



GOVERNMENT OF TAMIL NADU

STANDARD FIVE

MATHEMATICS

SCIENCE

SOCIAL SCIENCE

Term - I

Volume-2

A publication under Free Textbook Programme of Government of Tamil Nadu

Department of School Education

Untouchability is Inhuman and a Crime

Government of Tamil Nadu

First Edition - 2019

Revised Edition - 2020, 2022, 2023,
2025

Reprint - 2021, 2024

(Published under New syllabus in
Trimester Pattern)

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Content Creation



State Council of Educational Research
and Training

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Printing & Publishing



Tamil Nadu Textbook and Educational
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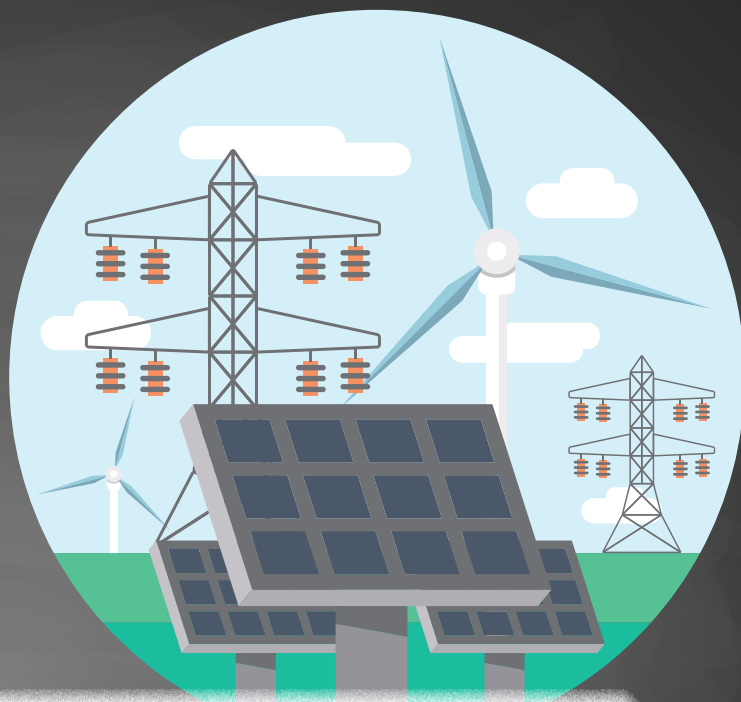
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E-Book



Evaluation



1

Organ Systems



Learning Objectives

- After completing this lesson, students will be able to:
- ❖ know about different organ systems of human body.
 - ❖ identify different organs.
 - ❖ understand the functions of different organs.



Introduction

We get energy for our daily activities from the food we eat. How is the food broken down into simpler forms? It is through the process called digestion. After we eat the food, it is digested and the waste products are removed from the body. The process involved in removal of wastes is called excretion. We need oxygen to survive. Our body gets oxygen through the process called respiration. These processes are carried out by different organs in our body. Different organs together form an organ system. In this lesson we will study about different organ systems in our body and their functions.



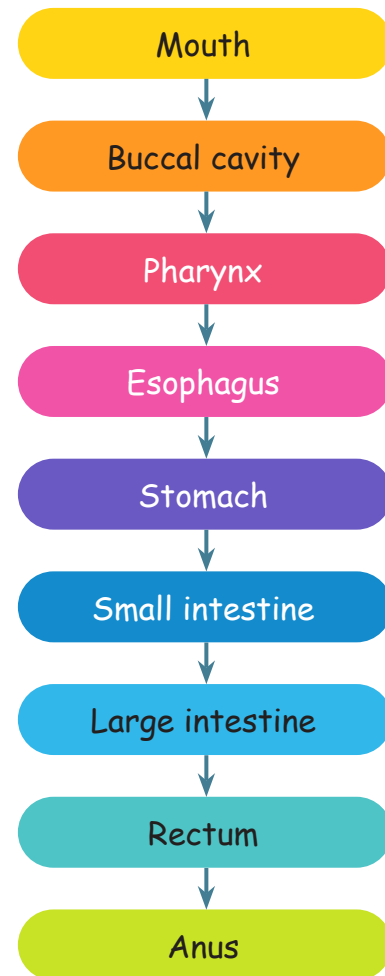
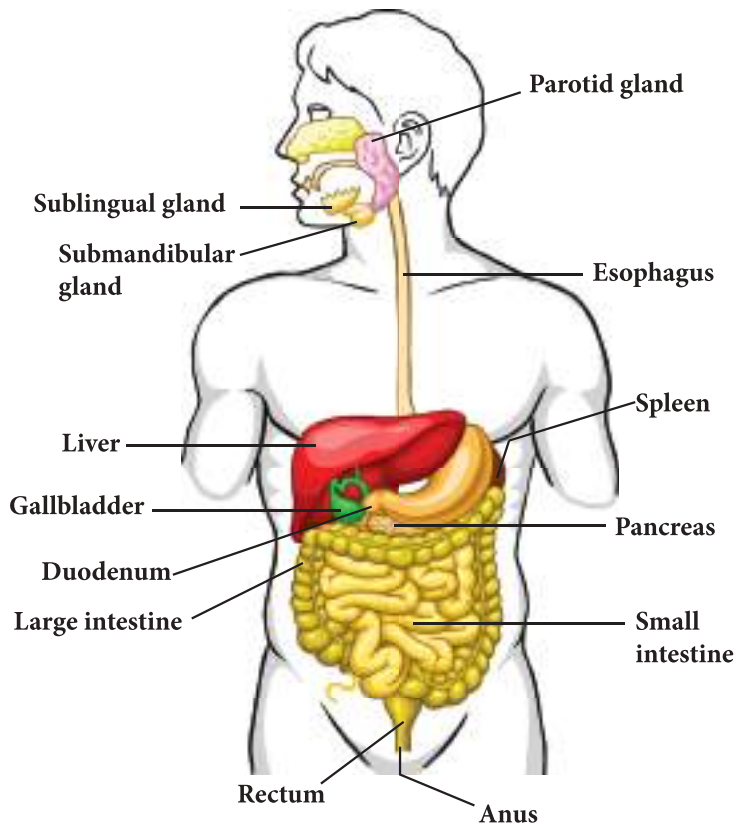
I. Digestive System

The food we eat consists of complex compounds like carbohydrates, proteins and fats. They have to be converted into simpler molecules like glucose, amino acids, and fatty acids and glycerol respectively. These simpler molecules are then assimilated either by blood or lymph in order to give us energy. The process of conversion of complex food molecules into simpler molecules is called digestion. The digestive system can be divided into two.

1. Digestive tract
2. Digestive glands

1 Digestive Tract (Alimentary canal)

It is a coiled muscular tube extending from the mouth to the anus. It is about 6-9 metres long and consists of many specialized divisions. They are sequentially arranged as mouth, buccal cavity, pharynx, esophagus, stomach, small intestine, large intestine, rectum and anus.



Do you know?

There are some organisms which live in the digestive systems of animals. For example, tape worm lives in the human intestine.

2 Digestive Glands

Three important digestive glands associated with the process of digestion are:

1. Salivary glands
2. Pancreas
3. Liver

Salivary glands secrete saliva which moistens food. Saliva contains enzymes which break down complex molecules into simple molecules. Pancreas produces pancreatic juice which contains digestive enzymes for digesting fats, proteins and carbohydrates. Liver produces bile for the digestion of fat.



Do you know?

