sugar and **starch** are two major types of carbohydrates in our food.

Source : Sugar is present in fruits (apple, orange, mango, etc.), milk, honey and sugarcane. Starch is present in potato, rice, wheat, etc.

Corn or maize is also a starch-rich cereal. The excess amount of sugar in our blood results into a disease called diabetes. India is called the capital of diabetes patients.



Potato



Apple



Sugar



Honey



Rice

SOURCES OF CARBOHYDRATES

SCIENCE BITS!

- **Glucose** is a simple carbohydrate which directly enters into the blood and produces energy through respiration. It is an instant source of energy.
- **Fructose** is also a simple carbohydrate, found in the fruits.
- **Sucrose** is table sugar which we use in our home. It is made up of **glucose** and **fructose**.
- **Lactose** is found in milk.
- **Maltose** is found in wheat.
- Sucrose, lactose and maltose are disaccharides while glucose and fructose are monosaccharides.

ACTIVITY 2.1

Aim : To test the starch.

Requirements : A small quantity of a food-item (bread or potato) and dilute iodine solution.

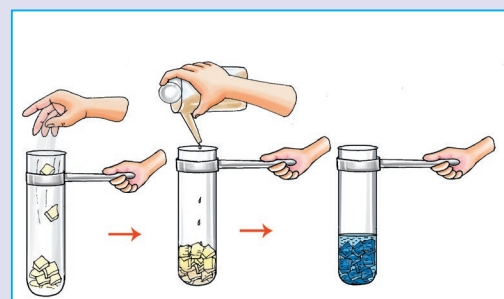
Preparation of Iodine solution : Add a few drops of tincture iodine to a test-tube half filled with water.

Procedure :

- Take a small quantity of food-items or raw ingredients such as potato slices or bread slices.
- Put 2-3 drops of dilute iodine solution on it.

Observation :

- Observe if there is any change in the colour of food item.
- If it turns blue-black this indicates that it contains starch.
- This test can be repeated with other food items also. If again the colour changes that took place is blue-black, the food-item contains starch.
- If there is no such colour change, then the food item does not contain starch.



2.1.2 Proteins

About 1/5th of our body is made up of proteins. Proteins are complex organic compounds, made up of carbon, hydrogen,

oxygen, nitrogen and sulphur. They help in body growth, tissue repair, digestion, etc. Proteins make new cells, replace old and damaged cells. Proteins are the most

essential for growing children, old and sick people. Hence, proteins are known as **body-building foods**. In addition to carbohydrate, proteins also give us energy only in the absence of carbohydrates and fats. So, it is also known as **tertiary source of energy**. We get proteins from the animals as well as from the plants.

Sources of Protein :

Animal sources : Meat, egg, fish, milk, cheese, etc.

Plant sources : Peanuts, soyabeans, peas, barley, wheat, corn, pulses, dry fruits, etc.



Butter



Fish



Milk

ANIMAL SOURCES OF PROTEIN



Coconut



Peanuts



Almonds

PLANT SOURCES OF PROTEIN

SCIENCE BITS!

Proteins in our body are made up of 20 different standard amino acids. Out of 20 amino acids, 10 are essential amino acids, while 10 are non-essential amino acids. Aloe vera and lady's finger contain all 20 standard amino acid. Silk obtained from the silkworms is also a protein.

ACTIVITY 2.2

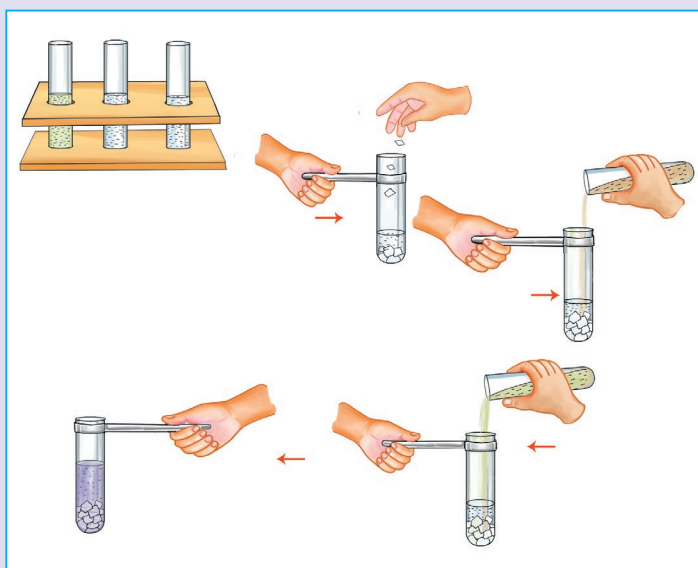
Aim : To test the protein.

Requirements :

- Small quantity of food item, such as egg white.
- Test tubes
- Water
- Copper sulphate solution
- Caustic soda solution

Procedure :

- Prepare copper sulphate solution by dissolving 2 gm of copper sulphate in 100 ml of water.
- Prepare caustic soda solution by dissolving 10 gm of caustic soda in 100 ml of water.
- Take a small quantity of food item to be tested for the presence of protein.
- Put it in a test-tube and add 10 drops of water to it.
- Shake it well.
- Put two drops of copper sulphate solution to it and put ten drops of caustic soda solution to the test-tube. Shake the test-tube well and allow the test-tube stand for a few minutes.
- If violet colour change takes place, it indicates the presence of proteins in the food item.
- Repeat the above-mentioned procedures in case of different food items.



2.1.3 Fats

Fats are also energy giving food. They provide more energy as compared to carbohydrates. Sometimes when we are short of carbohydrates, our body uses the fat stored under the skin of our body to maintain the supply of energy. That is why fats are called the **secondary source of energy**. This stored fat also keeps our body warm and acts as insulator. Eating too much fat-rich food is not good for us as it leads to obesity. This makes our blood vessels narrower which

causes high blood pressure and the problems related to heart.

Sources of fat : Fats can be obtained from both the plants and animals.

Plant sources : Groundnut oil, sunflower oil, mustard oil, coconut oil, other vegetable oils, almonds, cashewnuts, etc., are some good sources of fats.

Animal Sources : Meat, fish, egg, milk, butter, cheese, cream, ghee, etc., are good sources of animal fats.

ACTIVITY 2.3

Aim : To test the fats.

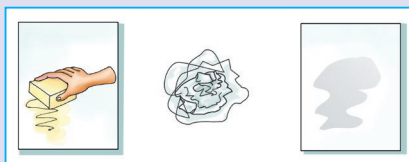
Requirements : • A small quantity of a food-item such as butter, almonds, etc. • A piece of paper.

