

Basic Science

Standard VI

Part 2



Government of Kerala
Department of General Education

Prepared by

State Council of Educational Research and Training
(SCERT) Kerala

2025

THE NATIONAL ANTHEM

Jana-gana-mana adhinayaka, jaya he
Bharatha-bhagya-vidhata
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga
Tava subha name jage,
Tava subha asisa mage,
Gahe tava jaya gatha
Jana-gana-mangala-dayaka jaya he
Bharatha-bhagya-vidhata
Jaya he, jaya he, jaya he,
Jaya jaya jaya, jaya he.

PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage.
I shall always strive to be worthy of it.

I shall give my parents, teachers and all elders, respect and treat everyone with courtesy.

To my country and my people, I pledge my devotion. In their well-being and prosperity alone, lies my happiness.

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Dear Friends,

As you know, science is the field of study that helps us to understand and interpret our surroundings and nature. The world of science has always been a wonder for children. This textbook is your companion, inviting you to explore the fascinating realm of scientific inquiry. I am sure that you have innumerable questions to ask about the world around you.

This friend, in the guise of a science textbook, will encourage you to embark on a quest to find the answers to your queries. This book will help you to realise the secrets of the universe and thus become a budding scientist by actively engaging in various activities including observation, experimentation, construction, study tours, seminars, interviews, projects and reading. It is essential for a researcher to own a science kit, right? This book will give you the chance to create your own science kit and to develop it by engaging in exciting experiments in the company of your friends. This book also provides opportunities for additional reading by adding colours to your scientific thoughts. It encourages you to climb the stairs of wisdom by exploiting the possibilities of ICT. At the end of each lesson, there are many activities that can help you track your progress through self-assessment. You can also engage in further exploration with the help of what you have learned. You should participate with enthusiasm in all the activities given in the book. Record your learnings, the questions you wish to explore further and your scientific ideas in your Science Diary and share them in your classroom. Present in the Science Club the knowledge you have gained and also share it with your parents, thus, try making the Science Club active.

By engaging in scientific research activities on your own, and also with your friends, and with the help of your teachers, you can learn with joy and move forward. I hope you will remember to give your opinions and suggestions about this science textbook.

Warm regards,

Dr. Jayaprakash R.K.
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Additional information related to the concepts in the textbook is given under the heading 'For Further Reading'. It is not subjected to assessment. Please note the icon given to it.



THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a ¹**[SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC]** and to secure to all its citizens :

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the ²[unity and integrity of the Nation];

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949 do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**

1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977)
2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977)

6

Tiny Chambers of Life

Do you love to play with toy houses? Isn't it fun to build a toy house? Don't you make use of many materials around us to make toy houses and toys?

We have observed various construction activities going on around us. You might have seen construction of walls and houses.

Observe the pictures given below.



Picture - 1



Picture - 2

What do you see in both these pictures?

Picture 1:

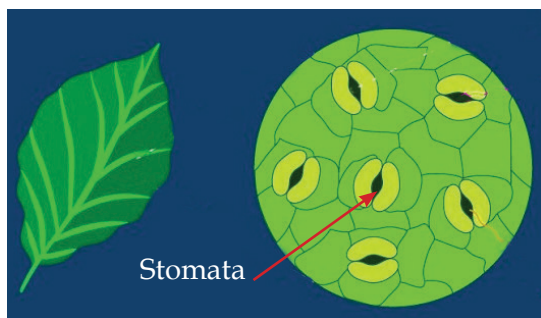
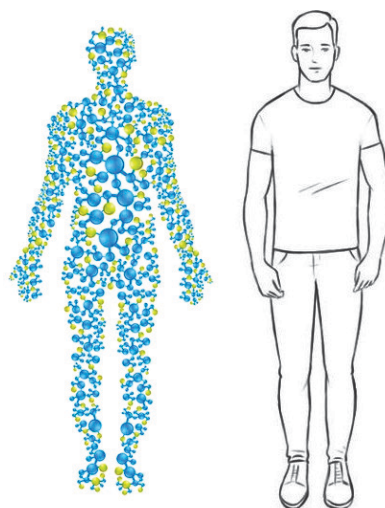
Picture 2:

You know that toy houses and buildings are constructed using building blocks. Is our body also made up of such basic units? Let's examine. Read the note given below.

Cells

Our body is built up of basic units called cells. They are the basic units of all living things. The human body is made up of millions of cells. There are many small and large organisms around us. Their bodies are also made up of cells.

The blocks used to build the house and the different coloured blocks used by the child to build the toy house can be seen with our naked eyes. Their peculiarities can also be identified. But we cannot see cells with our naked eyes. What could be the reason? Don't you remember observing the stomata in leaves in your previous class? Which device did you use to observe it? Why did you use such a device?



Cells are very tiny. They cannot be seen using a hand lens. Then, how can we observe them? We use a microscope to observe things that cannot be seen by naked eyes.

Microscope

Let's learn more about microscope.

Take a microscope from the school Science Lab and examine its parts with the help of your teacher. Which parts can you identify? Observe the given picture and record the parts of the microscope in your Science Diary.

◆ Eyepiece

◆

◆

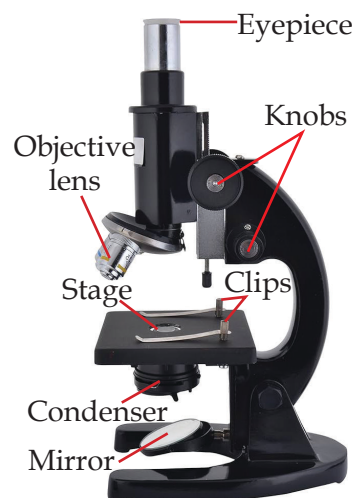
◆

◆

◆

Now you have understood the different parts of a microscope.

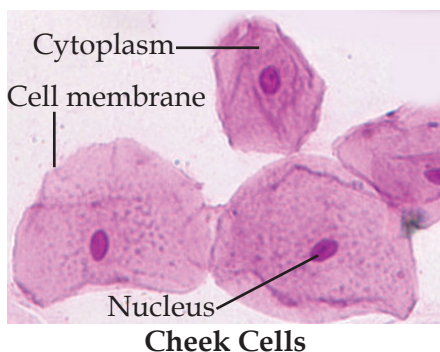
Let's Observe Cells



Shall we observe some cells of the human body using a microscope? Cells can easily be taken from the inner part of the cheek. Let's see how cells are taken from the cheek. What materials are required for this?

Materials Required: Toothpick, slide, methylene blue stain, cover glass

Rinse the mouth thoroughly with clean water. Gently scrape the inside of the cheek using toothpick. Cheek cells get attached at the tip of the toothpick. Place these cheek cells at the centre of the slide. Add a drop of methylene blue stain to it. Place a cover glass over it. Place the slide on the microscope and observe. Try to draw the observed cells.



You have observed the cheek cells. Try to understand the parts of the cell with the help of the figure. What you have observed now are animal cells. Aren't plants also living beings? Are plants also made up of cells like this? What's your guess?

Let's observe the cells in onion

Materials Required: Onion, blade, forceps, needle, watch glass, safranin stain, glycerine, pure water, cover glass, tissue paper, slide

Take a thin layer from a cleaned onion using forceps. Cut it into small pieces and put it in a watch glass containing dilute safranin stain. After sometime, take two or three pieces of stained onion from the watch glass and place it in

another watch glass containing pure water. Take one piece from pure water and place it in glycerine on the slide. Place a cover glass over this with the help of a needle. Wipe off excess glycerine with tissue paper. Observe the prepared slide under the microscope. Don't you see cells similar to those in the figure? Try to draw the cells you have observed. Don't you see similarities in the cheek and onion cells? Haven't you understood that cells are the basic units of plants and animals?



For Further Reading

Robert Hooke

The cell was discovered by Robert Hooke in 1665. He observed a small portion of cork taken from an oak tree through a microscope designed by him. He found numerous areas like tiny chambers. He called it 'Cella.' The Latin word 'Cella' means a small room. Now we call it 'cell'.

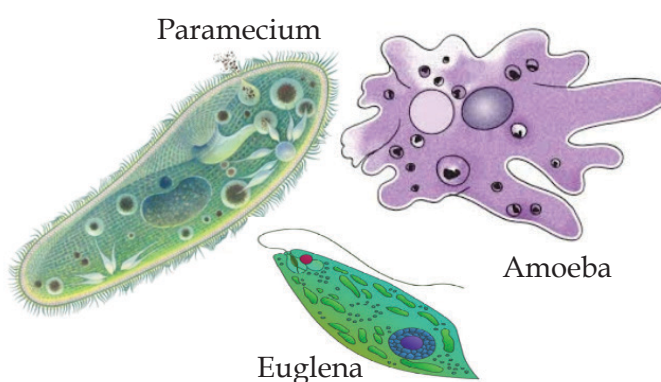


Wonder World in a Drop of Water

Let's observe a drop of water through a microscope.

Materials Required: Microscope, cover glass, water boiled with hay and cooled, water collected from pond/paddy fields, spoon

Pour some water collected from pond/paddy field into the water boiled with hay. Keep it for four or five days. Take a drop of water from this water sample on a slide. Place a cover glass over it and observe it under the microscope. Do you observe any microorganism as shown in the picture? Although they are microorganisms, their bodies are also made up of cells. How many cells do they have?



Unicellular Organisms

Unicellular organisms are organisms that have only one cell. As the number of cells is less, we cannot see them with naked eyes.

The organisms you have observed through microscope are unicellular organisms. Observe the pictures and write their names.

◆ Amoeba

◆

◆

Multicellular Organisms

Observe the pictures of the organisms given below.



Tapeworm



Leech



Cockroach



Starfish



Fish



Frog



Eagle



Garden lizard



Elephant

Microscope is not needed to see these organisms. What is the reason? There are millions of cells in human body. The organisms seen in the picture also have many cells in their bodies.

Multicellular Organisms

An organism whose body is made up of more than one cell is a multicellular organism. We can see multicellular organisms with naked eyes as they have numerous cells.

Are there similarities between unicellular and multicellular organisms? Let's examine.

Which are the life processes carried out in multicellular organisms? Discuss.

- ◆ Movement
- ◆ Nutrition
- ◆ Respiration
- ◆
- ◆ .

Do unicellular organisms also have all the same life processes as in multicellular organisms? Discuss.

One Cell, Big Facts

All the life processes in multicellular organisms occur in unicellular organisms also. In unicellular organisms, all life processes are performed by a single cell. You have understood the characteristics of unicellular and multicellular organisms. Complete the table and present it in the class.

Unicellular Organisms	Multicellular Organisms
Possess single cell	Body is made up of many cells

Into the Cell

Haven't you identified the cells of unicellular and multicellular organisms by observing them through microscope? How does the interior of cells look like? Are they similar? There are specific members within the cell to perform each function. These are called cell organelles.

A cell is like a classroom. What are the things inside a classroom? Don't they have walls as boundaries? What else are there?

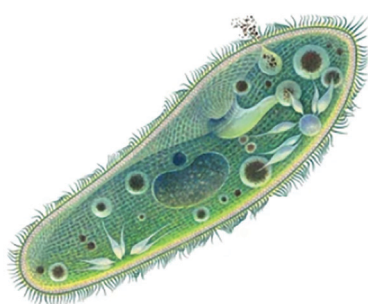
There are board, bench, desk and fan.

Do all these have the same use? Doesn't each have different uses?

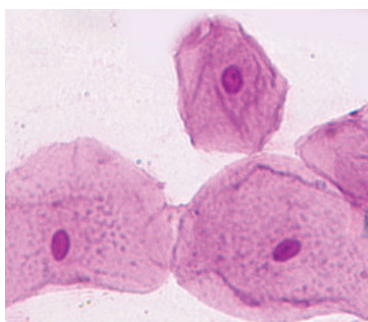
Cell organelles found within the cells are also different. Their functions are also different. Let's learn more about cell organelles.

Observe the pictures given below. What do you see?

What are their peculiarities? Write it in your Science Diary.



Unicellular organism



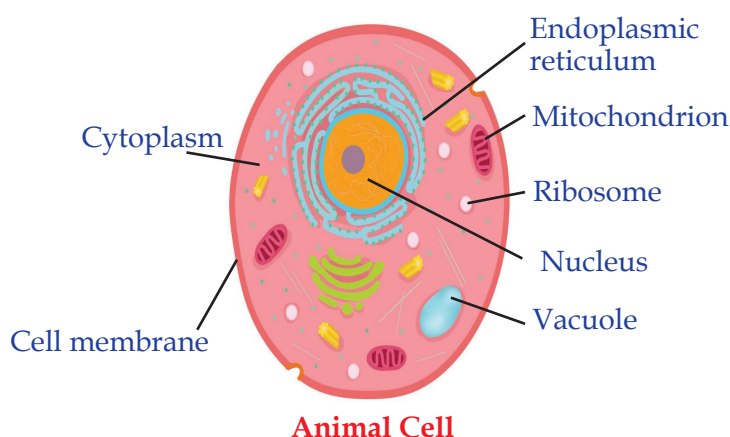
Cells in multicellular organisms



You have permanent slides of different types of cells in your school lab. Observe a slide of an animal cell through the microscope with the help of your teacher. What do you see? Don't you see the boundary of the cell? It is the cell membrane. Identify and list the different parts of cell with the help of the picture.