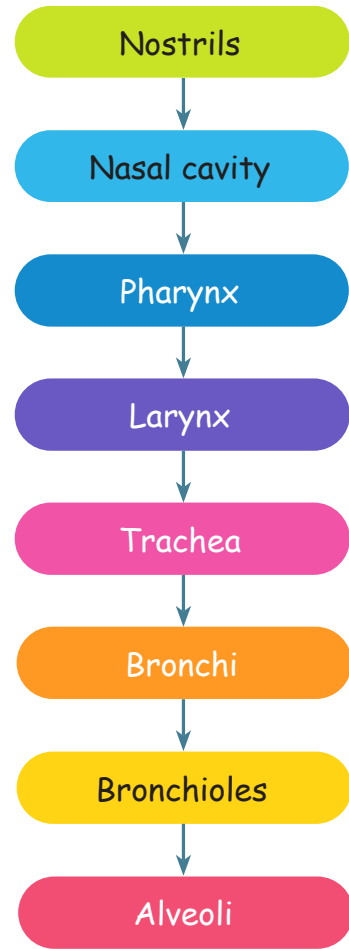
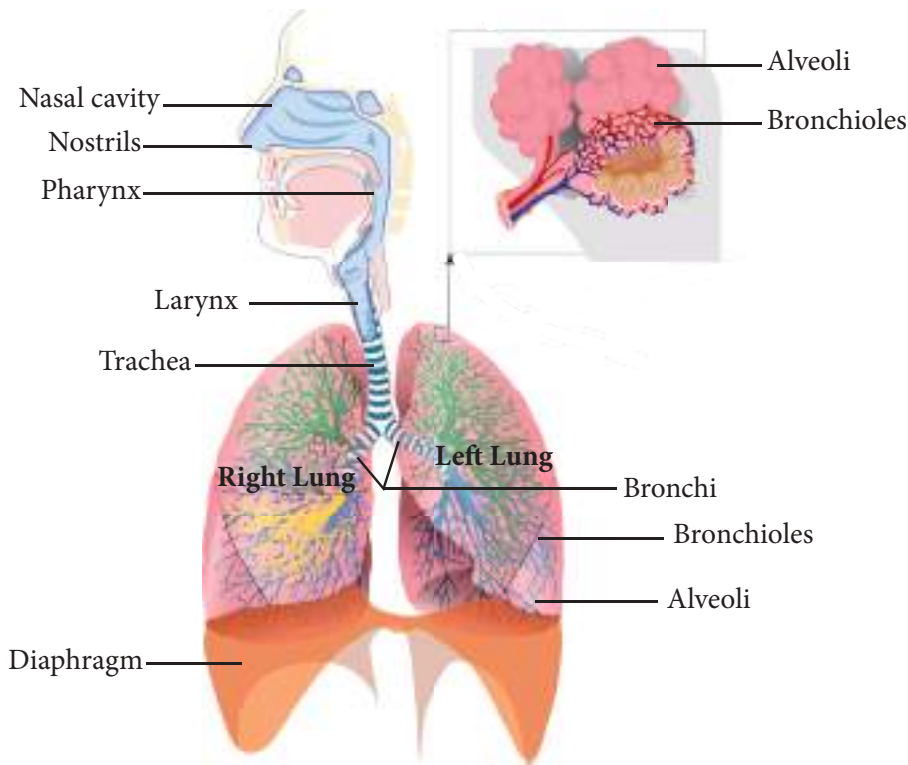
The three pairs of salivary glands parotid, sublingual and submandibular secrete approximately 1.5 litre of saliva every day.



II. Respiratory System

The respiratory system provides oxygen to the tissues of the body and removes carbon dioxide from the tissues. There are three major parts forming the respiratory system.

1. Airway
2. Lungs
3. Muscles of respiration



Do you know?

People suffer due to smoke. Smoke contains large amount of carbon monoxide, a toxic gas. People when engulfed in smoke or fire die due to suffocation.

Activity 1



Sit quietly and count how many times you breathe per minute. On an average, we breathe 16-18 times per minute. Can you guess the number of times you breathe in a day? On an average, we breathe more than 20,000 times in a day.

1 Airway

The airway includes the nasal cavity, pharynx, larynx, trachea, bronchi and bronchioles. It carries air between the lungs and the surrounding.

2 Lungs

The lungs are the primary organs of the respiratory system. They are paired, cone-shaped organs. They are located in the thoracic chamber (rib cage) on both sides of the heart.

3 Muscles of Respiration

Muscles of respiration include diaphragm and intercostal muscles. They help to push the air in and out of the lungs during breathing.



Do you know?

- Air pollution causes many respiratory diseases.
- Smoking can cause lung cancer.



III. Circulatory System

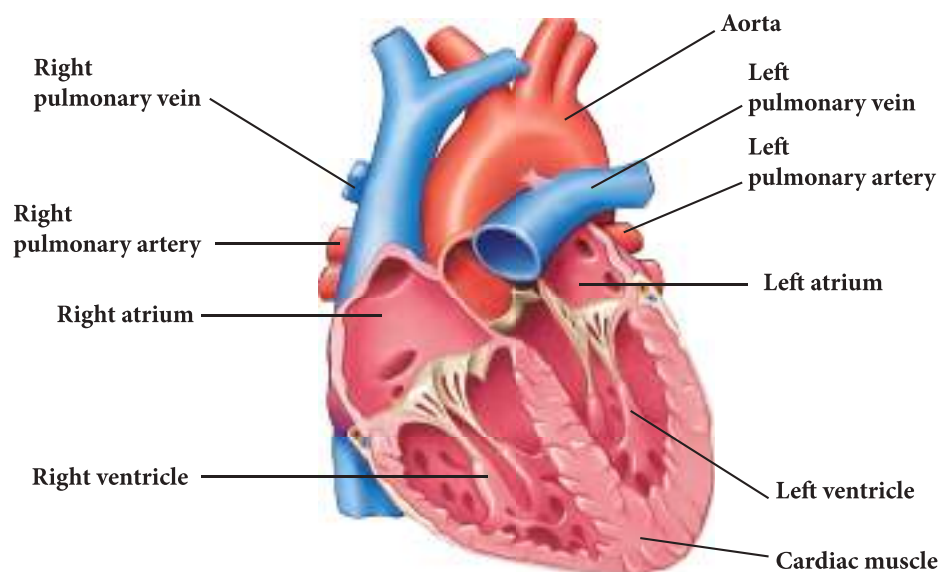
In this system blood is circulated to transport oxygen and nutrients to every part of the body. Circulatory system consists of the following.

1. Heart
2. Blood vessels
3. Blood



1 Heart

The heart is a hollow, muscular organ. It is somewhat conical in shape. It is covered with double walled membrane called pericardium. The space between the membranes is filled with pericardial fluid. The pericardial fluid protects the heart from shock. Heart is placed inside the thoracic chamber (rib cage) in between the two lungs.



The heart is divided into four chambers. Two upper chambers are called atria (Singular-atrium) or auricles. Two lower chambers are called ventricles. The upper and lower chambers of the heart are separated by a muscular wall or tissue known as the auriculo - ventricular septum of the heart. The right side of the heart receives deoxygenated blood from various parts of the body and pumps it to the lungs for oxygenation. The left side of the heart receives oxygenated blood from the lungs and pumps it to different parts of the body.

2 Blood Vessels

Blood vessels consist of arteries, veins and capillaries. Arteries carry oxygenated blood (except pulmonary artery which carries deoxygenated blood from the heart) and veins carry deoxygenated blood (except pulmonary vein which carries oxygenated blood to the heart).

Capillaries are thin blood vessels which connect the arteries and veins. They help in exchange of materials between circulatory system and body tissue.

3 Blood

Blood transports nutrients, oxygen, wastes and hormones. The volume of blood in human adults is 4-5 litres. It regulates water level and the body temperature. Blood is pumped throughout the body by the heart. It takes oxygen to the tissues and cells and finally reaches the lungs to take oxygen again.



Do you know?

There are some animals like lobsters and crabs that have blue blood. Cockroach has colourless or white blood.

Activity 2



Locate your pulse points either on wrist or neck. Place your right index and middle finger on the palm side of your left wrist. On the neck the pulse point is located beneath the ear and jaw bone. Count the number of beats for 15 seconds. Multiply this by four. This shows how many times the heart beats in one minute.