Procedure :

- Take a small bit of food-item.
- Wrap the food-item in a piece of paper and with the help of a crusher, crush the food-item.

Observation :

- Now, straighten the paper and observe it carefully.
- If there is an oily patch on the paper, it is due to the fat present in the food-item.
- Try to put the paper with oily patch towards a lighted bulb.
- If you can see the light faintly, the food item contains fat.
- In case there is no oily patch present after crushing the food item, the food item contains no fat in it.



CHECK YOUR KNOWLEDGE-1

Fill in the blanks :



















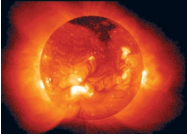








- A special component present in the food is called a _____.
- Energy-giving foods are _____ and _____.
- _____ are the primary source of energy.
- Fats are the _____ source of energy.
- Potato is the rich source of _____.
- _____ is the most essential for growing children.

2.1.4 Vitamins

Vitamins are complex organic compounds called the **protective foods**, because they help in protecting our body against diseases. These are very essential for our body but are required in less quantity. They are essential for the normal functioning of our body. They

keep our skin, teeth, nervous system, bones, digestive system, etc., healthy. Most of the vitamins are supplied through foods although some are produced by the body. These are absorbed into the blood stream and excess amount is thrown out of the body. Vitamins are of two types on the basis of their solubility.

Sources and Functions of different Vitamins

Vitamins	Sources	Functions
A	 Spinach  Mango  Carrot  Papaya  Milk	Helps to maintain the normal night vision and promotes the growth.
B	 Peas  Milk  Banana  Grains  Beans	Improves growth, lactation during pregnancy and formation of healthy blood.
C	 Amla  Lemon  Orange  Tomato  Guava	Keeps our teeth and gums healthy and prevents scurvy (disease of gums).
D	 Milk  Butter  Egg  Sunlight	Helps in normal growth of bones and teeth.
E	 Spinach  Tomato  Butter  Sprouted moong	Maintains the normal reproductive life.
K	 Cauliflower  Cabbage  Tomato  Egg	Helps in clotting of blood during any injury.

(a) **Fat-soluble Vitamins** : Those vitamins soluble in oil or fats are called **fat-soluble vitamins**, such as vitamin A, D, E and K.

vitamin B₁, B₂, B₄, B₆, B₉ (folic acid), B₁₂ (together known as vitamin B-complex) and vitamin C.

(b) **Water-soluble Vitamins** : Those vitamins soluble in water are called **water soluble vitamins**, such as

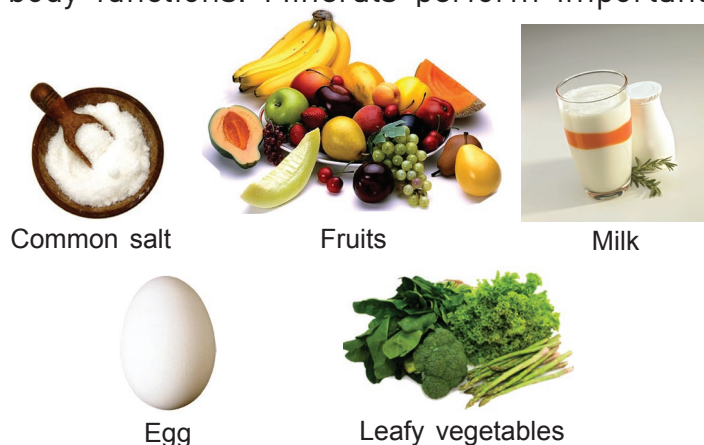
Sources : Milk, fruits, citrus fruits, (Amla, lemon, orange), raw vegetables, fish, meat, cereals, etc. Our body prepares vitamin D in the presence of sunlight.

Casimir Funk : He was a Polish scientist, who for the first time introduced Vitamins to the world. He isolated a substance from brown rice, which was instrumental in checking a disease called beriberi. He named this substance of brown rice, vitamin.



2.1.5 Minerals and salts

These are chemical compounds required for growth as well as for carrying out certain body functions. Minerals perform important



functions such as strengthening of the bones and maintaining a normal heartbeat.

For maintaining healthy bones and teeth, we require calcium and phosphorus. Some other minerals are magnesium, iron, iodine, zinc, copper, fluorine, sodium, potassium, etc.

Sources : These are present in leafy vegetables like spinach, pulses, eggs, milk, fruits, common salt, millets, nuts, etc.

2.1.6 Water

70% of human body weight is made up of water. Water is present in body-cells. Water sustains life processes.

Water is required for removal of waste products, transport of materials within the body and to maintain constant body temperature.

We require 6-10 glasses of water everyday to keep ourselves healthy.

It acts as solvent in which all chemical reactions take place. We also get fluorine from the water.

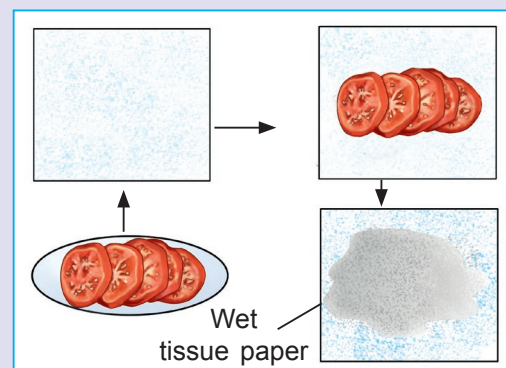
ACTIVITY 2.4

Aim : To show that most of the vegetables and fruits contain water.

Requirements : Knife, tomato, orange, cucumber, potato and tissue papers.

Procedure : Take a fruit and cut it into small pieces. Now keep these pieces in a tissue paper. Repeat the process in each vegetable and fruit.

Observation : You will observe that all the tissue papers with the pieces of fruit and vegetable become wet. It proves the presence of water in the fruits and vegetables.



2.1.7 Fibre (Roughage)

Apart from the above-mentioned nutrients, we get from our food, we need to have some more essential components in our food, which is dietary fibres.

The dietary fibrous content of our food, is called roughage; which prevents constipation. Without roughage, food cannot be digested by

our body. It passes down the entire digestive tract, helps in preventing constipation and ensures proper bowel movement. Not only this, many doctors believe that a high-fibre diet reduces the risk of heart diseases and bowel cancer.

Sources : Salad, fruits, corn, skinned grains, raw vegetables, etc.