◆ Nucleus

◆
◆
◆
◆
◆
◆



Parts of Cell and Their Functions

Let's get familiar with the parts of a cell. The different parts of the animal cell and their functions are given in the table. Examine.

Parts of cell	Function
Cell membrane	Covers the cell
Cytoplasm	Holds the cell parts inside the cell, except nucleus
Nucleus	Controls cellular activities
Vacuole	Stores water, salt and excretory products
Ribosome	Synthesises protein
Endoplasmic reticulum	Acts as intracellular pathway
Mitochondrion	Synthesises energy

Analyse the table and discuss the role of each part of the cell based on the given indicators. Record it in your Science Diary.

- ◆ What is the function of cell membrane?
- ◆ Which is the part that controls the entire cell?
- ◆ Which cell organelle works as the powerhouse of the cell?
- ◆ Which organelle acts as the pathway within the cell?
- ◆ What is the difference between the function of vacuole and that of ribosome?

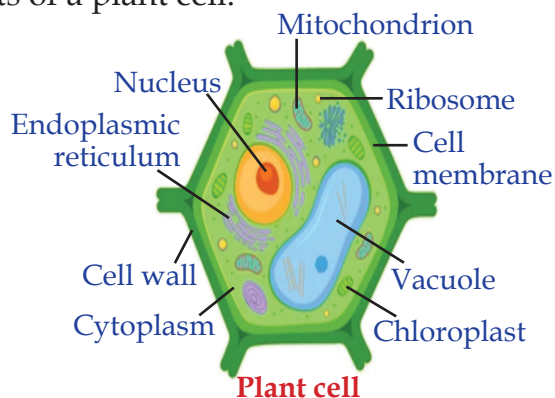
We are now familiar with the different parts of animal cell. Are they the same in plant cells also? Let's examine.

Plant Cell

Are all the parts you have seen in an animal cell present in a plant cell? Observe the picture and understand the parts of a plant cell.

- ◆ Cell wall
- ◆
- ◆

How does plant cell differ from animal cell? Do you see any part in plant cells that is different from animal cells? Analyse the figure.



- ◆ Chloroplast



Note the following table containing the list of plant cell parts that differ from animal cells and their functions.

Parts of cell	Function
Cell wall	Protects the cell
Chloroplast	Helps in photosynthesis

You have identified the parts of animal cell and plant cell.

Nucleus is an important cell organelle inside the cell. Vacuole, ribosome, endoplasmic reticulum, mitochondrion, chloroplast etc seen in the cytoplasm are other cell organelles.

Draw and label the pictures of a plant cell and an animal cell in a chart. Tabulate the similarities and differences between the animal cell and plant cell you have illustrated.

Similarities between plant cell and animal cell	Differences between plant cell and animal cell

Let's Construct a Cell Model

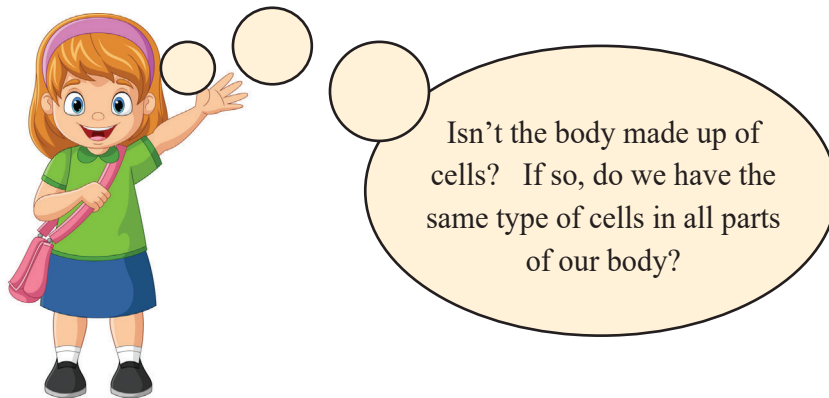
Construct models of plant cell and animal cell using materials like cardboard, white chart paper, beads, coloured yarns, coconut leaf midrib etc. Display them in the class.

Small and Large

Are you now of the same size as when you were a baby? Did your cells also grow as you grew up? Is that how you became bigger?

Are small building blocks used for small buildings and large blocks for large buildings? Aren't blocks of the same size used? When small houses are built, isn't the number of blocks that becomes lesser? Don't we require more blocks to make a bigger house? In the same way, we grow not because of the increase in the size of cells in our body, but because of the increase in their number. The difference in size between organisms is also due to difference in the number of cells.

Diversity among Cells

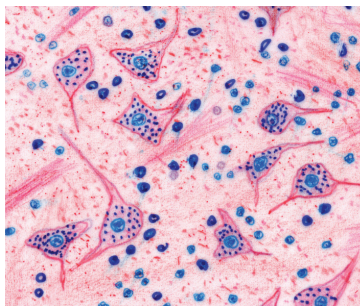


Isn't the child's doubt genuine? Eyes, legs and hands are parts of the body. Are the same type of cells found in all parts of the body? Let's examine.

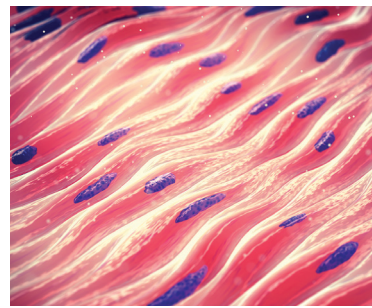
Observe the given pictures and understand the shape of different types of cells.



Blood cells



Nerve cells



Muscle cells

Diversity among Cells

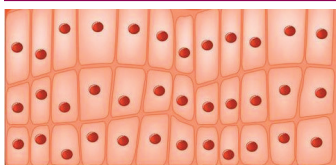
The human body is made up of different types of cells. There are about 200 different types of cells such as nerve cells, blood cells and muscle cells. Functions of all these are not the same. Their shapes also vary.

Cluster of Cells

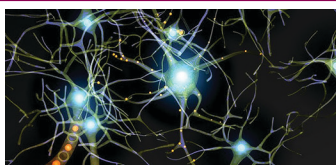
Cells that are similar in shape and perform the same function are collectively called tissues.

Tissues of Different Types

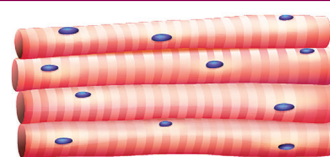
Skin is the part that covers and protects the body of animals. It is a group of cells. These are the epithelial tissues. Body has different types of tissues like nervous tissues and muscular tissues. Nervous tissues are formed by the combination of nerve cells and muscular tissues are formed by the combination of muscle cells.



Epithelial tissues



Nervous tissues



Muscular tissues

Likewise, different tissues are seen in plants also.

You have understood that cells combine to form tissues. What if many tissues combine together?

Different tissues function together to form organs. Example: Liver, heart

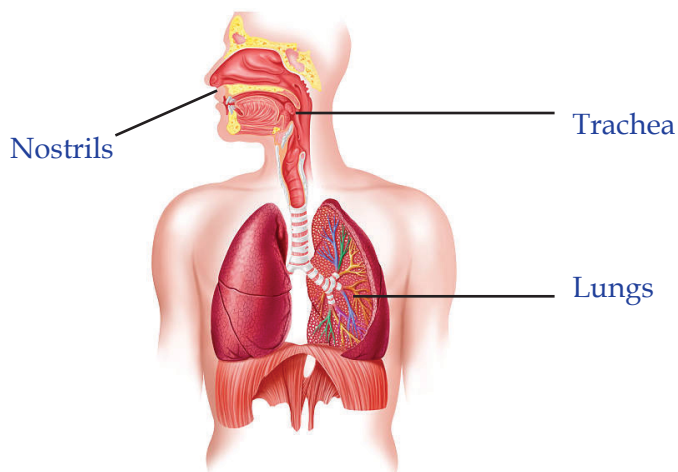
Organ System

Observe the given picture. What do you see?

- ◆ Lungs

◆

◆

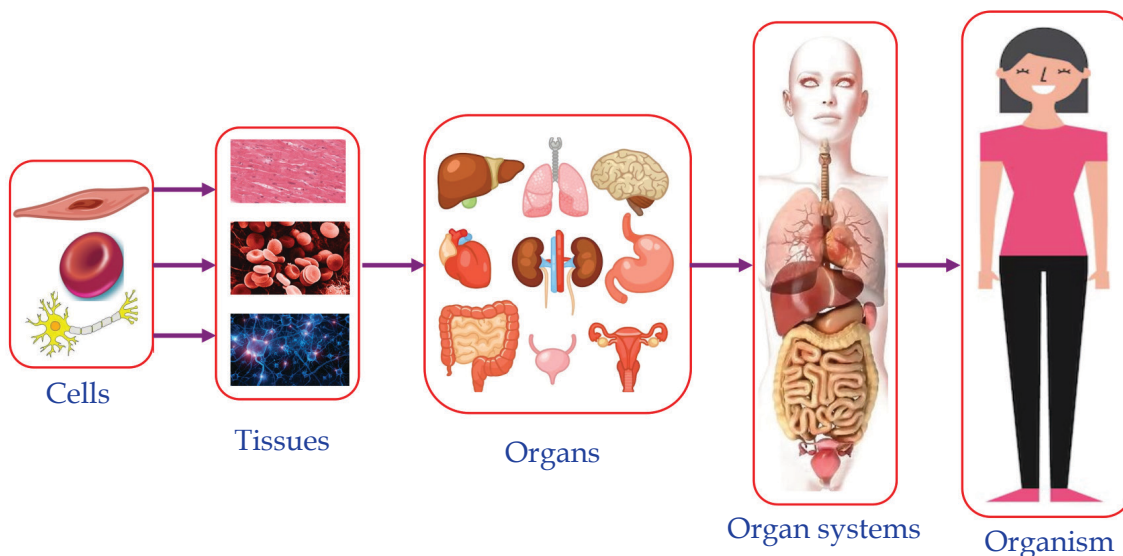


Respiratory system

Are they organs? Discuss.

When different organs function in coordination, they form an organ system. The lung is an organ. Similarly, nostrils and trachea are also organs. Together they form the respiratory system. Circulatory system is another organ system. An organism is formed by the combination of such organ systems.

Observe the illustration of the journey of a cells to an organism.



Complete the flowchart and record it in the Science Diary.

..... → Tissues → → Organ System →



Oh! me, who started my life journey as tiny cells, have now grown this much bigger!

The living world is full of diversity. This diversity begins at the very micro level. How many different organisms are there ranging from unicellular to multicellular! We can see similarities and differences between them. This is the beauty of nature. Friends, you should take care to go ahead in life by knowing and enjoying nature without disturbing it.

Let's Assess

1. Some statements related to cells are given. Identify the incorrect statement.
 - A. All cells have cell wall.
 - B. All cells have cell membrane.
 - C. All cells have chloroplast.
 - D. All cells have cytoplasm.
2. Read the given statement. 'Plant body is made up of cells. Animal body is made up of cells.' What conclusion can be drawn from these statements?
 - ◆ There is no diversity among the cells of living organisms.
 - ◆ Cells are the building blocks of all things.
 - ◆ Cells are the building blocks of all living things.
 - ◆ Organ systems in animal body and plant body are the same.
3. Arrange the following in sequential order.
Cells, Organism, Tissues, Organ system, Organ
4. Unicellular organisms have smaller cells and multicellular organisms have larger cells. What is your response to this statement?

Extended Activities

1. Prepare slides of plant parts and observe them under microscope.
2. Collect information related to Robert Hooke and history of cells from the library or internet. Prepare notes and present them in the class.

7

The World of Changes

Was it such an
egg that turned
into me!



Didn't you notice the picture? What a cute chick....! Do you know how this chick came out? Wasn't it hatched from an egg? For an egg to hatch and become a chick, many changes must have occurred within the egg.

Observe the pictures given below. What changes do you notice in each pair?

- ◆ Jaggery : crumbles
- ◆ Bean seed :
- ◆ Cloud :

Observe your surroundings and find more examples for similar changes. Write them in your Science Diary.

- ◆ Mango : Ripens
- ◆
- ◆

Changes are Many

Observe some handicrafts made from wax and paper.



Aren't you interested in making such handicrafts? Let's do it.