IV. Excretory System

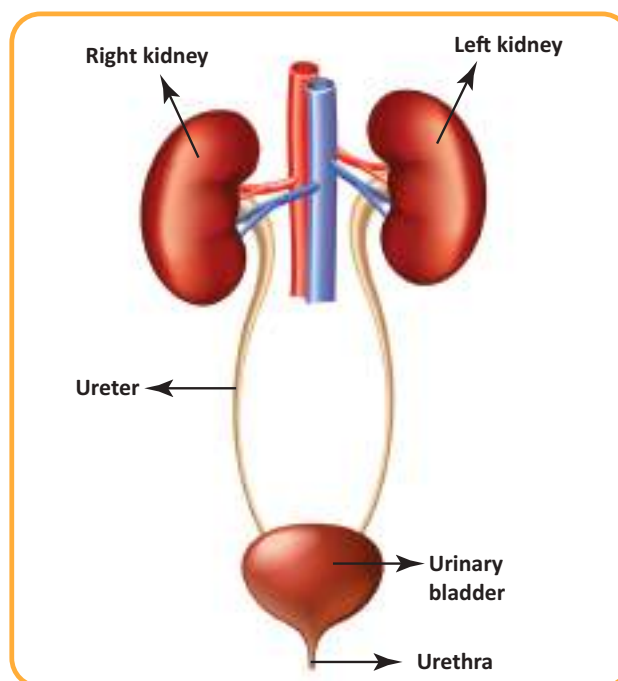
Excretory system removes the waste products from the body. It also regulates water and electrolyte balance. Kidneys, lungs, liver and skin together function as excretory organs. Excretory system consists of the following.

1. Kidneys
2. Ureters
3. Urinary bladder

1 Kidneys

The kidneys filter the blood to remove waste and produce urine. The kidneys are a pair of dark red, bean shaped organs placed behind the abdomen on either side of the vertebral column. The average adult's kidney measures about 12 cm in length, 6 cm in width and 3 cm in thickness. Right kidney is slightly lower than the left kidney. Each kidney is covered by a fibrous membrane called capsule.

The kidneys are made up of millions of excretory units, called **nephrons**, which are the structural and functional units of the kidneys.



2 Ureters

Two ureters connect the kidneys with the urinary bladder. Urine formed from each kidney reaches urinary bladder through ureters.

3 Urinary Bladder

It is sac-like in shape and acts as a temporary storage organ of urine. Urine entering the urinary bladder from the ureters slowly fill the hollow space inside the bladder. Urine is expelled from the body through the urethra.



Do you know?

Every minute, kidneys receive approximately 1.25 litre of blood.



V. Nervous System

Nervous system is an integration of nerves and they are composed of specialised cells called neurons. The human nervous system is divided into the following.

1. Central Nervous System (CNS)
2. Peripheral Nervous System (PNS)

1 Central Nervous System

Central nervous system consists of the brain, the spinal cord and the nerves.

❖ Brain

Brain controls all our activities like thinking, reading and writing. The brain is covered by three membranes called meninges. They are dura mater, arachnoid membrane and pia mater. The meninges protect the CNS from mechanical shock. It is made up of eight immovable bones. The brain is made up of millions of functional units called neurons.

Human brain is divided into three major parts.

- Forebrain
- Midbrain
- Hindbrain

Forebrain

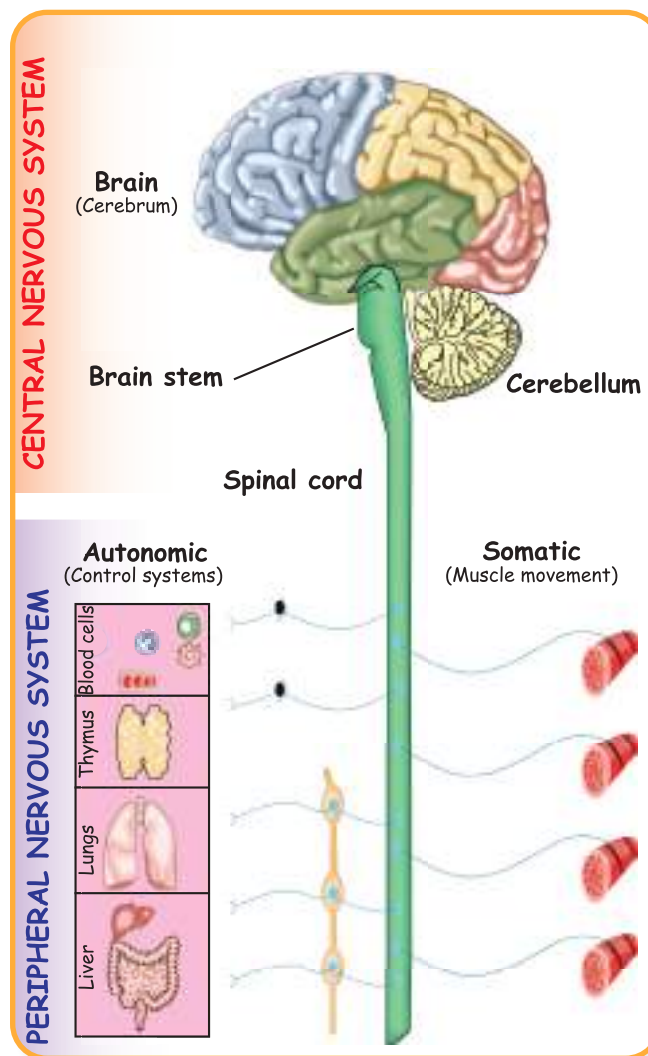
- The forebrain consists of cerebrum, thalamus and hypothalamus.
- It is the largest part of the brain.
- It is the centre of human memory.
- It is responsible for intelligence, imagination and reasoning.

Midbrain

- It lies behind the cerebrum.
- It co-ordinates the movements of the muscles of the body.
- It regulates our vision, hearing, sleep and body temperature.

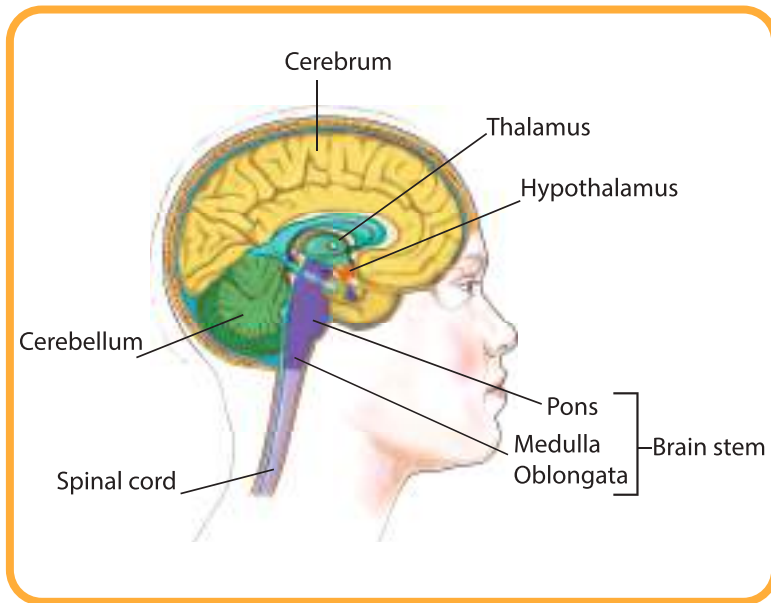
Hindbrain

- The hindbrain comprises of pons and medulla oblongata.
- It is also called the brain stem.
- It is called 'vital knot' because it controls breathing, heart beat and other involuntary muscles.
- It connects the brain to the spinal cord.



Do you know?

The weight of human brain is approximately 1.36 kilogram.



Do you know?

- The brain needs a continuous supply of oxygen for better functioning.
- The brain loses the ability to function when it does not get oxygen for more than 4 minutes.
- Enough sleep and healthy food increase the efficiency of our brain.

❖ Spinal cord

Spinal cord is a long tube like structure which extends from the brain. It lies within the back bone of our body.

2 Peripheral Nervous System

Peripheral nervous system consists of nerves extending from the spinal cord to all parts of the body. It is made up of two parts.

- Somatic Nervous System
- Autonomic Nervous System

Somatic nervous system carries sensations from the organs to the brain and takes messages from the brain to the organs for movements. Autonomic nervous system controls the nerves of the inner organs of the body.



Evaluation



I. Choose the correct answer.

1. What is the length of the alimentary canal?
a) 3-5 m b) 5-6 m c) 9-11 m d) 6-9 m
2. Which organ is involved in respiration?
a) Kidney b) Lungs c) Heart d) Brain
3. How many kidneys do we have?
a) 2 b) 3 c) 1 d) 4





4. Functional unit of brain is

- a) neuron b) nephron c) brain stem d) nerves

5. Blood is pumped by

- a) lungs b) heart c) kidneys d) bones

II. Fill in the blanks.

1. A group of organs together make up an _____ system.
2. The process by which the body removes waste is called _____
3. The number of chambers in human heart are _____
4. The functional unit of kidney is _____
5. The human nervous system is divided into _____ parts.