CHECK YOUR KNOWLEDGE-2

Match the Following :

Nutrients	Sources
(a) Vitamin A	(i) Butter
(b) Vitamin B	(ii) Milk
(c) Vitamin C	(iii) Papaya
(d) Vitamin D	(iv) Grains
(e) Vitamin E	(v) Guava

2.2 A BALANCED DIET

To keep healthy, one needs all the nutrients in optimum quantity. Only one kind of food cannot provide all the nutrients. If we eat only junk food such as burgers and cold drinks then very surely, we may get fats and sugar but not other nutrients. This can lead to obesity and diabetes or heart problems.

“A diet that contains all the essential nutrients in correct proportion required for our body is known as balanced diet.”

A balanced diet should contain the following :

- (a) **Energy giving food** : The food which is rich in carbohydrates and fats, provides energy to our body.
 - (b) **Body-building food** : Proteins contained in our food helps our body to grow.
 - (c) **Protective food** : Certain foods which contain **vitamins** and **minerals** provide protection to our body against **diseases**.
- Have you compared the amount of food eaten by you and your parents? Who consumes larger quantity of food?

- Think about the kind of diet the new born babies have. They take only milk.

- Why do these differences in diet exist?

A balanced diet is not the same for everyone. It depends on climate, age, sex, health and the type or nature of work that one does.

- A hardworking labourer needs more energy which he can get by eating more fats and carbohydrates.
- A child grows very rapidly. For this reason, he needs more and more proteins in his diet.
- A person doing a table work needs less energy than a labourer.
- A person recovering from long illness needs more protein-rich food.
- A nursing mother and a pregnant woman also need more protein-rich food to serve the needs of the growing baby.
- Besides human beings, all other animals also need balanced diet for their proper growth.

A Balanced diet for a School going Child

Foodstuffs	Quantity (vegetarians)	Quantity (non-vegetarians)
Milk	250 g	250 g
Fruits	50 g	50 g
Green leafy vegetables	75 g	100 g
Other vegetables	75 g	75 g
Pulses	70 g	60 g
Cereals	320 g (rice 160 g, wheat 160 g)	320 g (rice 160 g, wheat 160 g)
Sugar or Jaggery (<i>Gud</i>)	50 g	35 g
Fat	35 g	35 g
Meat, fish or egg	—	30 g or 1 egg

2.2.1 Disorder in diet

(a) Obesity : Carbohydrate is a very essential nutrient. But, eating too much of it may lead to ill-health. Most of the carbohydrates are converted into fat and get deposited in the body. People become overweight and this condition of the body is

called obesity. They never remain active and generally suffer from heart problems.

(b) Malnutrition : While it is important to take food rich in various nutrients, you must also be aware that lack of certain types of foods can cause some disorder, called **malnutrition**.

2.3 DEFICIENCY DISEASES

“Diseases that are caused due to the lack of carbohydrates, proteins, vitamins or minerals in the diet are called deficiency diseases.”

Deficiency Diseases and their Symptoms

S. No.	Lack of Food Components	Deficiency diseases	Symptoms of the disease
1.	Carbohydrates	Marasmus	The growth is stopped. Body is very thin and weak. Loss of energy and stamina.
2.	Proteins	Kwashiorkor	Swollen stomach, thin legs and ugly patched skin.
3.	Fats	Marasmus	Itchy, fatigue and dry skin. Joint pain, depression and inability to concentrate.
4.	Vitamin A	Night Blindness	Dryness of eyes, improper vision, eye infection, etc.
5.	Vitamin B	Beriberi	Loss of appetite, heart abnormalities, pale skin, irritation of eyes, frequent headache, etc.

6.	Vitamin C	Scurvy	Bleeding gums, poor appetite and skin disorder.
7.	Vitamin D	Rickets	Soft bones, pigeon chest, knock-knees and bow-legs.
8.	Vitamin E	Reproductive disorders	Damaged skin, premature aging and lung problems.
9.	Vitamin K	Haemorrhage	Excessive bleeding from any injury.
10.	Iron	Anaemia	A person looks pale and tired. Loss of appetite.
11.	Iodine	Goitre	Enlarged thyroid gland in the neck.
12.	Calcium	Rickets	Soft and bent bones, loss of teeth enamel, etc.
13.	Phosphorus	Decay of tooth and erosion of bones	Weak bones and teeth.
14.	Sodium	Tiredness	Muscle cramps
15.	Potassium	Paralysis	Weak muscles of the body.
16.	Fluorine	Tooth decay	Weakness of teeth and gums.
17.	Chlorine	Pyorrhoea	Problems related to digestion and heart activity.

2.4 HOW TO MAINTAIN THE FOOD QUALITY

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

Almost all types of foods are processed in some way before they are eaten.

Advantages of cooking : Food is cooked to make it easy to eat, digest and to kill germs.

Disadvantages of cooking : Although cooking is useful but at the same time it is disadvantageous as well in the following ways :

- (a) Cooking results in the loss of certain nutrients. Many useful proteins and minerals are lost if

excess water is used during cooking and is then thrown away.

- (b) Vitamin C gets easily destroyed by heat during cooking.
- (c) Some of the important nutrients such as ascorbic acid and folic acid which are susceptible to oxidation are readily oxidised by brisk cooking.
- (d) Minerals are also affected by high temperature.
- (e) In some cases, flavour may be lost by brisk cooking.
- (f) Excessive cooking may also cause an adverse effect on the digestibility of the vegetables.

CHECK YOUR KNOWLEDGE-3

Name the following :

- (a) A diet that contains all the essential nutrients in correct proportion. _____
- (b) A vitamin required for maintaining good eye sight. _____
- (c) A disease in which thyroid gland get enlarge. _____
- (d) Haemorrhage due to lack of this vitamin. _____
- (e) Calcium deficiency disease. _____

KEYWORDS

- ◆ **Nutrients** : Different food items contain some components or chemicals that are very essential for our body.
- ◆ **Roughage** : It is also known as dietary fibre which helps our body get rid of undigested food.
- ◆ **Balanced diet** : A diet that contains the proper amounts of each nutrient.
- ◆ **Deficiency diseases** : Deficiency caused by lack of vitamins and other nutrients.
- ◆ **Marasmus** : A disease caused by deficiency of carbohydrates and fats.
- ◆ **Kwashiorkor** : A disease caused by the deficiency of proteins.
- ◆ **Obesity** : The condition of body in which people become over-weight.
- ◆ **Malnutrition** : The condition of body due to lack of various nutrients.