Materials Required: Colour clay, colour paper, chart paper, beads, scissors, sketch pen

Using the materials provided, try to make the objects shown in the picture. Display them in the class.

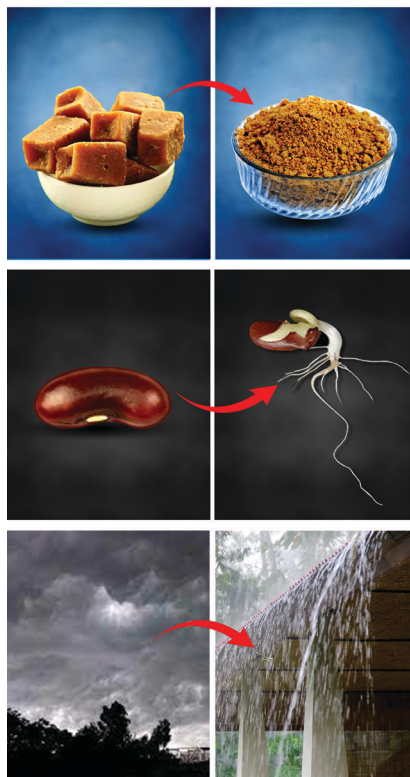
What changes have occurred to each of the materials you used?

Colour clay :

Colour paper :

Chart paper :

In the case of colour clay, was it the substance or its shape that changed?



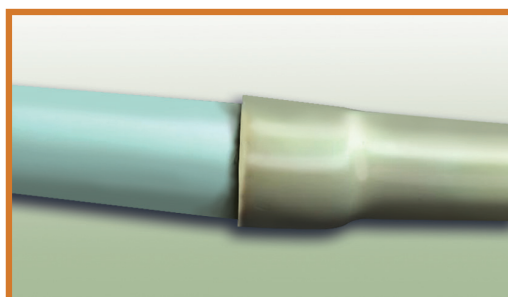
What changes occurred when handicrafts were made using chart paper and colour paper?

Does the substance change in each case? Discuss.

Isn't it the same substance that changed into different shapes in each of these situations?

Change in Shape

Examine the pictures given below. What change happens to the object in each situation?



Are all the changes shown in the pictures similar? Discuss.

Change of State

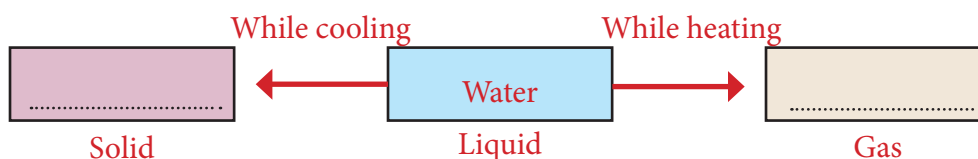
Haven't you learnt the changes in the state of water in the previous class? Try to write them.

Write the situations where nature and other living organisms make use of the change in the state of water.

- ◆ Formation of rain

- ◆
- ◆
- ◆

When the state of water changes, is there any change in water as a substance? Discuss. Aren't ice and water vapour the two other states of water? Complete the illustration.



Shape, size and state are the physical properties of substances. Consider the situations we have already discussed.

- ◆ Making various shapes using clay
- ◆ Making chair using wood
- ◆ Cutting watermelon into pieces
- ◆ Converting water into ice
- ◆ Expanding plastic pipe by heating

Didn't the physical properties of the substance change in all these situations? Was any new substance formed? Let's enquire more situations where physical properties change without any change in the substance.

When Wax Melts

Candle is a solid, isn't it? Cut a candle into small pieces. Now what change has occurred to the wax?

Isn't the wax still in the same state?

Take a small piece of wax in a spoon and heat it. What change has occurred to the state of the wax? Allow the molten wax to cool for a while. Now, what change has occurred in its state? Aren't the solid wax and the molten wax the same substance? Did the change in wax result in the formation of a new substance? Did it become a new substance on cooling? Tabulate your observations.

Item	Change	State
Cutting wax into pieces		
Heating wax		
Cooling molten wax		

Heat the wax in the spoon for a longer time. Do you see the wax there now?

Where did the wax go? Discuss and write down the changes of state of wax on heating.

Let's do another experiment to observe the changes of state of wax on heating.

Materials Required: Wax, boiling tube, test tube holder, cotton, lamp

Take a piece of wax in the boiling tube and heat it using the lamp as shown in the picture. The mouth of the boiling tube should be closed with cotton. What change happens to the wax in this experiment? Observe. Heat the molten wax again. What happens?

Remove the boiling tube from the lamp and observe it after a short while.

What do you see inside the boiling tube now? Take out the cotton from the boiling tube and observe. Can't you see traces of wax on the cotton and in the upper part of the boiling tube? Observe the sides as well. What is the reason for this?

Based on the indicators given below, analyse the change that occurred in each situation. Arrive at a conclusion. Record it in your Science Diary.

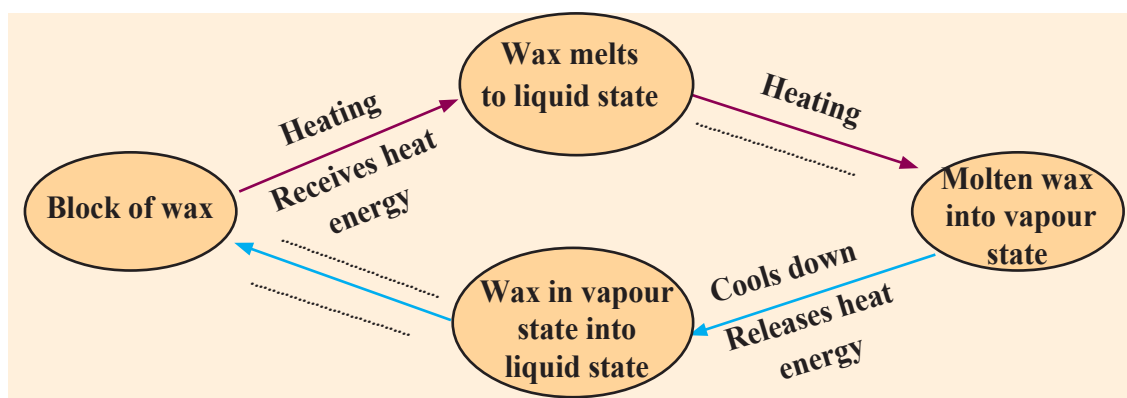
Indicators

In the experiment you conducted

- ◆ What was the state of the wax before heating?
- ◆ What change occurred in its state when heated?
- ◆ To which state did it change on heating further?
- ◆ To which state did the vapourised wax change on cooling?
- ◆ Did the wax turn into a new substance when its state changed?
- ◆ Is the change that occurred to the wax permanent or temporary?

Observe the illustration of the change that occurred to wax. Fill in the missing parts.





Discuss the changes that occurred when wax received heat energy. Record them in your Science Diary. Similarly illustrate the change of state of ice when heat is received and releases. Record it in your Science Diary.

Is the change that occurs in ice, temporary or permanent? Is any new substance formed when ice undergoes a change of state?

Haven't you noticed that ghee, coconut oil etc., that we use at home get solidified? In which season do these get solidified? Are these changes temporary or permanent? Do these changes result in the formation of new substances? Discuss.

So far we have discussed the changes in the physical properties of substances like size, shape and state. Such changes are physical changes. No new substances are formed through physical changes. Find examples for these and list them. Present them in the class.

Physical Change

Changes in the physical properties of substances such as size, shape, and state are called physical changes. Expanding, melting, breaking and tearing are physical changes. No new substances are formed due to these physical changes. In some physical changes energy is either absorbed or released.

Physical Changes in Daily Life

What do we do with broken and unusable plastic items at home?

- ◆ Making decorative items
- ◆ Giving them to the Haritha Karma Sena (Green Action Force)
- ◆

Can these items be recycled? Can any products be made by utilising changes in physical state? How is the change of state made useful in recycling?

Recycling

Plastic carry bags and other plastic items thrown around carelessly cause major environmental issues. Most of them can be recycled into new items. Metals like iron, brass and aluminium can also be recycled in this way.



Reuse

Haven't you seen many items that are no longer useful, being used for other purposes? This is reuse. You can also make use of such unusable materials in various ways like this. Look at the examples given in the picture.



Let's Protect Nature

When plastic burns, poisonous gases harmful to living organisms are produced. Reusing and recycling plastic, instead of throwing it away or burning is an act of nature conservation. Protect nature by proper utilisation of physical changes.

We have discussed the physical changes of wax, water, plastic etc. Find more examples of physical changes being used in life situations and write them in your Science Diary.

Situation	Physical Change
Grinding rice	Size decreases, becomes powdered

Complete the table and present it in the class.

Are all the changes happening around us physical changes?

Changes in This Way Too

Haven't you seen paper and wood burning? What change does happen here? Compare it with physical change. You have already understood that when paper is cut to make new shapes, the substances in the pieces of paper and the paper do not change. Is the substance obtained after burning paper the same as the paper before burning? Isn't the ash obtained after burning the paper a new substance? What happens when firewood burns? Discuss. Are the changes that occurred here permanent or temporary? Find more examples of permanent changes. Shall we do an experiment related to this?

Materials Required: Sugar, spoon, matchbox, candle, coconut leaf midrib, lamp

Take a little sugar in a spoon and heat it using the lamp. Observe the change in sugar. Take the molten sugar on a coconut leaf midrib and taste it. What happens on heating it further? Does the colour of the sugar change? After cooling take this substance on another coconut leaf midrib and taste it. Heat it again until it turns black. Take this substance on another coconut leaf midrib, cool it and taste. Is there a change in taste? Is this a new substance?



Tabulate the change that occurred to sugar at each stage.

Situation	Change			Whether new substance formed
	Colour	State	Taste	
On mild heating		Melts		
When the molten sugar is heated again				
On prolonged heating				

Analyse the changes and characteristics of the substances formed here. Are charcoal, the black substance obtained at the end and the sugar the same? What is the reason for the change in taste?

Cool the substance obtained. Does the new substance turn back into sugar? What are the characteristics of this change? Discuss. Record it in your Science Diary.

Shall we do another experiment?

Materials Required: Matchbox, magnesium ribbon, sandpaper

Clean the magnesium ribbon by rubbing it with sandpaper. With the help of the teacher, burn it using a matchstick.

Find the changes and discuss.



Weren't new substances formed in both the experiments you have done? They can't be changed back into the original substances. Therefore, these changes are permanent changes. Such changes are chemical changes. In chemical changes also, energy is absorbed or released. What are the characteristics of chemical changes? Discuss.

Chemical Change

When a chemical change occurs, the chemical properties of the substance change and new substances are formed. Energy is usually absorbed or released when such a change occurs. Chemical changes are permanent changes.

You have understood the major differences between the changes that occurred on heating wax and sugar. Discuss and tabulate the differences between physical and chemical changes. Present them in the class.

Physical Change	Chemical Change
The physical properties of substance change	The physical and chemical properties of substance change

Chemical Change in Daily Life

Many chemical changes occur daily in nature. We make use of many of these changes in our daily lives. Shall we discuss such experiences?

How do you understand that a mango has ripened? The ripening of a mango involves chemical changes. How is milk converted to curd? A chemical change occurs during curdling of milk also.

Some chemical changes that occur in daily life are given below. Discuss them.

- ◆ Digestion of food
- ◆ Verdigris on copper vessels
- ◆ Rusting of iron
- ◆ Souring of curd
- ◆ Burning of sparklers

- ◆ Cooking food
- ◆ Colour change of sliced apple
- ◆ Decomposition of waste

Among these, there are chemical changes that are useful and not useful for us. Tabulate and present them in the class. Find more examples of chemical changes and write them in your Science Diary.



Can we control the chemical changes that are not useful to us? What do we usually do to prevent rusting of iron? Discuss. Haven't you noticed that iron pans are usually greased with oil? Find other methods like this that are being used to control chemical changes. Write them down.

Rust

Rust is formed by the reaction of iron with the moisture and oxygen in the air. Rusting of iron objects can be controlled by greasing them with oil or by painting. By doing this, the contact of iron with air is prevented.

Spoilage of food items is due to the chemical changes caused by the action of bacteria. What is usually done at home to prevent this? Find out.

- ◆ Storing in a refrigerator

◆

◆

Let's Observe and Find

Let's do some experiments using some substances available at home.

Materials to be kept in the Science Kit:

Vinegar, eggshell, baking soda, glass, spoon

- ◆ Crush the eggshell into small pieces. What kind of change is this? Put a few pieces of eggshell in a glass. Pour vinegar into it and observe the change. Discuss the changes taking place here.
- ◆ Take a little vinegar in a glass and add one spoon of baking soda to it. What happens? What type of change is this?

Select different objects and design experiments with the help of the teacher. Conduct the experiments, record conclusions, present them in the class and discuss.