III. Say True or False.

1. The circulatory system is made up of the heart, blood and blood vessels.
2. Important function of the heart is to transport blood with nutrients, oxygen, waste and hormones.
3. The brain is protected by the rib cage.
4. The functional unit of kidney is neuron.

IV. Circle the odd one.

1. a) Mouth b) Buccal cavity c) Pharynx d) Lungs
2. a) Nostrils b) Nasal cavity c) Pharynx d) Stomach
3. a) Mouth b) Esophagus c) Stomach d) Kidney
4. a) Tasting b) Hearing c) Thinking d) Smelling
5. a) Cerebrum b) Cerebellum c) Medulla oblongata d) Nephron

V. Match the following.

1. Digestive system - Kidney
2. Respiratory system - Brain
3. Circulatory system - Alimentary canal
4. Excretory system - Heart
5. Nervous system - Lungs

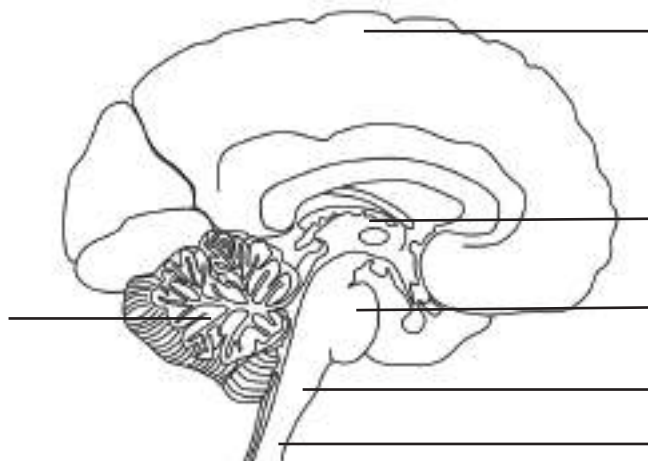


VI. Answer briefly.

1. Name the salivary glands in our mouth.
2. What is respiration?
3. What is the function of pericardial fluid?
4. Name the chambers in human heart.
5. Arrange the excretory system in correct sequence.
(Urinary bladder, Ureter, Kidney, Urethra).
6. What are the two parts of peripheral nervous system?
7. What are the functions of blood?

VII. Answer in detail.

1. List out the functions of the digestive system.
2. Explain the main parts of the circulatory system.
3. Explain three major parts of human brain.
4. Label the diagram given below.



VIII. Questions based on higher order thinking (HOT).

1. Why it is important to wear helmet while riding a bike?
2. Eating fast food and junk food affects our health. Justify.



2

Matter and Materials



Learning Objectives

After completing this lesson, students will be able to:

- ❖ know about matter and materials.
- ❖ understand the process of manufacturing fabrics.
- ❖ know the varieties of grains and the food products.
- ❖ understand why do things float or sink.



Introduction

Our needs have increased in the modern days and we use a number of things in our daily life. We get some of them from the nature and some of them are manufactured artificially. The things you use like pen, pencil, ink, eraser, note book, ball and the food you eat, all have different nature and characteristics. They are obtained by transforming the natural and artificial substances. In this lesson we will study about different things used in our life and how they are obtained.



I. States of Matter

Matter is anything that has mass and occupies space. Matter can exist in three physical states: solid, liquid and gas. It is made up of molecules and the molecules are made up of atoms.

❖ Solid

In solids, molecules are very closely packed. Solids are incompressible. They have definite shape, size and volume.

❖ Liquid

In liquids, molecules are loosely packed. Hence, liquids are negligibly compressible. They have definite volume, but no definite shape and size.



❖ Gas

In gases, molecules are very loosely packed. Hence, gases are highly compressible.



Activity 1

Look at your surrounding. Give some examples for solids, liquids and gases.

Solids	Liquids	Gases



II. Materials

A material is a mixture of substances that constitute an object. They can be pure or impure, natural or man made. Materials are required to get the things needed for our daily life. We need food, dress and many other goods for our daily living. Natural and man made materials are transformed to produce these things.



III. Fibres

Fibre is a thin thread of natural or artificial substances. It is used to make cloths with the help of power looms or weaving machines. The fibres we get from plants and animals are called natural fibres. Cotton, jute, coir and flax are examples for plant fibres. Wool and silk are examples for animal fibres. Fibres made by humans by chemical synthesis are called synthetic fibres or artificial fibres. Rayon, nylon, acrylic and dacron are examples for artificial fibres. These fibres are obtained from petroleum by complex chemical processes.



1 Natural Fibres

❖ Cotton

A cotton plant is a bushy plant of 5 to 6 feet high. Cotton grows well in black soil and alluvial soil. The cotton plant bears a large number of small green pods called cotton balls. These balls contain seeds covered with white fibres. When the cotton balls mature, they burst exposing the white fibre of cotton. Cotton is usually hand picked from the plants.



Ginning

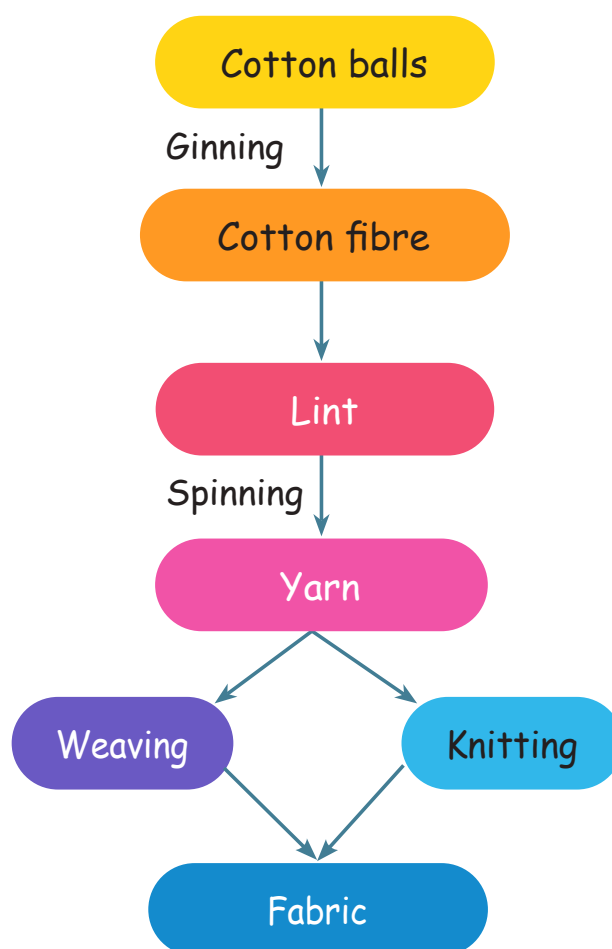
There are two processes to make cotton yarn from cotton fibre. The raw fibres are separated from the seeds by a process known as ginning. The fibrous material left after separating cotton seeds is called lint. The lint is then tied and pressed into balls. The final proportions of short fibres and other impurities are removed by the process of combing.

Spinning

The process of making yarn from lint (fibre) is called spinning. Spinning is done on a large scale with the help of spinning machines.

Yarn to fabrics

Weaving and knitting are the two most important processes used for making fabric from the yarn. The process of making two sets of yarns together to make fabric is called weaving. It is done by weavers on a machine called loom. The looms are either hand - operated (hand looms) or power - operated (power looms). During knitting a single yarn is used to make a piece of fabric. It is done by hand and also on machine.



Spinning



Weaving



Knitting

Uses of Cotton

- It is used to manufacture cotton textiles and garments.
- It is used as fillers in pillows and mattresses.
- It is used for making surgical bandages.
- It is used for making dhotis, sarees, bedsheets, table cloth and so on.



❖ Jute

Jute fibre is obtained from the stem of the jute plant. Jute plant has long, soft and shiny fibres. It is also known as **golden fibre** due to its colour and cost effectiveness. Jute fibres are separated from the process of retting jute by hand and then they are dried. These are converted into yarns in the same manner as in the case of cotton.

Uses of Jute

- It is used for making bags, carpets, curtains and ropes.
- It is used for making cloths for wrapping bales of raw cotton and to make sacs for storing grains.
- It is used for making wall hangings for decoration.