SUMMARY

- ❖ Carbohydrates, fats, proteins, vitamins, minerals, water and roughage are various components of food.
- ❖ Carbohydrates and fats are called **energy giving foods**.
- ❖ The excess sugar in our blood results into a disease called diabetes.
- ❖ Proteins are known as **body-building foods**. It is the **tertiary source of energy**.
- ❖ Vitamin B-complex and vitamin C are water-soluble vitamins.
- ❖ Vitamins and minerals are essential for normal functioning of our body. These are called protective food.
- ❖ Vitamin A, D, E and K are fat-soluble vitamins.
- ❖ Water makes up about 70% of our body weight. It plays a very vital role in the body's system.
- ❖ Our diet must contains adequate and right proportion of all food components.
- ❖ Deficiency of protein can cause **kwashiorkor disease** and deficiency of fats and carbohydrates causes **marasmus** disease in children.
- ❖ Night blindness, beri-beri, anaemia, scurvy and rickets are the vitamin-deficiency diseases.
- ❖ Rickets, goitre and osteoporosis are the mineral-deficiency diseases.

EXERCISES

A. Multiple Choice Questions :

Select the correct option

1. The vitamin required for healthy bones and teeth is
 a. vitamin A b. vitamin B c. vitamin C d. vitamin D
2. Marasmus and kwashiorkor are caused due to the deficiency of
 a. minerals b. vitamins
 c. proteins d. carbohydrates and proteins
3. Vitamin D deficiency leads to
 a. beri beri b. scurvy c. rickets d. anaemia
4. The water soluble vitamin is
 a. vitamin A b. vitamin C c. vitamin E d. vitamin K
5. What is caused by the deficiency of water in the body?
 a. Osteoporosis b. Dehydration c. Goitre d. Anaemia
6. Deficiency of which mineral causes goitre?
 a. Sodium b. Iron c. Potassium d. Iodine
7. Deficiency of iron causes
 a. anaemia b. goitre c. rickets d. beri beri
8. Which of these is the quickest source of energy?
 a. Sugars b. Starch c. Proteins d. Fats

B. Fill in the blanks :

1. Starch is a type of _____.
2. Soyabeans are rich in _____.
3. Carrots are rich in vitamin _____.

C. State True (T) or False (F) against each of the following statements :

1. A mineral that is required for healthy teeth is calcium.
2. Anaemia is caused due to the deficiency of phosphorus in the blood.
3. Food processing may not alter quality of food.
4. Roughage helps to prevent constipation.
5. The fibre content of food is called proteins.

☐
☐
☐
☐
☐

D. Match the items of Column A with those of Column B :

Column A	Column B
1. Vitamin needed for healthy bones	(a) Carbohydrates
2. Deficiency of a vitamin which causes scurvy	(b) Proteins
3. The nutrient found in maize, sugar and potato	(c) Vitamin A
4. The nutrient found in green leafy vegetables and fruits	(d) Vitamin D
5. Body-building nutrients	(e) Vitamin C

E. Differentiate between the following (give at least 3 differences) :

1. Carbohydrates and fats
2. Fat-soluble and water-soluble vitamins

F. Give reason :

1. Roughage is a very essential component of the diet.
2. A hard-working labourer needs more fats and carbohydrates than those who are working in the office.

G. Short-answer type questions :

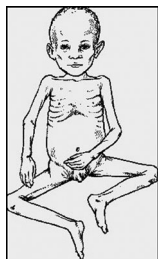
1. Which minerals are vital for bones and teeth?
2. Give two examples each of water-soluble and fat-soluble vitamins.
3. What are deficiency diseases? Give two examples.
4. Mention the benefits of cooking the food.
5. Mention any three disadvantages of cooking.

H. Long-answer type questions :

1. Eating carbohydrates is very essential, but its too much consumption causes obesity. Why?
2. Although vitamins and minerals are protective foods, but they are required in small quantities. Why?
3. What would happen if the diet of a child provides enough calories but is deficient in proteins?

I. 1. Label the child suffering from kwashiorkor, healthy child and a child suffering from marasmus disease.

(a)



(b)



(c)



2. Which of the components of food are present in the pictures given below :



(a)



(b)



(c)



(d)



(e)



(f)



(g)



(h)



(i)

J. HOTS Question :

Rajesh has been diagnosed with obesity and anaemia. He is advised by the doctor to avoid fats and increase iron content in his diet. Rajesh needs to test for these food components before consuming.

Can you help him in testing the following food products :

- (a) Apple (b) Milk (c) Spinach (d) Banana (e) Almonds (f) Peanuts

(Hints : Iron-rich food products turn black when exposed to air.)

K. Value based questions :

Harsh once went to a poor family having two children. He saw that both the children had protruding belly, swollen legs, and were underweight. He advised their parents to give children enough milk, pulses and eggs.

Answer the following questions based on the above information :

- Deficiency of which food item in the diet was responsible for the symptoms which Harsh observed?
- Which values are displayed by Harsh in taking this initiative?
- How can you contribute in the prevention for deficiency diseases at the community level?

PROJECT IDEAS

- With the help of your teacher and parent, find the calorific and nutrient value of the food your family consume and at the same time find the same for the food taken by a Punjabi and a Madras family. Draw conclusion, what kind of nutrients do Punjabi family and Madras family ignore?
- Prepare a list of daily diet of the people of your colony and find out the daily dosage of nutrients, they take in excess and lack of nutrients. Also find out the problem related to nutrient deficiency.

ACTIVITIES TO PONDER AND ACT

(Life Skill and Value Development)

- Make a list of food items which you ate yesterday as a breakfast, lunch and dinner. Find out which component of food was present in each item. Analyse if you had taken balanced diet or not.
If your diet is not balanced then how it should be modified to make it balanced diet.
Objective : To increase the awareness related to balanced diet.
Skill and Value Development : Curiosity towards healthy life, sensitivity towards balanced diet and thinking skills.
- A number of various nutritional disorders may arise depending on the nutrient deficiency in the diet. It also increases the risk of infections by affecting the immune system of the body.
Make a chart on vitamins, minerals and their deficiency diseases.
And also suggest a balanced diet for your age group children to avoid deficiency diseases.
Objective : To increase awareness related to deficiency diseases and their effects of human body.
Skill and Value Development : Sharing habits, love towards people of society, survey and collection of data.

FOR THE TEACHER

- A class discussion can be organised by the teacher on the malnutrition with the examples of the people suffered from malnutrition in certain parts of our country or any other country.
- A documentary movie could be shown to the students that must be related to children suffering from deficiency diseases.

IN THE LABORATORY

To test the starch present in a potato.

Materials Required : A small quantity of potato and dilute iodine solution.

Procedure : Take a small quantity of potato slices and put 2-3 drops of dilute iodine solution on it. Note down your observations.