When a Sparkler is Lit

Isn't it fascinating to watch a lighted sparkler? What are the things that attract you?

◆ Sound ◆..... ◆.....

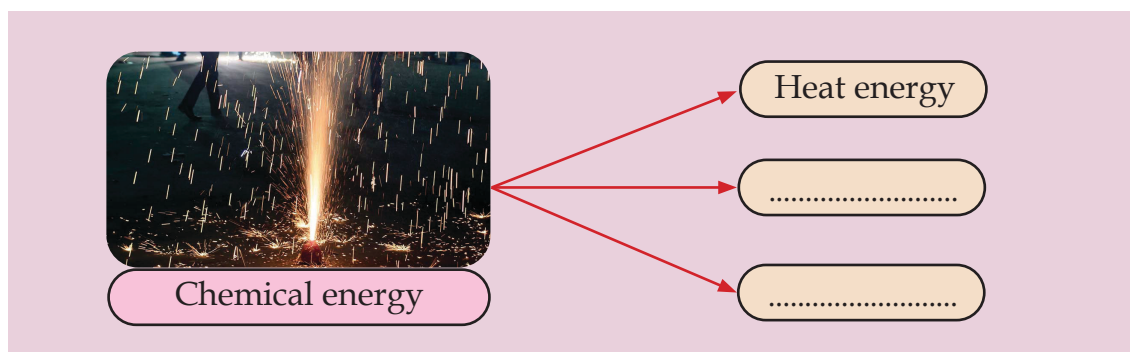
We know that when a sparkler is lit a chemical change takes place.

When a sparkler is lit, forms of energy like sound, light and heat are produced. You know that sound, light and heat are forms of energy. What is the reason for the energy change when a sparkler is lit?



There are chemical substances in a sparkler. It contains chemical energy. Chemical energy is present not only in the substances present in a sparkler, but in all substances. When the sparkler is lit, the chemical energy in the sparkler is converted into the forms of energy like sound, light and heat.

Which are the energy changes that happen when a sparkler is lit? Complete the illustration given below.



Some chemical changes are given in the table. Discuss the energy changes taking place in them. Put a tick (✓) mark in the appropriate columns. Write the conclusions in the Science Diary.

Chemical Change	Energy Change		
	Heat	Light	Sound
Paper burns			
Camphor burns			
Fire crackers bursts			
Cooking gas burns			

Energy Change in Plants, too

Observe the picture. What is the process taking place in plants?

Which substances are being used here?

Which form of energy do plants use during photosynthesis? The food that plants produce through photosynthesis is glucose. It contains chemical energy.



Photosynthesis

Photosynthesis is the process by which plants produce food using water and carbon dioxide, in the presence of sunlight, with the help of chlorophyll.

You have understood that when plants produce food, light energy is stored as chemical energy. Does this chemical energy stored in plants reach other living organisms? How does this happen? Discuss.



For Further Reading

Firefly

Haven't you seen fireflies glowing at night? Certain chemical substances in their bodies produce light. When a firefly glows, chemical energy is converted into light energy.



Let's explore more examples of energy change.

Energy Change in Daily Life

Energy changes are used for various purposes in daily life.



Haven't you seen a mixer grinder working? Which energy is used to operate the mixer grinder?

Do any parts of the mixer grinder move? Which form of energy is required to move the machine parts?

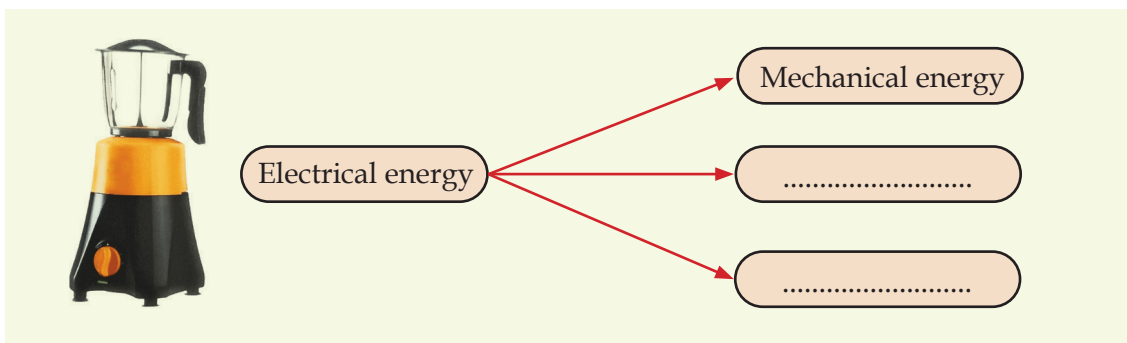
Moving machine parts possess mechanical energy.

Sound is produced while the machine part of the mixer grinder works. Apart from the forms of energy discussed earlier, are there any other forms of energy produced here?

Switch off the mixer grinder and touch it. Is it warm?

You have understood that when a mixer grinder works, electrical energy changes into various forms of energy.

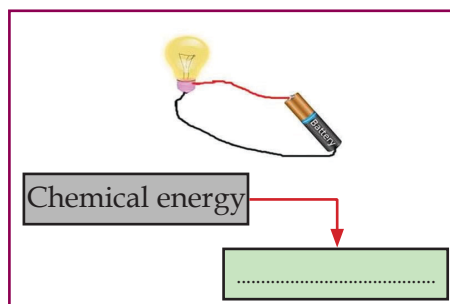
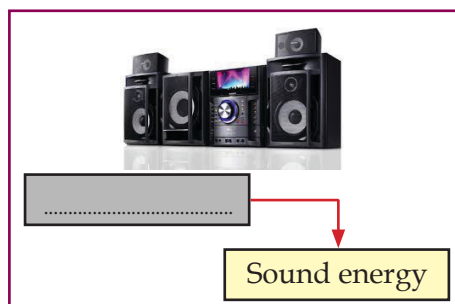
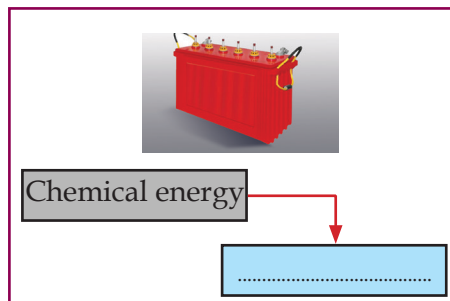
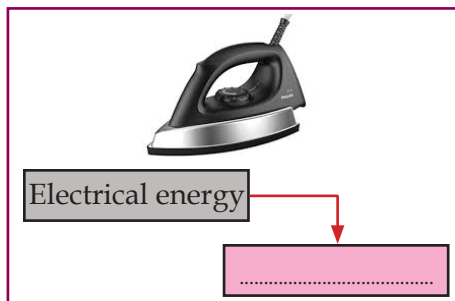
What are the energy changes that occur when a mixer grinder works? Write them in the Science Diary.



Have you understood that when a mixer grinder works, electrical energy is converted into mechanical energy, sound energy and heat energy.

Discuss the devices that convert electrical energy into mechanical energy and write them in the Science Diary.

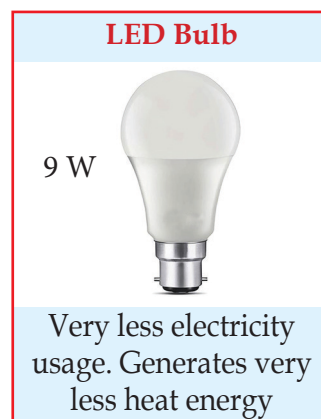
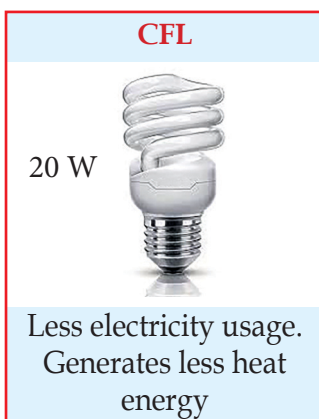
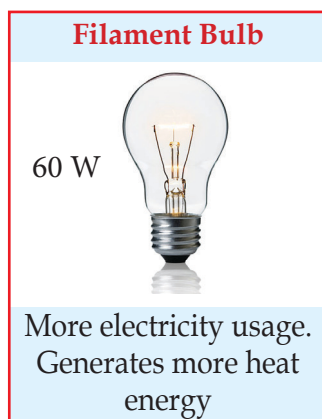
Observe the pictures given below. What energy transformations do we utilize in each device?



Find more examples of utilising energy transformations and write them.

Energy Transformation and Energy Loss

When energy transformation occurs doesn't a lot of energy get wasted without being used? We use an electric bulb to get light. But doesn't heat also get generated in the bulb? Heat generated like this is not utilised. The pictures below show three different types of bulbs we have used at different periods. The amount of light obtained in all three cases is almost the same.



Which of these do you use more in your house? Why? Analyse the energy transformations happening in each and find the reason.

We don't utilise the heat energy produced along with light energy when a bulb glows. Unutilised heat energy is energy loss.

What is the advantage of reducing the use of filament bulbs and increasing the use of LED bulbs? What could be the reason for the promotion of LED bulbs by the electricity board? You must promote LED bulbs in your house too.

In many situations, one form of energy is transformed into multiple forms of energy.

Haven't you understood that we don't use all these forms of energy?

Which forms of energy are produced in the following situations? Which form of energy among them is utilised? Which forms of energy are wasted? Complete the table, analyse and present it in the class.

Situation	Form of energy produced	Form of energy utilized	Form of energy not utilized
Working of a water motor	Mechanical energy Heat energy Sound energy	Mechanical energy	Heat energy Sound energy
Working of a fan			
Working of mixer grinder			

Knowledge about chemical change, physical change and energy change helps us to understand and explain the changes happening around us.

Use of devices that reduce energy loss in energy transformations make our lives better. This helps in energy conservation.

Let's Assess

- Find the odd one out.
 - Fire cracker bursts
 - Bottle breaks
 - String of kite breaks
 - Electric wire breaks
- Examine the following changes and write whether they are chemical change or physical change.

Change	Chemical change/Physical change
Camphor burning	
Copper vessel getting verdigrised	
Cutting firewood	
Fermentation of dosa batter	
Melting of tar	
Towel absorbing water	
Sugar dissolving in water	
Fish getting spoiled	
Green leaves turning yellow	

- You know that electrical energy is being used by converting it into different forms. Write down the names of the devices that utilize the following energy transformations.

Electrical energy to heat energy
.....
.....
.....

Electrical energy to chemical energy
.....
.....
.....

Electrical energy to sound energy
.....
.....
.....

Electrical energy to light energy
.....
.....
.....

4. All changes that occur by absorbing heat are chemical changes. Is this statement correct? Why?

Extended Activities

1. Write examples of chemical and physical changes by observing the activities in the kitchen.
2. Find methods that reduce consumption of electricity and record them in your Science Diary.
3. What are the methods that you would suggest to reduce energy loss in the following situations? Write your suggestions and present them in the class.
 - a) Old fan makes more noise when it works.
 - b) Wear and tear occur in the engine parts of vehicles.
 - c) Fire escapes from the firewood stove.

8

Motion in Daily Life



Do you like to go to parks? You might have seen various rides in parks. The picture shows different rides in such a park.

What do you see in the picture?

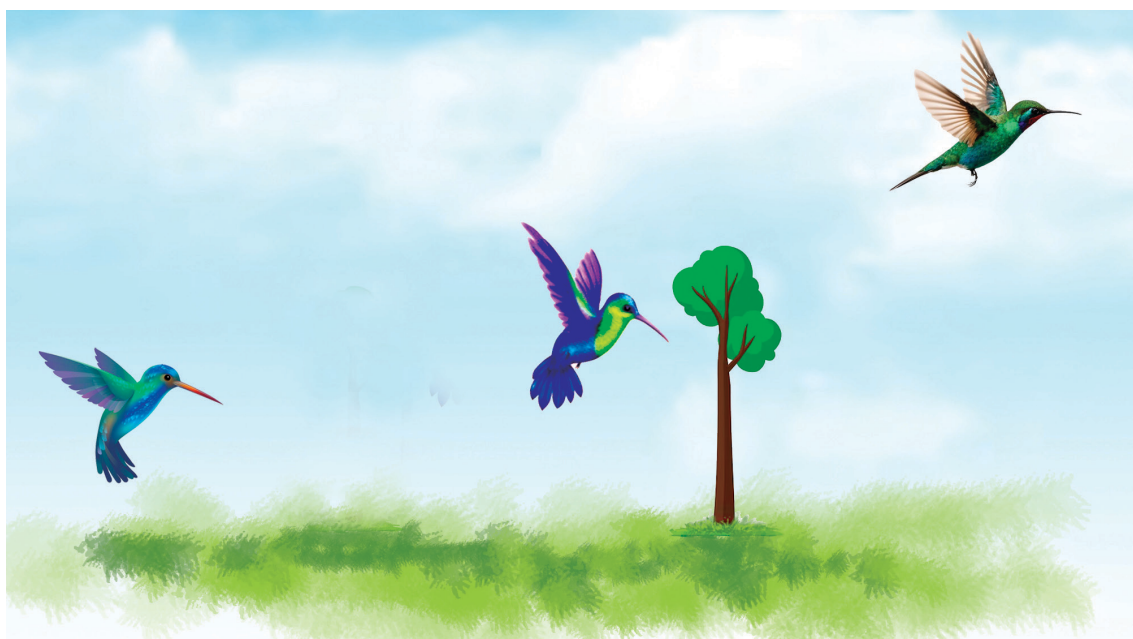
- ◆ Giant Wheel ◆
- ◆ ◆

Have you been on any of these rides? Do the rides differ from one another? Imagine that you are on a rotating giant wheel with your friend. When the giant wheel rotates, don't you also move along with it?