❖ Coir

Coir fibre is obtained from the outer covering of coconut. It is used to make floor mats, door mats, brushes and mattresses.



2 Synthetic Fibres (or) Manmade Fibres

These fibres are made by human beings with the help of chemical process. Hence, they are called synthetic fibres or manmade fibres. These fibres are obtained from coal, petroleum and natural gas.

Synthetic fibre	Sources
Rayon	Wood pulp
Nylon	Coal
Polyester	Petroleum products
Acrylic	Natural gas

Activity 2



Classify the following fibres.

Polyester, Jute, Silk, Nylon, Cotton, Wool, Acrylic, Rayon.

Synthetic Fibres	Natural Fibres

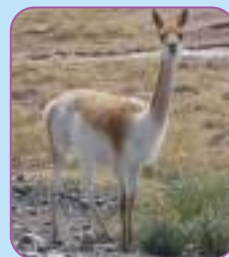
Uses of Synthetic Fibres

- Rayon is used to make rope, cloth, cap, tyre cords and carpets.
- Nylon is used to make fishing nets, ropes, parachutes, fabrics and bristles for brushes.
- Polyester is used to make fabric for suits and shirts, hoses, conveyor belts, films, PET bottles and wires.
- Acrylic is used to make sweaters, shawls and blankets.



Do you know?

The world's most valuable fibre is obtained from a small wild animal called Vicuna. It belongs to a camel family.



IV. Grains

Grain is a small, hard, dry seed. Each grain is protected by a husk and the husk encloses the seed. Two main types of commercial grain crops are cereals and legumes. Wheat, maize, rice, beans, peas, barley and millets are some of the whole grains.

❖ Wheat

This is the most important crop in the world. Whole wheat is important because it is rich in fibre, vitamins and minerals. Wheat products are breads, cakes, pasta, wheat germ and cracked wheat.



❖ Maize

In many tropical and sub tropical countries (Mexico and America) maize is the main food that people eat. It is also known as corn. Maize oil is extracted from corn for cooking. Yellow or coloured corn may promote eye health. It is also a rich source of many vitamins and minerals. Corn syrup is used as a sweetener instead of sugar in many products. Maize products are sweet corn, breakfast cereal, tortilla chips, taco and maize oil.



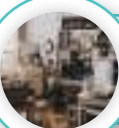
❖ Rice

Rice is a type of grass. It is cultivated worldwide after sugarcane and maize. Large parts of the world's human population especially people in Asia have this as their main food. Ninety percent of the world's rice production is in Asia. White rice contains few essential nutrients. Brown rice is a whole grain that contains the fibrous bran. Brown rice is usually considered much healthier than white rice. Rice idly, idiappam and rice aval (flattened rice) are the food items prepared from rice.



❖ Millets

Millets are a group of small seeded grasses. They are widely grown around the world as cereal crops for fodder and human food. It helps in weight loss. It is rich in fibre. Some of the millets are sorghum, foxtail millet, finger millet, pearl millet, barnyard millet, kodo millet and little millet.



V. Household Things

These are the products that we use in our houses. The things that are found in our houses permanently are called household things. Household things are furniture, kitchenware, clothes, towels, beddings, boots and electronic goods etc.

Household things used in the olden days



Household things used in the modern days



VI. Sinking and Floating

You could have seen that some objects float in water while others sink. Whether an object floats or sinks in water is determined by its density. When an object is immersed into a liquid, the liquid exerts an upward force on the object. It is known as upthrust. What happens if you put a coin and an empty water bottle in water? The weight of the coin is greater than the upthrust and so the coin sinks. But the weight of the empty water bottle is less than the upthrust and so it floats.



Activity 3

Take water in a bucket and drop the following items into the water.

Apple, Scissors, Silver fork, Marbles, Plastic ball.

Complete the table from your observation.

Things	Floats / Sinks
Apple	
Scissors	
Silver fork	
Marbles	
Plastic ball	

Floating



Sinking



Do you know?

A fish can control the upthrust on its body. So, it can float and go beneath the surface of the water.



VII. Solubility of Solids in Water

Some substances completely dissolve in water. We say that these substances are soluble in water. Other substances do not dissolve in water even after we stir for long time. These substances are insoluble in water.



Activity 4

Collect some samples of solid substances such as salt, sugar, chalk powder, sand and saw dust.

Take five beakers filled with water and add a small amount of sugar to the first beaker, salt to the second and similarly, add small amounts of other substances in other beakers. Stir the content with a rod. Wait for a few minutes. What happens to the substances added? Note your observation.

Substances	Disappears in water / Does not disappear
Salt	
Sugar	
Chalk powder	
Sand	
Saw dust	



Sugar in water



Chalk in water



Sand in water



VIII. Mixing

Certain liquids are denser than other liquids. When you attempt to mix liquids which have different densities they separate when you stop mixing them. The heavier liquid deposits at the bottom and the lighter liquid floats on the top.



Activity 5

Collect samples of coconut oil, kerosene, mustard oil, lemon juice and vinegar. Take five test tubes and fill them with water up to half mark. Add a spoon full of one liquid to this and stir it well. Keep it in a test tube stand and wait for few minutes. Observe whether the liquid mixes with water. Repeat the experiment with other liquids and tabulate your observation.

Liquid	Mixes well / Does not mix
Lemon juice	
Vinegar	
Mustard oil	
Coconut oil	
Kerosene	



Vinegar in water



Coconut oil in water



Do you know?

- Substances with similar chemical properties will mix.
- Substances with different chemical properties will not mix.



Evaluation



I. Choose the correct answer.

- Which of the following are the states of matter?
 - Solid, Liquid, Water
 - Solid, Liquid, Gas
 - Solid, Liquid, Wood
 - Solid, Liquid, Sugar
- Which of the following is a solid?
 - Kerosene
 - Air
 - Water
 - Apple
- Jute fibre is obtained from
 - leaf
 - stem
 - flower
 - root

II Fill in the blanks.

- _____ soil is suitable for growing cotton.
- The process of making cotton yarn from cotton fibre is _____.
- Ginning is done to separate _____ from the seeds.
- Synthetic fibre is also called _____ fibre.
- Woolen clothes are manufactured from _____ (plants / animals).



III. Match the following.

Yarn	-	Ginning
Lint	-	Spinning
Fabrics	-	Wood pulp
Rayon	-	Stem
Jute	-	Weaving

IV. Say True or False.

1. Coir is the outer covering of coconut.
2. Beans and peas are pulses.
3. Table is a household thing.
4. Sweet corn is not a product of maize.
5. Cotton balls contain jute fibre.

V. Complete the given analogy.

1. Solid : Table :: _____ : Water
2. Cotton seed : _____ :: Lint : Spinning
3. Coir fibre : _____ :: Cotton fibre : Cotton plant
4. Black pepper : Spice :: Sweet corn : _____

VI. Answer in brief.

1. What is known as ginning?
2. Give two examples for food products made from wheat.
3. What are synthetic fibres?
4. What is known as upthrust?
5. Name the list of whole grains.

VII. Answer in detail.

1. Discuss briefly about three states of matter.
2. Draw a flow chart to indicate the process of making fabrics from cotton ball.

VIII. Give reason.

1. Why umbrellas are made up of synthetic cloths?
2. What determines whether an object floats or sinks in a fluid?



3 Energy



Learning Objectives

After completing this lesson, students will be able to:

- ❖ know about different forms of energy.
- ❖ explain the energy changes in daily life.
- ❖ understand the law of conservation of energy.
- ❖ list out the uses of energy.



Introduction

Mala was standing in the row for her morning school assembly. Suddenly she fainted and fell down. Her class teacher rushed to her, took her to the class room and gave her water to drink. She came to know that Mala had skipped her breakfast. She was given some food and then she came back to normal. What do you understand from this?

We need energy to do our daily activities. We get this energy from the food. In science, energy is defined as the capacity to do work. Let us study about different forms of energy and their uses in this lesson.



I. Different forms of Energy

We do many works in our daily life. Many of them are done physically. Some works are done with the help of instruments and devices. But, they also need energy to work. There are different forms of energy like mechanical energy, heat energy, light energy, wind energy and so on. Let us study about them here.



Activity 1

Find out what do we need for the following.



To drive bus



To dry cloth



To cook



To work in laptop

1 Mechanical Energy

Energy possessed by an object due to its motion and position is called mechanical energy. Mechanical energy can be classified into two.