3



Fibre to Fabric

Learning Objectives

At the end of this chapter, students will be able to understand :

- Variety of fabrics.
- Different types of plant fibres.
- Different types of animal fibres
- What is spinning?
- How is a yarn made into a fabric?
- History of clothing material.

Do you know what a fabric is? Often you visit a cloth shop to buy cotton or synthetic clothes. Whether you buy cotton, synthetic or woollen clothes – all are fabrics. Hence, fabric is a material that is made up of either cotton, silk, wool or some other synthetic fibres. Different types of fabrics are used for different purposes and during different seasons of the year.

Now to understand fibre, take out a yarn from a piece of cotton fabric. You can split up the yarn into thinner strands, called fibres. These fibres are twisted together to make yarn. Fabrics such as cotton, jute, silk, etc., are made of yarns, which are further made

of fibres. Now can you say where do these fibres come from?

3.1 VARIETY OF FABRICS

We use various types of clothes. They are made of cotton, synthetic, woollen, linen or silk fabrics. We sit on chairs and sofas covered by fabrics, we use bedsheets and blankets made of fabrics. Cotton and linen are used during summer while woollen and synthetic fabrics are best suited for winter.



Cotton shirt

3.2 FIBRE

The fibres of some fabrics such as cotton, jute, silk and wool are obtained from plants and animals. So, these are called natural fibres. Natural fibres are of two types —

- (a) **Fibres obtained from plants** : Cotton and jute.
- (b) **Fibres obtained from animals** : Wool and silk.
 - (i) Woollen fibres are obtained from the fleece of **sheep or goat**. It

is also obtained from the hairs of **rabbits, yaks** and **camels**.

- (ii) Silk fibre is drawn from the cocoon of silkworm.

With the development of textile technology, fibres are produced artificially from various chemicals, obtained from petroleum. These are known as synthetic or artificial fibres. Nylon, rayon, polyester, acrylic, etc., are some examples of synthetic fibres.



Fur jacket

Process of producing clothes

The clothes are made either manually (by hand) or by machines. *Takli, charkha*, spinning wheels and handlooms are used for producing hand-made clothes. Khadi is a coarse variety of cotton cloth which is woven on the charkha using hand spun yarn. It is more durable than the machine made clothes.

ACTIVITY 3.1

Aim : To differentiate between various types of clothing materials.

Requirements : (i) Woollen sweater (ii) cotton shirt (iii) silk scarf (iv) leather jacket and (v) a magnifying glass (hand lens).

Clothing materials	Feeling of the garments when touched	Are threads visible through hand lens?	Other observations, if you have made
Cotton			
Wool			
Leather			
Silk			

Ask your classmates to perform the similar activity and note down their observations.

Compare your observation with those of your classmates and draw your conclusions. Show these to your science teacher.

3.3 PLANT FIBRES

Fabrics are manufactured from fibres. These fibres may be natural or synthetic. Fibres are very thin threads. When spun, they become thicker and woven into clothes. For example, fabrics are made of plant fibres like **cotton, jute, flax, ramie, hemp, sisal and kapok**.

[a] Cotton

Have you lighted the wicks of oil lamps (*diyas*) during *Diwali*? Have you ever noticed what is used while making the wicks of oil lamps (earthen-made *diyas*)? Cotton wool, is in fact, used to make the wicks of these lamps. It is also used for filling mattresses, quilts or pillows.

In India, **Khadi**, is made from cotton fibres.

Production of cotton wool

The cotton plant grows well in black soil and warm climate. It produces a small, green fruit of the size of a lemon, called **cotton boll**. The cotton boll contains soft white fibres which grow around the seed. When the fruit matures, it turns brown in colour. The brown boll bursts open and the white fibres are exposed. When these fibres dry in the sun and become fluffy, they are picked by hand.



Cotton plants

The fibres are separated from the seed by a process called **ginning**. It is done by hand, with the help of a large comb or by machines. The ginned cotton is pressed into bundles called **bales**.

Cotton is a natural **polymer** made of pure **cellulose**. Each fibre consists of twenty to thirty layers of cellulose, coiled in neat series of natural strings. The finishing process includes dyeing, bleaching and printing.

Properties of cotton

- It is a traditional cool summer fabric, though it is comfortable during the wet climate also.
- It is of various types ranging from light weight **voile** to heavy **corduroys** and strongest **denim**.
- It is durable.
- It absorbs dyes easily.
- Cotton fibres can be twisted to make strong yarns during spinning.
- Water easily penetrates right to the core of the fibres.
- It is soft and comfortable to the skin.

- It is a good absorber of moisture and sweat.
- It lets air in through the pores of the fabric, thus, sweat evaporates and our body feels cool.
- It is a bad conductor of heat and electricity.

[b] Jute

Jute is produced from the bark of jute plants. These are biodegradable, durable and strong fibres. It is also used for making strong packing materials. Jute is mainly grown in West Bengal, Bihar, Assam and Bangladesh.



Jute plants

It is cultivated during the rainy season and harvested at the flowering stage. The stems of the plants are tied into bundles and soaked in pond water for a few days. This process is known as **retting**. During the sinkage, the gummy substances holding the jute fibres to the stem, rot and the fibres separate out. The fibres are washed in clear running water and dried in the sun. All these processes are carried out by hand.

Uses of Jute

- To make cloth, mainly for wrapping bales of raw cotton.
- To make sacks, ropes, carpets, curtains and cushions.
- To make coarse cloth.
- Its fibres are woven into hessian cloth and backing for **linoleum** and **carpets**.
- It is used to make sugar and coffee baggings.
- Fine quality jute is also used to make jute fabric from which clothes are made.

SCIENCE BITS!

Jute is only next to cotton in importance commercially. It is also called golden fibre.

[c] Flax

It is a natural cellulose fibre produced from flax or linseed plant. The fibre is extracted from the skin of the stem of the **flax plant**. They are separated from the woody stem just like jute fibres, by the process of retting.



Flax

Flax-fibre is soft, lustrous and flexible. It is stronger but less elastic than cotton fibres. Flax fibres are mainly used in the production of ropes and high quality paper.

[d] Hemp

It is obtained from the stem of hemp plant. This plant grows in loamy soil. It is grown during monsoon.

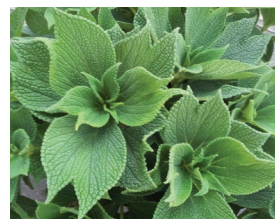
Hemp fibres are used in the production of ropes, carpets, nets, clothes and paper.



Hemp

[e] Ramie

This fibre is obtained from the stem of ramie plant. Ramie fibres are used in making canvas, parachutes, fishing nets, etc.