Do people in the train ride also move like this? What about the movement of those in dashing cars? Other than this, don't we see many movements around us? Write some other movements seen around you.



Why do we say that these are moving? When an object is moving, isn't there a change between its initial position and that after a while? Three positions of a flying bird are shown in the picture given below. Observe the picture. Hasn't the position of the bird changed? Based on this, can you explain motion?



Motion

Motion is the change in position of an object.

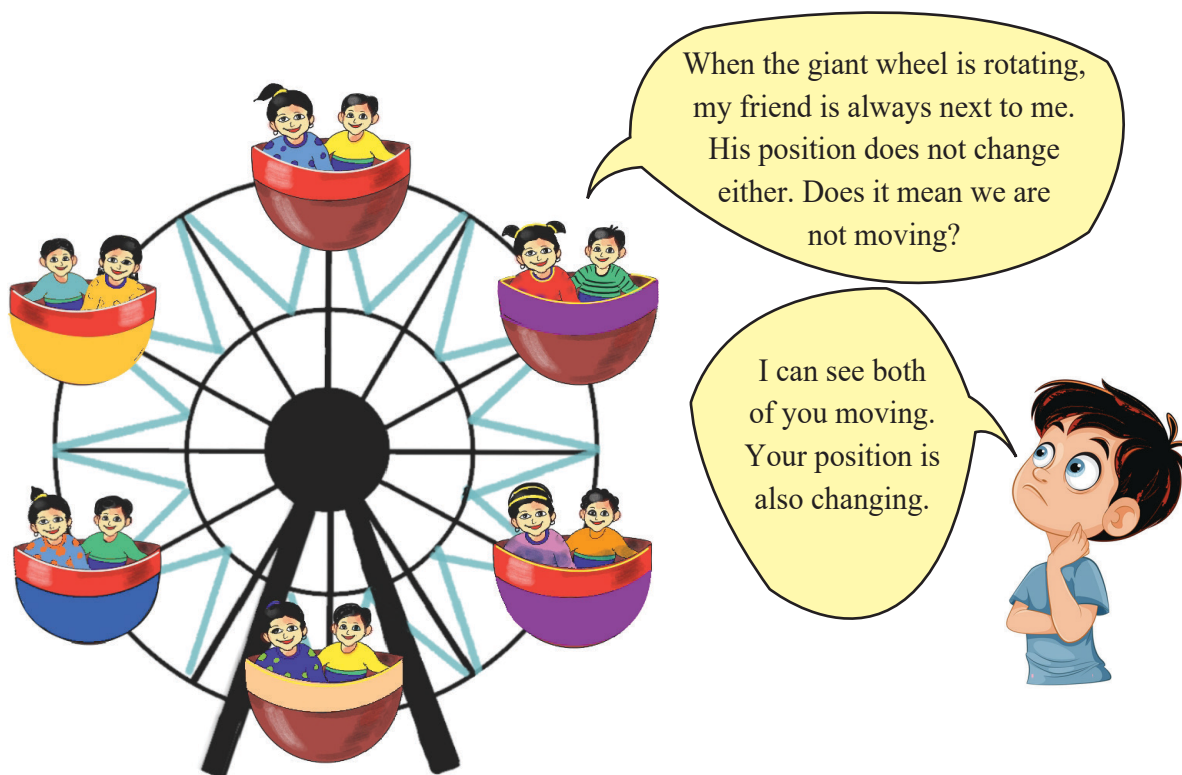
There is change in position of the object in all the movements you have observed. Do all the objects around you move? Which objects do not seem to move? Write them.



Why do you consider these as not moving?

State of Rest

State of rest is a state in which the position of an object does not change.



Haven't you listened to their conversation? Are the children in the giant wheel moving? What is your opinion? Discuss in the class.

With respect to the child in the giant wheel, does the co-rider have a change in position? What about the change in their position with reference to the child standing below?

It is in the relation to another object that an object is said to be in motion or not. There is no change in position for the child in the giant wheel with respect to the co-rider. On the other hand, all the children in the giant wheel have change in position with respect to the child standing below.

Reference Body

An object can be said to be in motion only in relation to another body or position. The body used for this purpose is called reference body.



Observe the picture of the school sports meet and complete the table below.

Context	Motion		Reason
	Yes	No	
◆ Child sitting in the gallery			The position does not change with respect to the gallery
◆			
◆			
◆			

Analyse the table. Who among these are moving? On what basis are they found to be in motion?

It is based on a position that an object is found to be moving or at rest. Children are said to be in motion based on their change in position.

Haven't you noticed moving objects and objects at rest in everyday life?

Record some moving objects and the objects at rest that you know.

Moving Objects

- ◆ Fish swimming in the pond
- ◆ Car moving on a road
- ◆
- ◆

Objects at Rest

- ◆ House
- ◆ Rock
- ◆
- ◆

On what basis do you say that each moving object is in motion? How do you say that object at rest are not moving?

Movements Everywhere

Everything in the universe, including the planets, stars and galaxies, are moving every moment. The very existence of the universe is based on this motion. All the objects on earth that are assumed to be at rest are also moving along with the earth.

Motion of an object can be explained only based on a reference body. It is only when the reference body changes, that we understand many objects that appear to be at rest are actually in motion.

We have understood that some objects are said to be at rest with reference to the earth. However, the earth and all the objects on it are in motion with reference to the sun and other spheres of the solar system.



Haven't you observed the movements of birds and animals? Do all of them have similar movements?

How does a frog move? How about mabuya?

Haven't you seen domestic animals like cats, dogs and cattle taking rest? Don't their body parts move even when they are at rest? Have you noticed the movements in their body when they are breathing? Discuss.

Everyone be silent and close your eyes for a while and listen to the movements within your own body. Which are the movements you have recognized? What are the other movements that take place within the body?

Tabulate the movements you have noticed.

Organ	Various Movements
Heart	Heart beat

The very existence of life is through the coordination of various rhythmic movements.

Different Types of Motion



Observe the picture. Do the children make the same movements while they play in the park? How does each movement differ? Through discussion, find out the type of motion that takes place in each equipment and complete the table given below.

Equipment	Characteristic of Motion
Swing	
Rotating disc	
Slider	
Seesaw	

Do and Learn

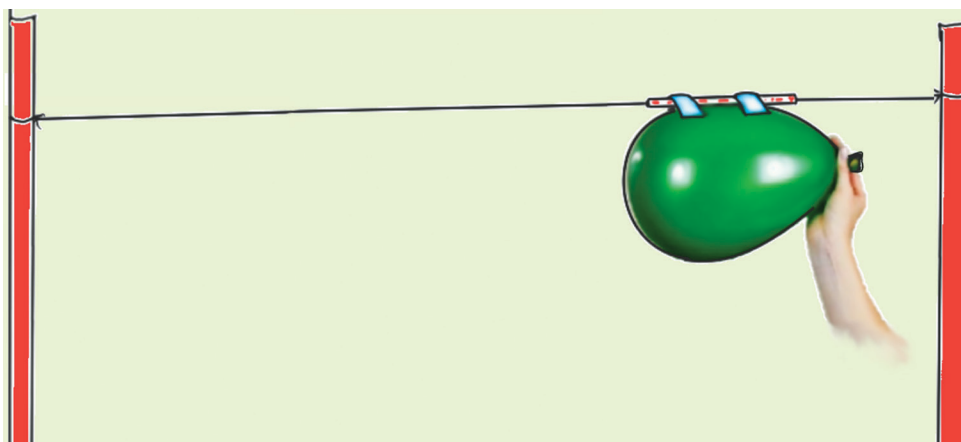
Let's do some experiments to learn more about the characteristics of different types of motion.

Experiment 1 : Motion in a straight line

Balloon Carriage

Materials Required: Twine, straw, cello tape, balloon.

Pass a twine through a 5 cm long straw. Tie up each end of this twine at the same height in convenient places in the class. Glue the inflated balloon to the straw parallel to the twine as shown in the picture. Release the air in the balloon. What do you observe? How did the balloon move?



Linear Motion

Linear motion is the motion of an object along a straight line.

Find examples of linear motion in the movements you see every day and present them in the class.

Experiment 2 Motion about own axis

Materials Required: Ice cream ball, small sharpened pencil



Make a hole each on the lid and at the bottom of the ice cream ball and put a sharpened pencil through them as shown in the picture and tighten the lid. Keep the tip of the pencil on the floor and try to rotate it. How does it move? Discuss the observations. Don't you understand that movements also take place about its own axis?

Rotational Motion

Rotational motion is the movement of objects about their own axis.

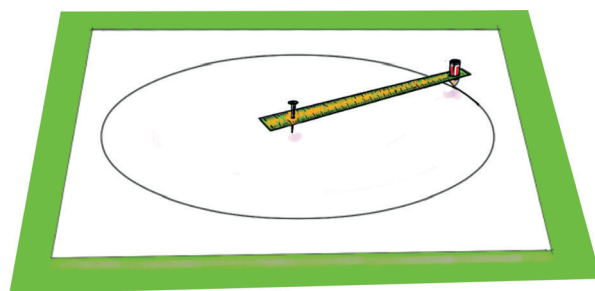
You have learnt that it is the rotational motion of the earth that causes day and night.

Experiment 3 : Motion in a circular path

Haven't you observed the movement of the second hand of a clock? How does it move? What about the second hand of a watch? Don't they move in a circular path about a point? Let's do an activity to observe the motion in a circular path.

Materials Required: Wooden scale, nail, pencil, paper

Make one small hole each about a centimetre away from either end of the wooden scale. Insert a nail through one hole and fix it on a paper kept on the table so that the scale can rotate freely. Insert a pencil through the hole on the other end. Move the scale on the paper in a circular path. Similarly draw a circle



on another paper using a compass. In both these cases, the path of the pencil forms a circle. The path in the shape of a circle is called a circular path. Aren't the kids in a giant wheel also moving in a circular path?

Find out the rides moving in a circular path in the children's park and write their names.

Circular Motion

Circular motion is the motion of objects in a circular path.

Observe the surroundings to find more examples of circular motion and write them in the Science Diary.

Experiment 4 Moving To and Fro

What is the peculiarity of the motion of a swing? Let's create a similar movement in the class.

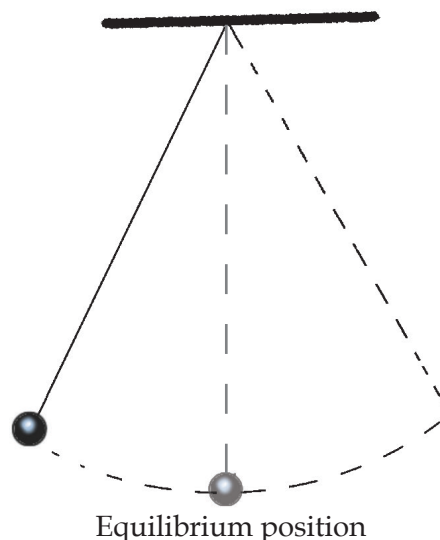
Materials Required: Nail, twine, stone

Using stone, nail and twine, make an instrument similar to a swing as shown in the picture and swing it. The position at which the suspended stone remains stationary is the equilibrium position.

What are the characteristics of the motion you have observed?

The movement of the stone to either side is with respect to the equilibrium position.

How are such movements known?



Oscillation

Oscillation is the movement of an object to both sides about the equilibrium position.

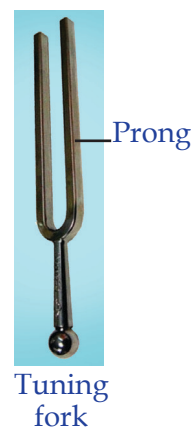
Find more examples of oscillation and discuss them in the class.

What happens if the object in oscillation moves fast about the equilibrium position?

Try to do the following activities.