- Kinetic Energy
- Potential Energy

Kinetic Energy

Energy possessed by a moving object is known as kinetic energy. It is also known as energy of motion.

Examples: Moving car, cricket ball bowled by a player, bullet coming out of a gun.



Potential Energy

Energy possessed by an object which is at rest is known as potential energy. It is also known as stored energy of position.

Examples: Object lifted above, stone in the stretched rubber, water in the dam.



Uses of Mechanical Energy

Mechanical energy can be used to do many works. Some of them are given below.

- In hydro electric plants, kinetic energy of water is converted into electrical energy.
- Wind mills convert kinetic energy of winds into electrical energy.
- Mechanical energy of the hammer is used to apply force on the nail.
- Mechanical energy can bring a moving body to rest and make a body at rest to move.





Activity 2

Find out the form of energy in the following.



2 Wind Energy

Energy possessed by the wind is known as wind energy.

Uses of Wind Energy

- Wind mills use wind energy to generate electricity.
- Ships sail by the power of wind.
- Sports like wind surfing, sailing, kite surfing use wind energy.
- Wind energy can be used for pumping water.



Do you know?

Tamil Nadu stands first in generating electricity from wind mills. Wind mills are located in places like Aralvaimozhi, Kayatharu and Gudimangalam.



3 Heat Energy

When the temperature of a substance is raised, its atoms and molecules begin to vibrate and release a kind of energy. This energy is known as heat energy or thermal energy. This energy flows from a hot substance to a cold substance.

If we put some ice cubes into water in a glass, water becomes cold. It is because, heat is transferred from water to ice.



Do you know?

Heat is the total energy of the molecules in a body. Temperature is the measure of heat in a body.

Activity 3

Rub your hands together. What do you feel in your hands? Do you feel the heat generated by friction?



Activity 4

Take a small amount of lime powder in a glass. Add some water and stir well. Touch the glass outside. How do you feel?



In both the cases, you can feel the heat. Thus, heat is produced by friction and chemical reactions also. Sun is the primary source of heat energy.

Uses of Heat Energy

- Heat energy obtained from power stations is used to generate electricity.
- Heat energy obtained from petrol and diesel is used to run vehicles.
- We cook food with the help of heat. Heat energy renders the food material soft and easy to digest.
- Hard substances like iron are heated to mould them into different shapes.
- Heat is used to dry clothes and other wet substances.



4 Light Energy

Light is a form of energy which travels as a wave. It contains a particle called photon which are the minute packets of energy. It is the only form of energy visible to human eye. Light does not require any medium to travel. It travels at a speed of 3,00,000 km/s. Sunlight takes 8 minutes and 20 seconds to reach the earth.



Do you know?

Study of light is known as Optics.

Uses of Light Energy

- We are able to see objects with the help of light energy.
- Plants use light energy to synthesis their food.
- With the help of light energy, our skin is able to synthesis Vitamin-D.
- Electricity can be produced with the help of light energy.



5 Electrical Energy

We know that all things are made up of atoms. Atoms possess particles like protons, electrons and neutrons. Movement of electron in the objects causes an energy. This energy is called electrical energy. In our daily life we use batteries to get electrical energy. Electrical energy is also generated from nuclear power plants, hydroelectric plants and wind mills. It is also generated from solar energy.

Uses of Electrical Energy

- Electrical energy is needed for the working of fan, light, television, washing machine, refrigerator etc.
- Electric iron box, electric stove and electric water heater work by electrical energy.
- It is used to run cars and trains.
- It is used in factories to produce materials.



Do you know?

'Electric eel' is a fish which generates electrical energy. It uses this energy to defend itself against its predators.



Activity 5

Mention the places in Tamil Nadu where electrical energy is generated in power plants.



Nuclear plant	Hydroelectric plant	Thermoelectric plant



6 Chemical Energy

Chemical energy is stored in substances when atoms join together to form chemical compounds. When two or more chemical substances react with each other, this energy is released.

Uses of Chemical Energy

- The food we eat contains chemical energy.
- Chemical energy in wood provides heat energy which helps us to cook food.
- Chemical energy in coal is used to generate electricity.
- Batteries we use in our daily life contain chemical energy.
- Fuels like petrol and diesel possess chemical energy which is used to run vehicles.

Activity 6

Observe the stove burning in your kitchen. Do you see the light and feel the heat? Where do you get these from?



II. Conservation of Energy

Energy cannot be created and it cannot be destroyed also. It is changed from one form to another form or transferred from one object to another object. We can say many examples for conservation of energy in our daily life.

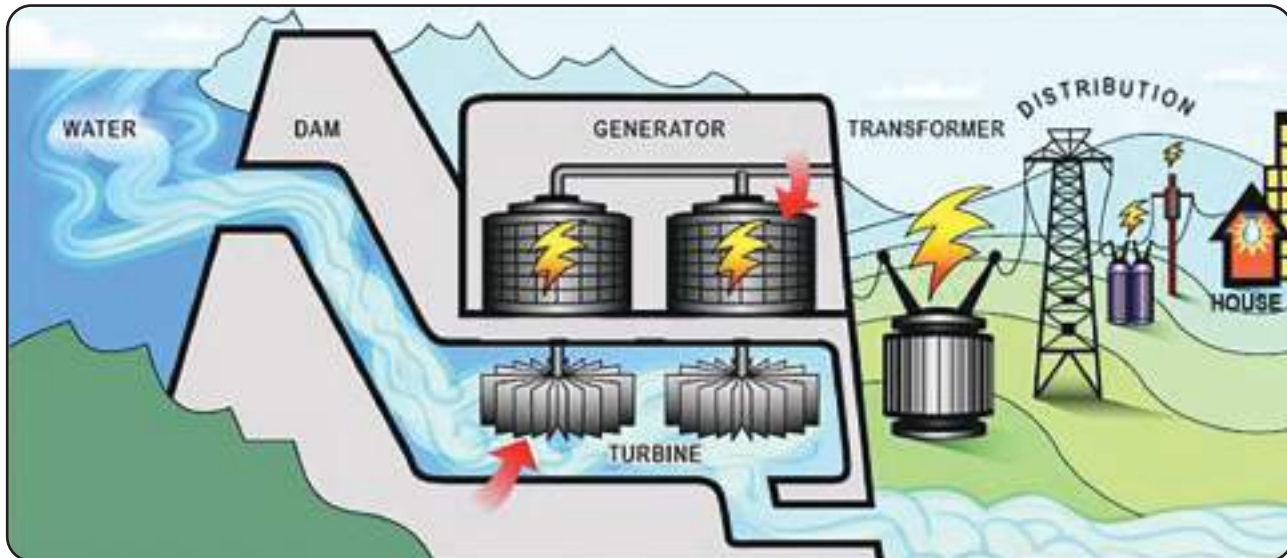
1 Water Dam

Water stored in water dams possesses potential energy. When water falls down, potential energy of water is converted into kinetic energy. Kinetic energy of water rotates the turbines and electric energy is generated.



Do you know?

Law of conservation of energy states that energy can neither be created nor be destroyed. One form of energy is converted into another form of energy. This law was given by Julius Robert Mayer.



2 Electrical Appliances

Electrical energy is used in many domestic appliances such as electric stove, iron box and fan. As current flows into the coil of the electric devices, it heats up the coil. With the help of this heat energy, we do many useful works. Thus, electrical energy is converted into heat energy. Electrical energy is converted to mechanical energy in fan, light energy in bulb and, sound and light energy in computer.



3 Driving Car

We use fuel in the form of petrol or diesel or gas to run vehicles. When this fuel burns in the engine, chemical energy is converted into heat energy. Burning fuel produces hot gases which pushes the piston in the engine to move the vehicle. Thus, heat energy is converted into mechanical energy.