Ramie plant

[f] Sisal

These fibres are made from the leaves of sisal plants. Sisal fibres are used in the production of ropes, matting, etc.



Sisal plant

[g] Kapok

It is obtained from the fluffy yellowish fibres surrounding the seeds of the **silk-cotton plant**. Its fibre is known as **kapok**. It is light and water repellent. When its fruits burst open, cotton-like kapok is exposed. Kapok fibres are used in making floss, life-preservers, stuffing materials and insulation.



Kapok

CHECK YOUR KNOWLEDGE-1

Answer the following questions :

1. Name the fibres obtained from the stem of the plants.
2. What are bales of cotton?
3. Which plant produces fruits similar to that of cotton plant?
4. What is retting?

3.4. ANIMAL FIBRES

(a) Wool

This fibre is obtained from the hair of sheep. The hair of camels, goats and rabbits are also used for making woollen fabrics. The hair is removed from the animals with the help of a special clipper or a large

razor. This process of removal of wool from sheep is called **shearing**. Shearing is also carried out with the help of a shearing machine. The quality of wool depends on the breed of sheep. The quality is decided on the basis of colour, thickness, length, shine and strength of the fibre. **Pashmina**, an exceptionally

good quality wool, is obtained from the sheep found in Kashmir and the surrounding Himalayan areas. Wool is fluffy since it retains air between the fibres. Air being a bad conductor of heat, enables the woollen fibres to retain the body heat. Therefore, woollen clothes are good for wearing during the cold weather.

(b) Silk

It is obtained from the cocoon of silkworm. There are four stages in the life cycle of a silkworm — egg, larva, pupa and adult. The silkworm or larva feeds on mulberry leaves and spins a cocoon around itself.

Each silkworm produces a single continuous thread of raw silk 300-900 metres long. The cocoons are boiled in water to kill the silkworms and it is unwound to get the silk fibre. The rearing of silkworms for the production of silk is called **sericulture**.

Rearing of silk was practiced in China for at least 5000 years. Silk was traded to India, Middle east and Europe. This route between Asia and Europe is named as the **Silk Route**. The shining texture of the fabric makes it a valuable dress material.

CHECK YOUR KNOWLEDGE-2

Answer the following questions :

1. What is shearing?
2. Give an important feature of the silk thread produced by a silkworm?
3. Define sericulture.
4. What makes silk a valuable dress material?

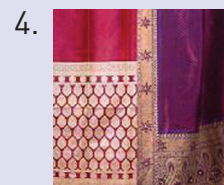
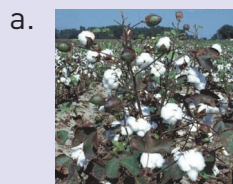
SCIENCE BITS!

- People who study ancient civilizations and their cultures are called **Archaeologists**.
- In small sector, weaving is done on **Handlooms**. In big industries, weaving is done on **Power looms**.

ACTIVITY 3.2

Aim : To match the figures with the types of clothes made from them.

Draw a line from the plant or animal to the clothing that is made from it.



3.5 SPINNING YARN

The process of making yarn from fibres is called **spinning**. In this process the cotton fibres are pulled to make them straight and then twisted. This makes the yarn stronger. Spinning is done with the help of simple devices like *takli* or *charkha*. On a large scale, spinning is done with the help of spinning machines.



Charkha

A *takli* consists of a hand spindle while the *charkha* is made up of a wheel which rotates while spinning the fibres. The charkha was used and made popular by **Mahatma Gandhi** during the freedom movement in India.



Takli

Spinning machines consist of metal spindles, shaped like spikes which make the process of spinning fast. After spinning, the yarns are dyed in different colours or treated with chemicals to prevent shrinkage before weaving into fabrics.

3.6 YARN TO FABRIC

The two main process of making fabrics from yarns are weaving and knitting.

SCIENCE BITS!

India is the second largest producer of silk after China and the largest consumer of silk in the world.

(a) Weaving : The process of arranging two sets of yarns together to make a fabric, is called weaving. Weaving is done in handlooms in which a shuttle carries the yarn back and forth, across the yarn placed lengthwise. In big industries, powerlooms are used. The woven fabric is then dyed, bleached or polished.



Handloom



Powerloom

SCIENCE BITS!

Cotton is made of cellulose while wool and silk are made of protein.

(b) Knitting : In this process, a single yarn is used to make a piece of fabric. Sweater, socks and mufflers are knitted from woollen yarn. Knitting is done by hand and also by machines.



Knitting wool

CHECK YOUR KNOWLEDGE-3

Answer the following questions :

1. In which process, a single piece of yarn is used to make a piece of fabric?
2. Why are yarns treated with chemicals before weaving?
3. Name two simple devices used for spinning.

ACTIVITY 3.3

Aim : To study the strength of fibres.

Requirements : A small bucket, a few weights, four fibres like jute-thread, cotton-thread, nylon-thread, woollen yarn.

Procedure : Suspend the bucket with the jute thread. Go on placing the weights in it till the thread breaks. Calculate and write down the weight just when the thread breaks. Now repeat the same procedure for all the different kinds of fibres. Arrange the order of the fibres from the strongest to the weakest. Write down your observation in the following table.

Kind of fibre	Measured weight	Order
Jute thread		
Cotton thread		
Nylon thread		
Wool yarn		

Now answer the following questions.

- Which fibre is the strongest?
- Which fibre is the weakest?
- Nylon is a synthetic material. It is completely man-made. Is the nylon thread stronger or weaker than the cotton thread?
- Which thread is stronger, nylon or jute?
- Can you say that the artificial thread nylon is stronger than the natural threads like cotton and jute? Why?

3.7 NATURAL FIBRES VERSUS SYNTHETIC FIBRES

Benefits of natural fibres

- Cotton fibres are soft, absorb sweat, let air in and can be used in all seasons.
- Woollen fibres trap air in between them and thus retain the body heat.
- Silk clothes have a natural shine and can be made into expensive dresses.
- Natural fibres are used as a protective covering for our body.

Drawbacks of natural fibres

- These are very expensive due to their production cost. For example, natural silk is a costly fabric.

- They get creased or crumpled easily. So, they have to be ironed after every wash.
- They take longer time to dry, especially during the rainy season.
- Moths and moulds generally attack these clothes as these are either carbohydrates (cotton) or proteins (wool and silk).
- They generally shrink on ordinary washing.

Benefits of using synthetic fibres

- They are strong, durable and generally do not shrink.
- They do not get creased or crumpled easily.
- They are easy to wash and maintain.