Materials Required: Steel scale, tuning fork, rubber hammer, rubber band

1. Press one end of the steel scale on the table. Press the other end downward and then release. Observe the movement of the scale.
2. Stretch a rubber band on either side with your friend and tap it in the middle. Observe the movement of the rubber band.
3. Take a tuning fork from the science lab. Hit on one of the prongs with a rubber hammer. Observe the movement of the prongs. Discuss the characteristics of the movements you have observed.



In all these three activities, didn't you observe fast movements? What change did you observe when the speed of oscillation was increased? Was there any sound? Quick oscillation is vibration. Various types of vibrations are occurring around us. Music is produced by vibrating different parts of musical instruments. Find more examples for vibration and discuss them in the class.

Vibration

Vibration is quick oscillation.



For Further Reading

Sound and Vibration

Sound is produced due to vibration. There will be vibration of an object behind the production of any sound. We are able to produce sound due to the vibration of the vocal cords in the larynx in our throat. When an excited tuning fork is kept near the ear, we will be able to hear a sound. Music is produced in veena, violin etc., by vibrating the stretched strings in different ways. In instruments like chenda, it is the diaphragm that is vibrated. In flute and harmonium, it is the air that gets vibrated.

Instruments making use of different types of motion are given below. Complete the table by identifying how the different types of motions in each instrument and how they are made use of.

Moving Object	Type of Motion	Usage
Seesaw	Oscillation	Entertainment
Hand of a Clock		
Top		
String of a Veena		Pleasant sound is produced

Haven't you realized that movements are utilised in our lives? Have you seen instruments that make use of different types of motion simultaneously? Share your experiences.

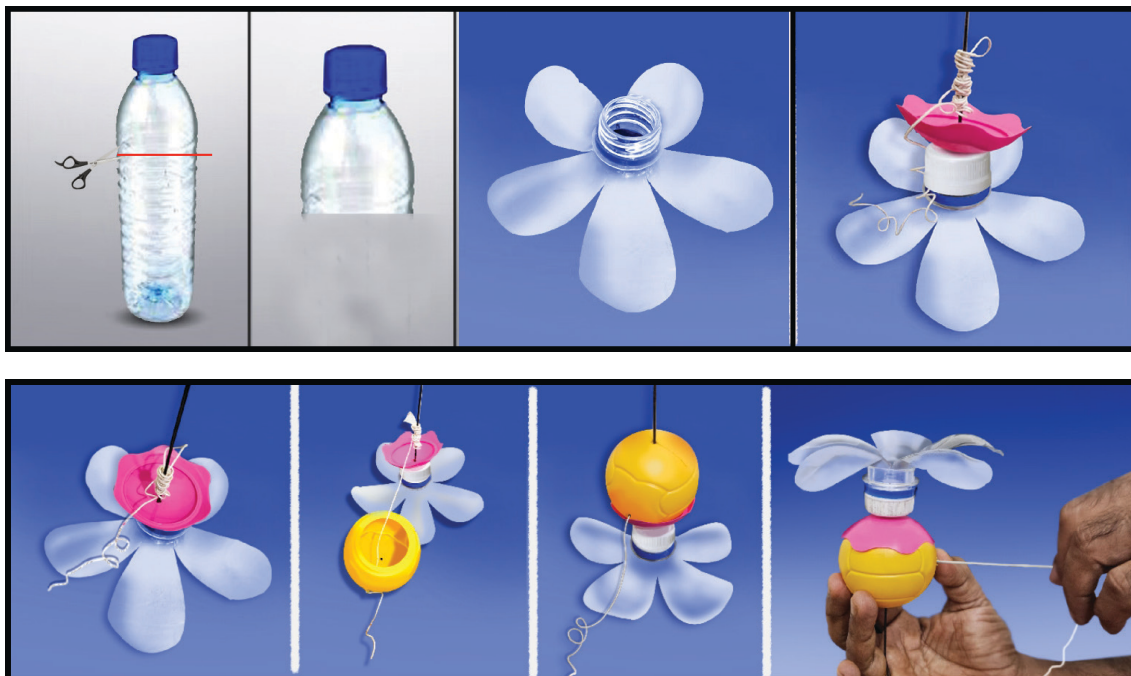
Let's Make A Toy Fan

Shall we make a toy fan utilising different types of motion?

Materials Required: Ice cream ball, string, thin umbrella rod (15 cm long), bead, pet bottle, stencil cutter/paper cutter, coconut leaf midrib

Basic Science

Make fan leaves using the upper portion of the pet bottle with lid as shown in the picture.



Make small holes on the lid, bottom and one side of the ice cream ball. Fix the fan to the umbrella rod. Tie the string at the centre of the rod. Pull it out through the hole on the side of the ice cream ball.

Tie a small coconut leaf midrib at the end of the string. Insert the rod fixed with the fan through the hole on the lid of the ice cream ball.

Wind the string around the rod. Then insert the end of the rod through the hole at the bottom of the ice cream ball. Pull the end of the string and operate the device.

Observe the movements at each part of this instrument. Placing a smooth bead between the fan and the ice cream ball will make the rotation even smoother.

Which are the different types of motion that take place in the different parts of the toy fan such as the rod, fan and string? Discuss your findings.

Which are the types of motion that occur when a toy car moves?

What type of motion occurs in the wheels? What is the type of motion of the car when the wheels move?

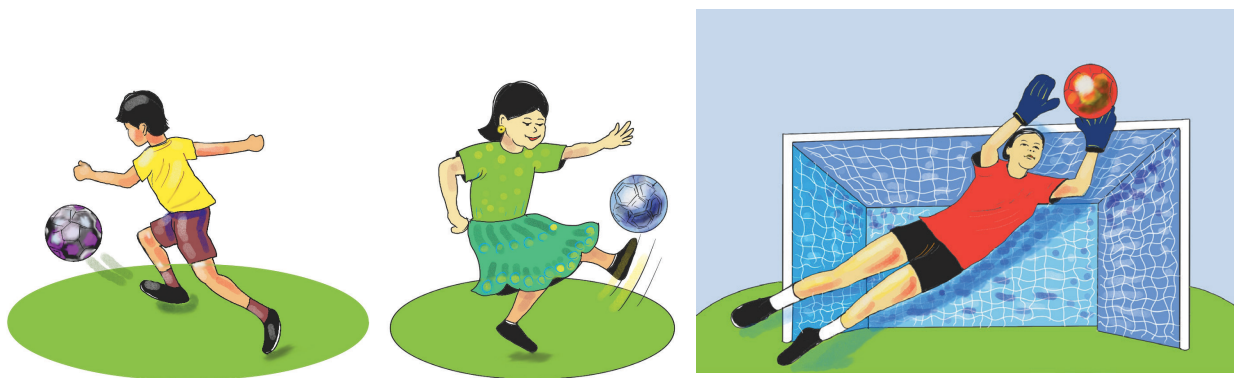
Force and Motion

What must be done to move an object at rest? Place a notebook on the table. How can it be moved?

Isn't force applied during pushing or pulling?

You might have observed the movement of the ball in a football match. How is the ball moved? The ball moves according to the force applied by each player on the ball. According to the force applied, the ball undergoes different types of motion. Let's do the following activities to observe how the ball moves according to the force applied on it.

Make it Move, Change it's Direction



A child kicks a football straight across the floor. Another child hits the ball with more force and changes its direction. A third child kicks the fast-moving football upwards. Observe its movement through the air. You understand that it is by applying force on the ball, that the ball undergoes different types of movements. Discuss the different types of movement of the ball in each situation. Haven't you understood that we apply force not only to move the ball but also to change its direction?

What relationship could you find between the motion and speed of the football and the force applied on it?

Let's Bring it to Rest

Let a child roll a ball on the floor. Let another child try to stop the ball. What did the child apply to stop the ball? Isn't it necessary to apply force to bring moving objects to rest also?

What aspects regarding force and motion have been discussed so far? Consolidate them and record in the Science Diary.

Force and Motion

Force should be applied to move an object at rest and to bring a moving object to rest. Force needs to be applied to change the speed and direction of moving objects.

Movement and Health

Can't different types of motion be utilised in health care? Are we making use of different movements while exercising? Find exercises from your 'Health and Physical Education' book that utilise various types of movements. Practice them at home and school.



Force Here, Movement There

Can force applied in one place be made available in another place to make movement possible? Are there any instruments working in this way?



Let's check the movement of a bicycle. Which are the parts of a cycle? Discuss.

While cycling, which are the different types of motion that occur in the following parts?

Part of the Bicycle	Types of Motion
Pedal	
Big Gear	
Small Gear	
Chain	
Wheels	

While cycling, force is applied on the pedal of the bicycle. Which part is moved by the force applied on the pedal? How does it move the two wheels and there by the bicycle? Discuss.

You have understood that the force applied in one place can be brought to another place to make the movement possible.

Belt, gear, axles etc are made use in vehicles and instruments for this purpose. Let's do an activity utilising these.

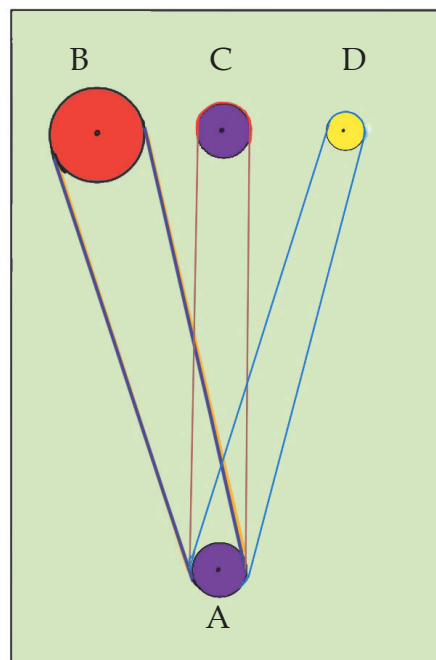
Materials Required:

Wooden plank (30x20 cm), 4 plastic lids [same size (A & C)- 2, small plastic lid (D)- 1, big plastic lid (B)- 1], nails- 4, rubber band -3.

Take one lid (A) from the same sized plastic lids (A & C). Fix it on the wooden plank using a nail as shown in the picture so that the lid A can rotate freely.

Similarly arrange the other three plastic lids (B, C, D) in a freely rotating manner using nails as shown in the picture. B, C and D are to be arranged at a specific distance from A.

Pass a rubber band from A to B and rotate the lid A. Doesn't the lid B also rotate? Similarly repeat the activity by arranging the rubber bands to C and D. Compare the speed of rotational motion of the lids B, C and D in each case. Which one is faster? Which one is slower?



Is there any difference in the speed of movement when the same sized lids (A, C) are rotated? What is your inference? Discuss and write.

When A rotates once

- C rotates once
- B
- D rotates more than once

You have understood that rotating a smaller wheel using a bigger wheel increases the speed and rotating a bigger wheel using a smaller wheel decreases the speed. Gears are used in vehicles in the same manner. In bicycle also, bigger gear is used to rotate the smaller gear.



Haven't you understood that gears are inevitable parts for the functioning of vehicles and machinery?

In a gear system, wheels of different sizes are usually used. These systems are used for increasing and decreasing the speed. Observe the pictures given below. Which system should be used to decrease the speed? Which one for increasing the speed?



Picture A

Picture B

We live in a dynamic world. All bodily processes involve some form of movement. Movement may be fast or slow. You have learnt that force should be applied to move objects, change their direction and stop moving objects. You have also understood how force applied in one place is transferred to another place to make motion possible. You will learn more about motion and force in higher classes.

Let's Assess

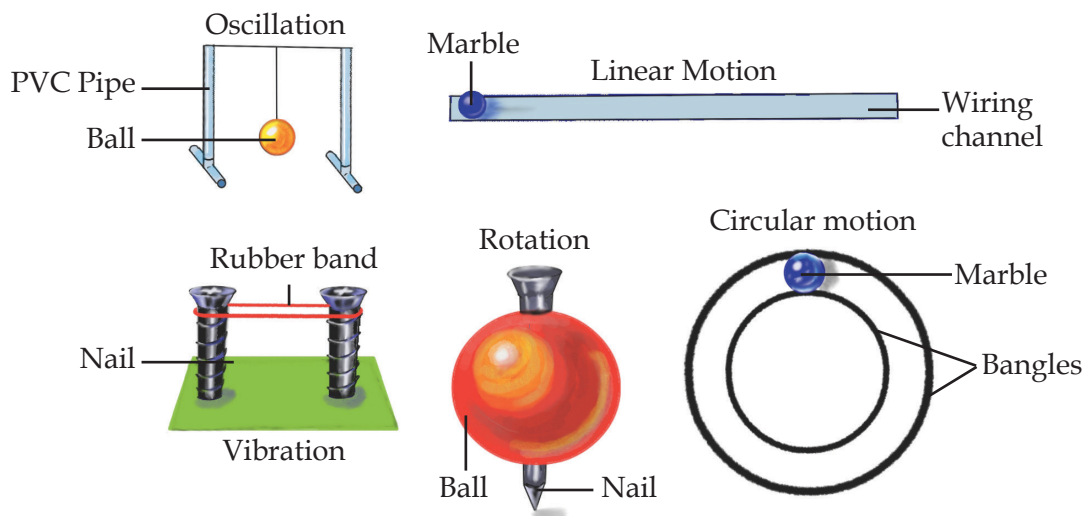
1. Which of the following statements are true? Correct the wrong ones.
 - a. Force must be applied to increase and decrease the speed of motion of an object.
 - b. Gears are used only to increase speed.
 - c. All objects on the earth that are assumed to be at rest are moving along with the earth.
 - d. The turning of the hand of the clock is linear motion.
2. Examine the given movements. Is there a different movement among these? Why?