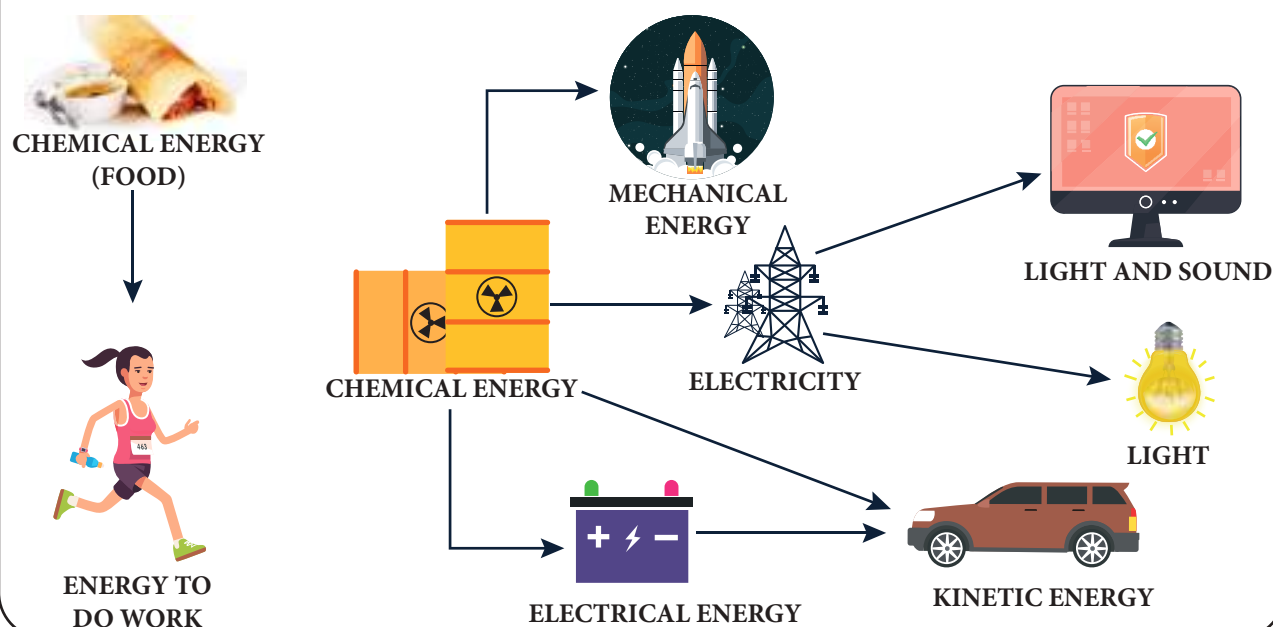


Do you know?

Photosynthesis changes solar energy into chemical energy.



Conservation of Energy



Evaluation



I Choose the correct answer.

- When diesel is burnt chemical energy is converted into _____.
 a) wind energy b) heat energy
 c) solar energy d) sound energy
- Running water possesses _____.
 a) potential energy b) chemical energy
 c) kinetic energy d) sound energy
- Unit of energy is _____.
 a) kilogram b) Newton
 c) Kelvin d) Joule
- Which one of the following requires wind energy?
 a) Bicycle b) Photosynthesis
 c) Parachute d) Automobiles
- Cow dung possesses _____.
 a) kinetic energy b) chemical energy
 c) solar energy d) heat energy



II. Find out the energy conversion that takes place in the following.

1. Iron box : Chemical energy → Heat energy
2. Electric iron box : _____ → _____
3. Electric fan : _____ → _____
4. Speaker : _____ → _____
5. Generator : _____ → _____

III. Find out the form of energy possessed by the following things.

1. A rock on the top of a hill
2. A rolling ball
3. Charcoal
4. Water falls
5. Battery

IV. Match the following.

1. Electric bell - Heat energy
2. Water in dam - Light energy
3. Solar heater - Chemical energy
4. Petrol - Potential energy
5. Torch light - Sound energy

V. Say True or False.

1. An apple falling from a tree is an example for kinetic energy.
2. Electrical energy is used to run electric trains.
3. Heat energy cannot be produced by friction.
4. Potential energy and heat energy are the two forms of mechanical energy.
5. The unit of energy is Joule.

VI. Answer in brief.

1. What is energy?
2. What are the different forms of energy?
3. What are the uses of mechanical energy?
4. State the law of conservation of energy.
5. Mention the uses of light energy.

VII. Answer in detail.

1. Explain the types of mechanical energy.
2. Explain the conservation of energy.



4

Science in Everyday Life



Learning Objectives

After completing this lesson, students will be able to:

- ❖ know about scientists from Tamil Nadu.
- ❖ understand the reason for the blue appearance of the sky.
- ❖ differentiate reversible and irreversible processes in daily life.
- ❖ get awareness about waste materials generated in home and school environment.



Introduction

Science has helped us to find solution to many of our problems. It has shaped our daily life also. The world we are living in is not the same as before. It is changing everyday, in fact every hour. We see a lot of changes around us. Some of them are reversible and some of them are irreversible. Irreversible changes like burning of wastes pollute our home and school environment. We need to know about waste management and proper disposal of wastes. Let us study about them in this lesson.



I. Scientists from Tamil Nadu

Tamil Nadu has a long history of science since ancient times. Scientific concepts can be seen in ancient Tamil literatures. Tamil Nadu has produced many scientists who have contributed to the world of science. The following table gives the names of some of the scientists from Tamil Nadu and their contributions.

Name of the Scientists	Department	Contribution
Dr. M.S. Swaminathan	Genetics	Green revolution
Srinivasa Ramanujam	Mathematics	Composite numbers
Venkataraman Radhakrishnan	Biology	Structure of ribosome
Dr. A.P.J. Abdul Kalam	Aeronautical Engineering	Missile development
Sir. C.V. Raman	Physics	Scattering of light

1 Sir. C.V. Raman (1888-1970)

Chandrasekhara Venkata Raman was born at Trichirapalli, Tamil Nadu on 7th November, 1888. In 1904, he completed his Bachelor of Arts (B.A) degree at Presidency College, Chennai. He stood first and won gold medal in Physics. In 1907, he got his master degree from University of Madras.

Sir.C.V. Raman won the Nobel Prize in Physics in the year 1930 for his work on scattering of light. In 1954, he was awarded the Bharat Ratna.



Blue appearance of the sky

One day in the summer of 1921, Sir.C.V. Raman was on the deck of a ship sailing in the mediterranean sea. He was observing the blue colour of the sky and started reasoning it. He concluded that sunlight is scattered by the gases and particles present in the air. The white light we see is composed of different colours such as violet, indigo, blue, green, yellow, orange and red (VIBGYOR). Among these colours, blue is scattered more. Because of this reason, sky appears blue most of the time. During sunrise and sunset, rays have to travel long distance. As they travel, all other colours except red are scattered. So, sky appears red at sunrise and sunset.



Do you know?

National Science Day is celebrated on 28th of February in order to commemorate the invention of the Raman Effect by Sir Chandrasekhara Venkata Raman on the same day in the year 1928.

2 Dr. A.P.J. Abdul Kalam (1931-2015)

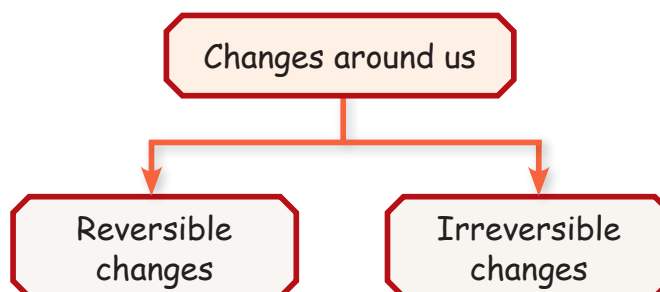
Avul Pakir Jainulabdeen Abdul Kalam was an aeronautical scientist. He was born on 15th October, 1931 in Rameshwaram, Tamil Nadu. He got his Bachelor of Science (B.Sc) degree from St. Joseph's College, Trichirappalli in 1954. In 1960, he got his degree in Aeronautical Engineering from Madras Institute of Technology.

He was involved in India's missile development programme and thus came to be known as Missile Man of India. He also served as the President of India (2002-2007) and was widely referred to as the **People's President**. He was awarded Padma Bhushan in 1981, Padma Vibhushan in 1990 and Bharat Ratna in 1997. He has written many books like **Wings of Fire**, **India 2020** and **Ignited minds**.