- They dry very quickly as they absorb very little water.
- Moths and moulds do not attack these fabrics.
- They are available in very attractive colours, designs and prints.
- They are cheaper than the natural fibres.

Drawbacks of synthetic fibres

- These fibres are not comfortable in any season since they do not absorb sweat and do not let air in.
- These clothes catch fire easily.
- They get damaged when pressed by a hot iron.

3.8 HISTORY OF CLOTHING MATERIAL

In ancient times, clothing consisted of leather, fur, leaves and grass wrapped or tied around the body. Grass vines and hairs of animals were twined to make clothes. Egyptians were the first to discover and use cotton about 14000 years ago. Both cotton and flax were grown near the river Nile. The early Indians also cultivated and used cotton clothes. The cotton plants were grown on the banks of river Ganga for more than 3000 years.

At around 30,000 BC sewing needles were invented. The remains of needles made

SCIENCE BITS!

People going into outer space have to wear special clothes in order to survive. This special garment is called a space suit.

of animal bones and ivory were discovered by archeologists in Russia. These were supposed to have brought about a revolution in the type of clothes worn.

Stitched clothes began to be used in India around the 14th century. Western clothes became popular in the 20th century. But even now unstitched and a single large piece of cloth is used, both by men and women as a *dhoti*, *turban* or a *saree*. In Africa also, this type of a single large rectangular piece of cloth is wrapped around the body and used as clothing.

Clothes protect us from heat, cold, wind and rain. It also protects us from insect bites. Cotton clothes keep us cool during summer and woollen clothes keep us warm during winter. Raincoats keep us dry during the rains. Synthetic clothes are also used frequently since they are durable and easy to maintain. Silk clothes are highly valued because of their shimmering appearance and production cost. Therefore, we can choose the type of clothes we want to wear from a wide variety of fabrics.

CHECK YOUR KNOWLEDGE-4

Answer the following questions :

1. How are clothes useful to us?
2. What material was used for making the earliest needles?
3. Name a form of unstitched cloth used by the men in India.

KEYWORDS

- ◆ **Cotton wool** : The fibres of cotton seed.
- ◆ **Fabric** : The material made by weaving cotton, wool and other natural and synthetic yarns.
- ◆ **Plant fibres** : Thin hair like strands that are obtained from plants, which are made into yarn.

- ◆ **Yarn** : Fibres are twisted to make yarns.
- ◆ **Knitting** : It is a process in which, a single yarn is used to make a piece of fabric.
- ◆ **Weaving** : The process of arranging two sets of yarns together to make a fabric is called weaving.
- ◆ **Spinning** : The process of making yarn from fibres is called spinning. In this process, fibres from a mass of cotton wool are drawn out and twisted.
- ◆ **Khadi** : A coarse, hand-woven cloth made from cotton.
- ◆ **Retting** : A process used for obtaining plant fibres from the stem of the jute plant.
- ◆ **Ginning** : A process used to separate the cotton fibres from seeds.
- ◆ **Cotton boll** : The cotton plants bear small, green fruit called the cotton boll.

SUMMARY

- ❖ Clothes protect our bodies from adverse weather conditions in summer, winter or rains.
- ❖ There is a variety of clothing material or fabric, such as, cotton, silk, wool, polyester, nylon, rayon, etc.
- ❖ Fabrics are made from yarns, which in turn are made from fibres.
- ❖ Fibres are of two types, i.e. **natural** and **synthetic**.
- ❖ Cotton, jute, wool, silk, etc., are natural fibres, whereas nylon and polyester are synthetic fibres.
- ❖ Fibres like cotton, jute, kapok, ramie, etc., are obtained from plants.
- ❖ Wool and silk fibres are obtained from animals.
- ❖ Spinning is the process of making yarn from fibres.
- ❖ Fabrics are made by weaving and knitting of yarns.
- ❖ Cotton is good for hot and humid weather as it lets air in and absorbs sweat.
- ❖ Black soil and warm climate are good for cultivation of cotton.
- ❖ Jute fibre is coarse and strong, and is obtained from the jute plant.
- ❖ Silk is obtained from the cocoon of silkworms.
- ❖ Silk is prized because of its shimmering appearance and production cost.
- ❖ Wool is fluffy and retains air, and hence heat.
- ❖ Synthetic fibres are mainly made from chemicals obtained from petroleum.
- ❖ Synthetic clothes are strong and very long lasting. They do not wrinkle easily.

EXERCISES

A. Multiple Choice Questions :

Select the correct option

1. Which of the following is a synthetic fibre?
 a. Linen b. Cotton c. Rayon d. Silk
2. Fruit of cotton plant is known as
 a. bale b. boll c. fibre d. kapok
3. Which of these is not the property of jute?
 a. Biodegradability b. Durability c. Smoothness d. Strength

4. Which of the following fabrics will you prefer to wear in hot and humid conditions?
a. Cotton b. Silk c. Nylon d. Wool
5. Which Indian hand-woven cloth is made from cotton?
a. Leather b. Wool c. Khadi d. Coir
6. Which of the following is a plant fibre?
a. Nylon b. Rayon c. Silk d. Silk-cotton
7. Which of these is not a natural fibre?
a. Nylon b. Jute c. Wool d. Cotton
8. Which type of soil is the best for growing cotton?
a. Red soil b. Black soil c. Grey soil d. Brown soil
9. Historians believe that cotton clothes were first worn in :
a. India b. Egypt c. China d. Europe
10. Which one of the following is not true with reference to cotton?
a. It requires black soil and warm climate. b. It is grown all over the world.
c. The fabric made from this plant is suitable for summer wear.
d. Cotton has been grown in India for more than three thousands years.

B. Fill in the blanks :

1. Chemicals obtained from petroleum is used to make _____.
2. Soaking the jute plants in water is called _____.
3. To grow best, cotton requires _____ soil.
4. Jute is cultivated in the _____ season.
5. Silk is obtained from the _____ of silkworms.
6. Ginning is done to separate cotton fibres from _____.
7. The first sewing needles were made of _____.
8. _____ fibres are obtained either from plants or animals.

C. State whether the following statements are True (T) or False (F) :

1. Polyester is a natural fibre.
2. Jute fibre is obtained from the stem of the jute plant.
3. Yarn is made from fibres.
4. Synthetic fibres dry faster than cotton or wool.
5. Wool was used for making cloth before cotton.
6. Jute is one of the cheapest natural fibres.
7. Weaving of yarn makes a piece of fabric.
8. Silk fibre is obtained from the stem of a plant.
9. The process of removing seeds from cotton is called retting.