Motion of a swing, motion of a cradle, motion of the pendulum of a clock, motion of the prongs of a tuning fork.

3. A straight line is drawn using a scale. Which of the following motion is similar to the motion of the pen at that time?
- Movement of wiper of vehicles
 - Movement of a compass while drawing a circle
 - Movement of a lift
 - Motion of a stone thrown away

Extended Activities

1. Make the devices as shown in the figures below and arrange them. Operate each of them. Observe the different types of motion and find out the differences between them.



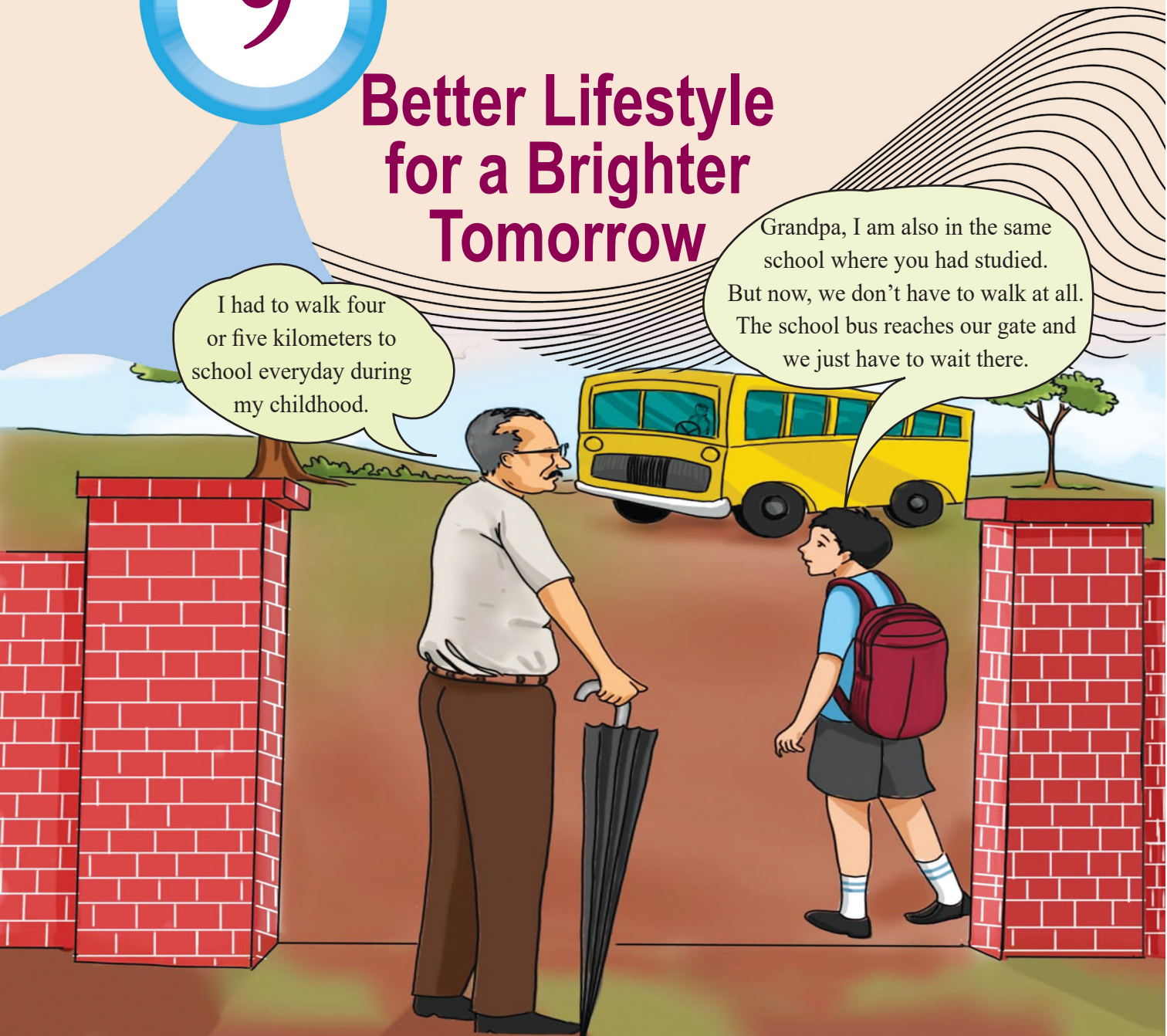
- There might be saw mills or flour mills in your locality. Visit them and try to understand how movement from one place is transferred to another and also the difference in movements.
- There are different types of movements in a sewing machine. Find out the different movements in each part.

9

Better Lifestyle for a Brighter Tomorrow

I had to walk four
or five kilometers to
school everyday during
my childhood.

Grandpa, I am also in the same
school where you had studied.
But now, we don't have to walk at all.
The school bus reaches our gate and
we just have to wait there.



Have you noticed the conversation between the child and the grandfather? How do you go to school? On foot or by a vehicle? How did your grandparents go to their schools during their childhood? Enquire it.

Almost all children used to walk to school in the past. How would this habit have helped the children in those days? Discuss.

Compared to the past, great changes have occurred not only in conveyance but in many other areas also. Have these changes improved our lifestyle? You know that changes in every field are due to the progress in science and technology. Some of them are given below. Elaborate the list.

- ◆ Telephone → Smart phone
- ◆ Grinding stone → Mixer grinder
- ◆ Desktop → Laptop → Tablet
- ◆
- ◆



Do the improved facilities resulting from the progress in science and technology alter our lifestyle? Discuss. Do these changes in our lifestyle cause health issues? Let's find out.

Food Habits

You have learnt about nutrients and balanced diet in the unit *Food for Health*.



Food then

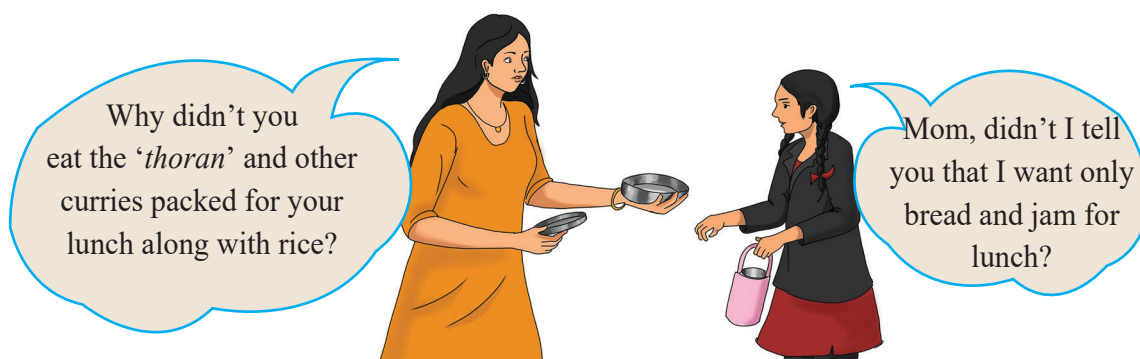


Food now

Our food habits also change when the living facilities improve. Such changes are illustrated in the picture above. Observe the picture and discuss the changes.

Are these changes healthy? Shouldn't we plan our food by including diverse food items to get all essential nutrients?

Ask the elders in your family about the food items included in the diet during their childhood. Are you having the same food now? Which of the food habits shown in the above pictures has more nutrients? Discuss and write them.



Did you notice the conversation? Do you agree with what the child said? Why do our parents include locally available eggs, milk, fruits, vegetables and leafy vegetables in our diet? Discuss the above situation based on the unit 'Food for Health' which you have learnt.

What were our food items and food habits in the past? Let's ask the elders. Have a look at the food habits of Ammu's grandma.

Grandma's Food Habits

How vibrant were those days in the past! The kitchen was live with my father, mother, grandmother and everyone bustling around. The breakfast was a delight with *kappapuzhukku* or *chakkapuzhukku*. When they weren't available, we preferred to have *pazhamkanji*. How delicious it was to have *pazhamkanji* with *kanthari* and *chembu curry*!

Lunch was a kingly feast! The parboiled rice from *Punjakrishi* was accompanied with pea, spinach, banana stem, banana flower (*koombu*), raw banana and tender jackfruit picked from the courtyard. In addition, this would be followed by a delicious fish curry cooked with mangoes plucked from the *moovandanmavu* on the northern side. In the evening, there would be steamed snacks like *kozhukkatta* or *ada* spread on banana leaf. Holidays were a festival of fruits. We used to have mangoes, bananas, papayas, guavas and cashew apples as our snack items. How tasty they were! Nowadays, we don't even get to see them. Nowadays, everyone prefers only snacks from shops.

Did you notice what grandma has said? You might have understood the joint family culture and their food habits then?

Are you having the same type of food your grandma had in her childhood? What changes have taken place in your daily diet? Discuss and prepare a note. Check whether all these changes in the food habits are good for health?

As living conditions improved, food habits changed. These changes are not good for a healthy life. Menu should be balanced to ensure the intake of all nutrients by including diverse food items.



For Further Reading

Along with the Elderly

Everyone enjoys the stories shared by grandparents. They may have many things to talk about like their food, food habits, household articles, way of dressing, agriculture, occupation, school life etc. connecting with the era you live in.

Our elders are our wealth. So, we should cherish them. We must take efforts to love them, take care of their health and fulfil their needs. We should make maximum use of their knowledge, skills and experiences. Every year, October 1st is observed as the 'International Day of Older Persons'. Read more about the events related to this day.

Prepare posters related to 'International Day of Older Persons' and display them.

Unhealthy Food Habits



Reduced use of vegetables, fruits, leafy vegetables and pulses



High consumption of fried food items



Excess use of sugar, salt, oil, ghee and fat



Excess use of bakery food items



Reuse of cooking oil



Not eating on time

Aren't there many food items that affect our health? How will these food items affect our health if they are consumed daily? Discuss and write in the Science Diary.

Harmful Changes in Eating Habits

How can we solve the health issues caused by the eating habits mentioned above? Discuss. Observe the picture given below.



Did you notice what the mother had told the child? Do you also eat while watching T.V.? What is the problem with eating while enjoying T.V. shows? Discuss and write in the Science Diary.

- ◆ Eating carelessly



Certain food items you love to eat are given in the picture. Discuss the major nutrients present in these food items.



What are the problems with eating only these food items regularly? Discuss and write in the Science Diary.

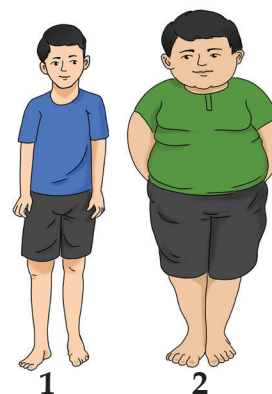
- ◆ Gets some nutrients in excess



Height and Weight

Does eating more food lead to better health? Observe the figure. Which of these two children has proper growth? How do we find out?

One of the methods to check growth is 'Body Mass Index' (BMI). It can be used to find out whether a person has weight proportionate to his height. For this, height and weight should be found out first. Body Mass Index is weight in kilogram divided by (height in metre x height in metre). The first child has 25 kg weight and 120 cm height. What is his BMI?



$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (metre)} \times \text{Height (metre)}} = \frac{25}{1.20 \times 1.20} = \boxed{}$$

The second child has 45 kg weight and 125 cm height. What is his BMI? Find out using the formula to calculate BMI.

$$\text{BMI} = \dots\dots\dots = \boxed{}$$

You have now calculated the BMI of both. Match the result with the table and find out their physical condition.

BMI	Physical Condition
Below 18.5	Underweight
18.5 – 24.9	Normal weight
25 – 29.9	Overweight

BMI	Physical Condition
30 – 34.9	Obesity (First stage)
35 – 39.9	Obesity (Second stage)
Above 40	Obesity (Third stage)

What are your inferences?

Physical condition of the first child:

Physical condition of the second child:

What is the reason for this kind of physical condition of these two children? Discuss.