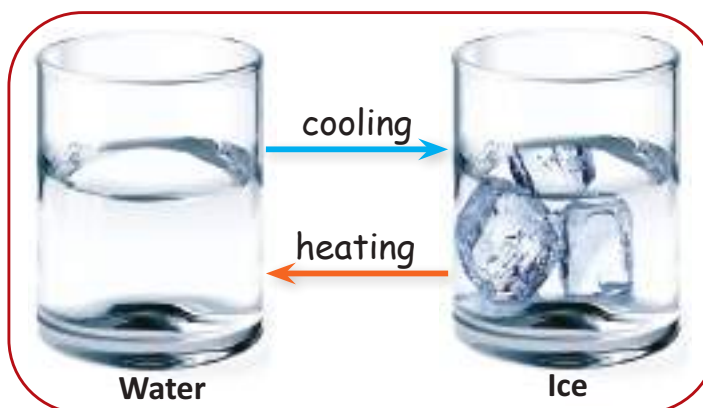
II. Changes Around Us

Change is the transition of a substance from one form to another. We see many changes around us. We see changes like day and night, summer and winter and so on. We also see changes in objects. Growth of a tree, ripening of fruits, falling of leaves are some of the changes taking place around us. You can observe changes in you also. Your height and weight increase, hair and nail grow and you have grown up as a whole compared to last year. Changes around us can be classified as reversible and irreversible changes.



1 Reversible Changes

Changes which can be reversed are called reversible changes. If you keep water in the freezer for some time, it is transformed into ice. If it is taken out, it becomes water again. This is a reversible change.



2 Irreversible Changes

Changes which cannot be reversed are called irreversible changes. If you burn a piece of paper it burns and turns into ash. It cannot become paper again. This is an irreversible change.



Do you know?

Irreversible changes are also known as permanent changes. Processes like burning, cooking, rusting of iron cause permanent changes.



Activity 1



Take an elastic band and stretch it to the maximum. Now release it. What do you observe?

Cut it now into pieces. Can you get the band back again?



Activity 2



Take a balloon and blow air into it. You can see that the shape and size of the balloon is changed. Now let the air escape from the balloon. What do you observe now?

Now blow it to its full size and prick it with the tip of a pin. It is burst. Can you get the balloon back?

From such activities we can observe some differences between reversible and irreversible changes. Differences between reversible and irreversible changes are listed below.

Reversible Change	Irreversible Change
A substance can turn to its original state.	A substance cannot turn to its original state.
The chemical properties of the substance do not change.	The chemical properties of the substance change.
Most of the physical changes are reversible.	All chemical changes are irreversible.

Activity 3

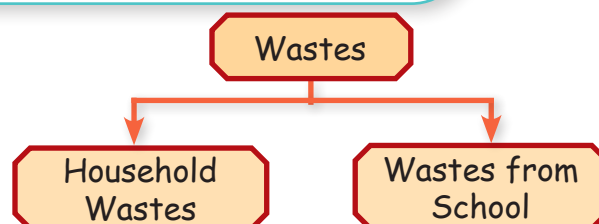
Which of these common changes, you think, can be reversed?

Change	Can it be reversed?
Raw egg to boiled egg	Yes / No
Ice cube to water	Yes / No
Batter to Idly	Yes / No
Milk to Curd	Yes / No
Grain to Flour	Yes / No
Bud to Flower	Yes / No
Cow dung to Biogas	Yes / No



III. Wastes Generated in Our Environment

Waste is any substance which is discarded after primary use. It is worthless, defective and of no use. They are unwanted and undesirable materials.



1 Household Wastes

Wastes from home is known as household waste. Solid wastes disposed from home and apartments comprise of garbage and rubbish (bottles, cans, clothings, composts, disposable items, food packings, news papers, magazines and trimmings). We can classify the household wastes as below.

Organic wastes: Kitchen wastes, vegetables, flowers, leaves, fruits.

Toxic wastes: Old medicines, paints, chemicals, bulbs, spray cans, fertilizers, pesticide containers, batteries, shoe polish.



Recyclable wastes: Paper, glass, metals, plastics.

Soiled wastes: Cloths soiled with blood and other body fluids.

e-wastes: Computer parts, electronic materials, cell phone parts, CFL bulbs.



Do you know?

- 40 million tons of electronic waste is generated every year worldwide.
- E-waste comprises 70% of our overall toxic waste.
- E-waste contains hundreds of substances, of which many are toxic.



Activity 4

Collect the wastes from your house before it is thrown into dustbin. Separate them into two groups.

Group 1: Garbage from the kitchen like fruit and vegetable peel, egg shells, waste food, tea leaves, news papers, dry leaves and paper bags.

Group 2: Pieces of cloth, polythene bags, broken glass, aluminum wrappers, nails, old shoes and broken toys.

Find out how you can dispose them properly.

2 Wastes from School

You leave many waste materials inside your class rooms and throw away many things in the school campus. If they are not collected and disposed properly, your environment will be polluted. Papers, pen and its parts, blades, chocolate covers and plastic items are found in the school environment. The single most common material generated in schools is food waste. Food is not only wasted but it is also thrown away everywhere, making your surrounding unclean.

In a survey conducted, it is found that food waste accounts for 23.9% of the total wastes generated in the school and recyclable paper like card board, white paper and mixed papers account for 23.5% of the total waste. To keep our surrounding clean, we need to have a proper waste disposal system.



Do you know?

Each one in our state capital (Chennai) contributes 700 gram of waste everyday. It is the highest in our country.



3 Need for Proper Disposal of Wastes

With so much of wastes lying everywhere, what do you think that we should do? We need a proper waste management system. Waste management is needed for the following reasons.

To control pollution

→ Various pollutions like water pollution, air pollution and soil pollution can be avoided.

To conserve natural resources

→ Waste disposal is important for the conservation of our environmental resources like forest, minerals and water.

To control spread of diseases

→ Spread of infectious diseases can be controlled.

Recycle for further use

→ Wastes can be recycled to get products for further use.

4 Ways to Reduce Waste

The best place to start difference is our home. We need to learn how to reduce, reuse and recycle wastes. The following practices will be helpful to reduce wastes in our home and school environment.

- Use reusable and recyclable bags and containers.
- Avoid one time use items and use items which can be used permanently.
- Segregate wastes into bio-degradable and non-biodegradable items and hand over them to the municipal and corporation people who collect them.
- Do not throw away your wastes everywhere. Put them in dustbins and dispose them properly.
- Don't waste food. Waste food in schools can be collected and used to feed cattle.
- Organic wastes can be converted into manures.





Evaluation



I. Choose the correct answer.

- Blue appearance of the sky is due to _____ of light.
a. reflection b. refraction c. interference d. scattering
- Who is known as Missile Man of India?
a. Sir. C.V. Raman b. Dr. A.P.J. Abdul Kalam
c. Dr. M.S. Swaminathan d. Srinivasa Ramanujam
- An example for reversible change is
a. melting of ice b. burst of balloon
c. burning paper d. change of milk into curd
- Chemical reactions are example for
a. reversible change b. irreversible change
c. both of them d. none of them
- Which of the following is not an organic waste?
a. Flowers b. Vegetables
c. Fruits d. Battery

II. Fill in the blanks.

- The book 'Wings of Fire' was written by _____
- A stretched rubber band comes back to normal shape. It is an example for _____.
- Most of the physical changes are _____ changes.
- News paper is a _____ waste.
- Wastes from house and apartments are called _____ waste.

III. Match the following.

- | | | |
|----------------------|---|------------------------|
| 1. Bud to flower | - | Dr. A.P.J. Abdul Kalam |
| 2. Reversible change | - | Recyclable waste |
| 3. India 2020 | - | Organic waste |
| 4. Paper | - | Melting of ice |
| 5. Vegetables | - | Irreversible change |





IV. Circle the odd one.

- | | | | |
|------------------|-------------|------------|--------------------|
| 1. a) Melting | b) Freezing | c) Boiling | d) Cooking |
| 2. a) Boiling | b) Burning | c) Cooking | d) Rusting of iron |
| 3. a) Vegetables | b) Flowers | c) Fruits | d) Chemicals |
| 4. a) Paper | b) Glass | c) Metals | d) Paints |

V. Answer briefly.

1. Sky appears blue in colour. Why?
2. What is reversible change?
3. Differentiate reversible and irreversible changes.
4. What are the different types of wastes?
5. Write a note on e-waste.
6. Name the scientists from Tamil Nadu.

VI. Answer in detail.

1. Write about different household wastes.
2. Explain the need for waste disposal.
3. How can you reduce waste in your school environment?