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D. Match the items of Column A with those of Column B :

Column A	Column B
1. Spinning	(a) Green fruit of the cotton plant.
2. Ginning	(b) Nylon, rayon, polyesters, etc.
3. Synthetic fibres	(c) A coarse, hand-woven cloth made from cotton.
4. Khadi	(d) A process of separating cotton fibre from seeds.
5. Boll	(e) The process of making yarn from fibres.

E. Differentiate between the following :

1. Ginning and retting
2. Jute fibres and cotton fibres
3. Silk-cotton and silk
4. Fabrics and fibres
5. Synthetic and natural fibres

F. Give reason :

1. Cotton clothing is the best clothing for hot and humid climate.
2. Natural silk is very comfortable cloth but very expensive.
3. Synthetic fibres are lasting, easy to wash and wear but still it is not advisable to wear this type of clothing frequently.
4. Pillows, life-preservers, and stuffing materials are made from silk-cotton.
5. Cotton clothes are easy to wash.

G. Very short-answer type questions :

1. Name the fibre which can be knitted.
2. Name the fibre which absorbs water easily.
3. Name the fibre which is obtained after the process of retting.
4. Name the type of fibre which burns easily.
5. Name the fibre which is stronger but less elastic than cotton.

H. Short-answer type questions (I) :

1. Why are clothes important?
2. Give two examples each of : (a) Plant fibres (b) Animal fibres.
3. Name three synthetic fibres. Why should we not wear these clothes while working in the kitchen?
4. Which part of cotton plant contains the fibres?

I. Short-answer type questions (II) :

1. How is silk obtained? Describe in brief.
2. Name four natural fibres that are used to make clothes, and two materials that are not fibres but are used to make clothes.
3. Give four reasons why we wear clothes?
4. What is meant by the "Silk Route"?
5. State four properties of synthetic clothes.

J. Long-answer type questions :

1. Explain how jute fibre is obtained from jute plant?
2. State the properties that make natural fibres better than synthetic fibres.
3. Write short notes on the following :
 - a. Sisal
 - b. Ramie
 - c. Hemp
 - d. Silk-cotton.
4. Explain in detail the process of making yarn from fibre.

K. HOTS questions :

1. Silk clothes are much costlier than the cotton or jute clothes. Why?
2. Why should we not wear nylon clothes while working in kitchen?

L. Value based questions :

Sam's father brought a dried coconut fruit at home. He removed the outer fibre with the help of sickle. He broke the coconut shell and removed coconut fruit. Then he used the fibres for cleaning and scrubbing the floor. Sam wondered to observe it. Next day he went to school and discussed his problem to his teacher. The teacher explained his problem properly.

Answer the following questions based on the above information :

- (a) What are the values noticed in Sam.
- (b) To what other use can be done with such fibre and outer shell?

PROJECT IDEAS

1. Make a chart of all different kinds of fibres. Observe which of these fibres are used in making your school uniform. Note down your observations in a tabular form.
2. Visit a local handloom or a powerloom and observe the various steps involved in the production of finished clothes from fibres. Collect information on the following :
 - (i) the type of yarn used
 - (ii) the source of the yarn
 - (iii) the process of weaving/knitting
 - (iv) the fabric manufactured
 - (v) the number of people involved in each type of work
 - (vi) the amount of fabric manufactured each day.
3. Visit a farm where sheep are reared and collect information on the following :
 - (i) the most favourable time for carrying out the process of shearing.
 - (ii) the tools used in the process.
 - (iii) how the wool is sorted according to quality?
 - (iv) how the animals are taken care after shearing? (v) how much wool is produced in the farm?

ACTIVITIES TO PONDER AND ACT

(Life Skill and Value Development)

1. Khadi production was started by **Gandhiji** during Independent struggle of India against British. It is still worn and liked by people in and outside India.

Make a list of things made from Khadi-cotton and Khadi-silk.

Also find out how is Khadi-silk different from traditional silk?

Objective : To increase the awareness related to fabrics used and the awareness related to national movements.

Skill and Value development : Attitude towards nation, survey and collection of data, inquisitiveness towards national leaders and their works and initiatives.

2. Take a physical map of India and mark various regions and the various arts of fabric making and fabric styling. For e.g.,— Bandini, Batik, Bandej, Madhubani, Maheswari, Kanjivaram, Patola, etc.

Objective : To make students aware of various fabric art forms prevalent in India.

Skill and Value development : To increase the awareness of India, attitude towards India and its craftsmen.

FOR THE TEACHER

1. Fabrics made of different fibres can be brought to the classroom and shown to the students.
2. The yarns of the various fabrics can be pulled out and their thickness can be observed under a microscope. The strength of these yarns can also be tested.
3. The process of knitting (with knitting needles) in which a single yarn is used to make a fabric can be demonstrated.

IN THE LABORATORY

To observe what happens when a piece of cotton, woollen or silk fabric is burnt.

Materials Required : A piece of cotton fabric, a piece of woollen fabric, a piece of silk fabric, and a match box.

Procedure : Light a matchstick and burn each piece of fabric separately. Note down your observations. What kind of odour is given off by the fabrics when they burn? Now complete the following table.

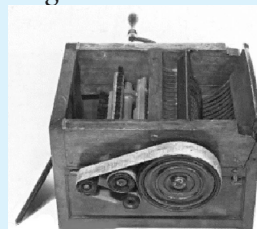
Type of fabric	Changes observed when burnt	Kind of odour given off
Cotton		
Woollen		
Silk		

KNOW THE SCIENTISTS

Eli Whitney (1765 – 1825) was born in Westboro, Massachusetts and graduated from Yale College in 1792.



He designed and constructed the cotton gin, a machine for separating cotton fibres from seeds in 1793. It consisted of a toothed cylinder revolving against a grate that enclosed the cotton seeds. The teeth caught the fibres pulling them from the seeds and the fibres were removed by a revolving brush. Prior to his invention, farming cotton required hundreds of hours to separate raw cotton fibers from the seeds.



Edmund Cartwright (1743 – 1825), an English inventor and clergyman was the inventor of the imperfect powerloom (patented in 1785). Large scale weaving of wide cotton clothes was carried out using this machine. He also invented a wool-combing machine (1789), a machine for rope making (1792) and an engine (1797) that used alcohol as fuel.



Elias Howe (1819 – 1867), an American, was the inventor of the sewing machine. He was apprenticed in 1838 to a machine maker in Boston, at whose suggestion he devised a sewing machine. He exhibited his first machine in 1845 and patented another in 1846. In the same year he sold a third with all the right to William Thomas in England, since no financial backing was obtained in the United States. Howe worked with Thomas in London to produce a machine to stitch leather.