Now check your height and weight and find your BMI. Compare it with the table and check your body condition. What are your findings? Are you overweight or underweight?

Take up a project activity to find out the BMI of all the students in your class.

Obesity is a condition in which body weight is in excess than the normal. This may lead to illness. Underweight also indicates unhealthy condition.

- ◆ What is the solution for underweight?
- ◆ What is the solution for overweight?
- ◆ If the weight is normal, what should be done to maintain it?

Discuss your thoughts in the class and write it in the Science Diary.

Good Food Habits

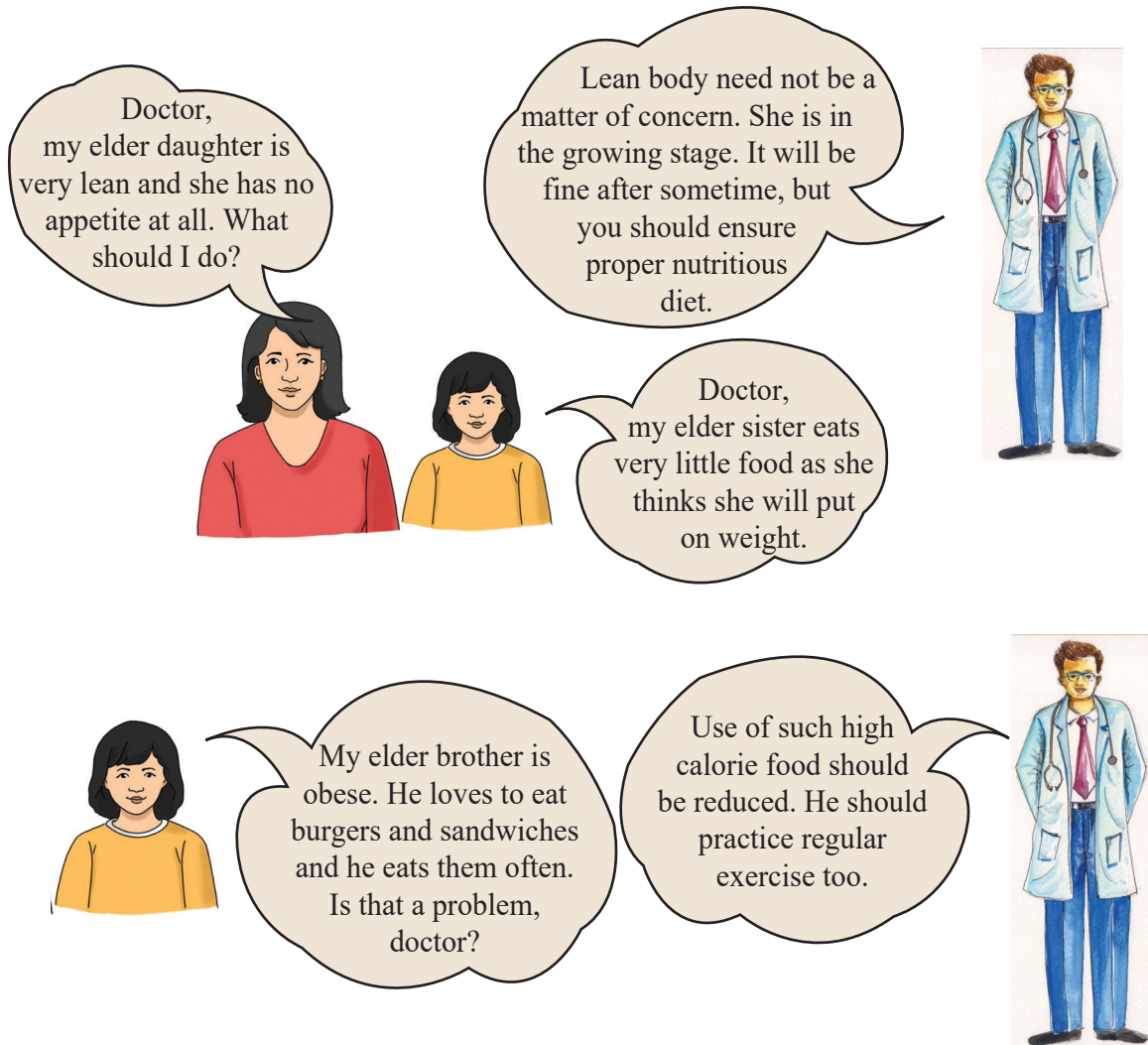
Age appropriate healthy food habits should be followed. Put (✓) mark against good food habits in the list given below.

- | | |
|---|--------------------------|
| ◆ Eating on time | ☐ |
| ◆ Eating too much | ☐ |
| ◆ Eating the same food items regularly | ☐ |
| ◆ Eating frequently | ☐ |
| ◆ Including plenty of fruits, vegetables and leafy vegetables in the diet | ☐ |
| ◆ Eating adequate amount of food | ☐ |
| ◆ Eating while watching television and mobile phone | ☐ |
| ◆ Everyone in the family eats together at home | ☐ |
| ◆ Eating very little food | ☐ |
| ◆ Eating more of fried food items | ☐ |
| ◆ Eating only the favourite food | ☐ |
| ◆ Not drinking enough water | ☐ |
| ◆ Eating fast foods in between | ☐ |
| ◆ Eating healthy snacks | ☐ |

Write good food habits on a chart and exhibit it in the class. Acquire healthy eating habits from childhood itself.

Food And Exercise

Pay attention to conversation of a mother and child with a doctor on the topic of food and exercise.



Doctor, my elder daughter is very lean and she has no appetite at all. What should I do?

Lean body need not be a matter of concern. She is in the growing stage. It will be fine after sometime, but you should ensure proper nutritious diet.

Doctor, my elder sister eats very little food as she thinks she will put on weight.

My elder brother is obese. He loves to eat burgers and sandwiches and he eats them often. Is that a problem, doctor?

Use of such high calorie food should be reduced. He should practice regular exercise too.

Did you notice the conversation with the doctor? Don't you understand that exercise is as important as diet for proper health? Most of the occupations that people engaged in the past required physical activities. So, they used to get the benefit of exercise while working. Most jobs people engage in nowadays demand lesser physical activities. Hence, it is essential to do exercise properly.

Observe the picture. What do they do for exercise?

What do you do for exercise? Discuss and present.

- ◆ Takes advantage of the physical education period in the school
- ◆ Running and play
- ◆
- ◆



The World of Games

Observe the pictures. In both, the children are engaged in games. What is the difference between them? What games do you play in your free time?



Do you prefer playing outdoors or indoors? Pay attention to the children's dialogue.



I play football every evening.

I love playing chess.



Whenever I get free time, I play video games.



I watch T V whenever I am free.



There is a small pond near my house. Every day I swim for half an hour with my father.



Did you notice the words of these children? Out of these, which games provide exercise to them? Write it down.

Activities/games which provide exercise	Duration

What are the activities you engage daily that provide you exercise? List them in your Science Diary.

What is your finding? Do you get adequate exercise?

Did you understand that nutritious diet and proper exercise are important for good health? Now let's understand the importance of sleep.

Importance of Sleep

Look at the habits of two children.

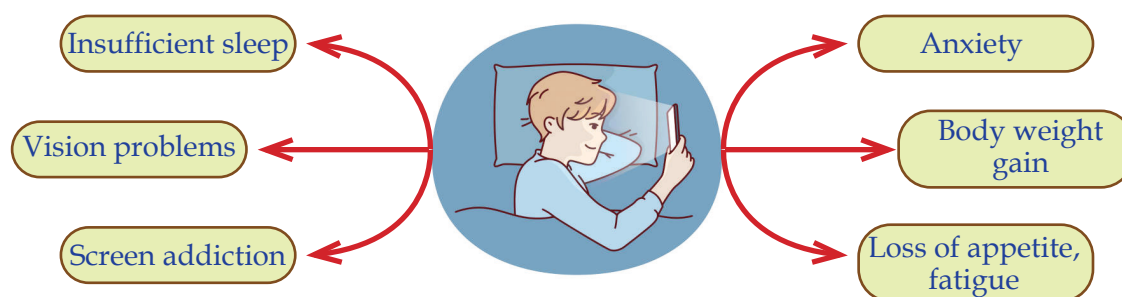


Uses mobile phone for a long time at night. Sleeps very late.



Goes to bed early and has sound sleep.

Which of these is your habit? What are the health issues caused by excessive use of mobile phones?



Don't you also use a mobile phone? How long do you use mobile phone daily? You have understood that excessive use of mobile phone can lead to many health issues. Organise a debate on the topic 'Excessive Use of Mobile Phones and Health Issues.'

Read the note below related to sleep.

Sleep

The body gets proper rest during sleep at night. It is during this time that the cells repair their damage. Muscles are at rest during sleep. Breathing, heart rate and digestive processes slow down. Many complex chemical reactions in our body take place during sleep at night. Therefore, sleeping during daytime can never compensate the loss of sleep at night. Sleeping excessively is also not good. A person of your age needs 7-8 hours of sleep.

- ◆ What is the benefit of sound sleep at night?
- ◆ Sleeping during daytime is not a compensation for the loss of sleep at night. Why?

Exercise and sleep are as important as food for good health.



For Further Reading

The Secret of Sleep

The production of melatonin, known as the 'sleep hormone', increases at night. Melatonin is produced in our body as a result of the response of the pineal gland towards darkness. The production of this hormone decreases at dawn due to the presence of light and as a result, we wake up. Coffee, tea, cola etc. stimulate us to stay awake. So, avoid using these items before going to bed at night. Fatigue, lack of concentration, lethargy and short temper may result from sleeplessness.

Write down information related to your sleep.

- ◆ Approximate bed time at night -
- ◆ Approximate time of waking up in the morning -
- ◆ Total duration of sleep -

On the basis of the above note on 'Sleep', Check whether you are getting adequate sleep.

Changes in lifestyle bring about many changes in diet, exercise, sleep etc. These changes may lead to many health issues. Discuss the major health issues associated with this.

Diabetes



Aren't you familiar with such conversation? What is diabetes? Read the note given below.

Diabetes

The normal level of glucose in 100 ml of blood is 70-100 mg. Diabetes is a condition in which blood sugar (glucose) level rises highly.

Haven't you understood that her fasting blood sugar 170 mg/dL, indicates a high blood sugar level.

What are the symptoms of diabetes?

- ◆ High appetite
- ◆ Frequent urination
- ◆ Delay in healing of wound
- ◆ Extreme thirst
- ◆ Fatigue

It is not possible to confirm diabetes by observing these symptoms alone. Diabetes can be detected by testing blood and urine. If diabetes is not under control, it may lead to severe health issues like stroke, kidney diseases, poor vision etc.

Diabetes Control Measures

Observe the poster related to diabetes. Discuss how diabetes can be controlled?

Exercise
daily



Control
food





No Bad Habits

Say no to bad habits like smoking, alcoholism, substance use etc.



For Further Reading

Insulin and Diabetes

The level of glucose in the body is controlled by the hormone called insulin, produced by the pancreas. Two scientists named Frederick Banting and John Macleod discovered the hormone insulin in 1921. Type 1 diabetes is a condition in which the body does not produce enough insulin due to the damage of cells which produce insulin. It is generally seen in children. But Type 2 diabetes is a condition in which body is unable to use the insulin produced or produces insufficient insulin. Type 2 diabetes is the common one. Lifelong insulin injection is required for Type 1 diabetes. But Type 2 diabetes can be managed by adopting healthy life style and proper medication.

Blood Pressure



Your BP is slightly higher.
Reduce the quantity of
salt in food. You should
sleep well and do exercise.

Haven't you heard people say that BP is low or high? What is BP or blood pressure? Read the note.

Blood Pressure

Blood pressure is the pressure exerted on the walls of the blood vessels as the blood flows through them. Blood pressure is measured using a device called sphygmomanometer. A reading of 120/80 mmHg on this device indicates normal blood pressure. Smoking, obesity, potassium deficiency, excessive salt intake and ageing can cause variations in normal blood pressure level.



What are the measures to be taken for controlling blood pressure? Write them in the Science Diary.

Cholesterol

Some food items fried in oil are given in the picture. Do you prefer fried items or steamed food items? You have already understood that the use of fried food items should be reduced. What is the reason for this? You have learnt that cholesterol is one of the different types of fats in our body. Read the following note and find answers to the questions that follow. Present it in the class.



Cholesterol

A total cholesterol level below 200 mg/dL is the ideal condition. There are two types of cholesterol, good cholesterol (HDL) and bad cholesterol (LDL). Excess bad cholesterol gets accumulated in the blood vessels and blocks the blood flow, thus leading to heart attack. It also harms the liver. As good cholesterol increases, the chances of heart attack decreases. Good cholesterol increases in the body while doing exercise. Similarly, fish like sardine and mackerel, food items like leafy vegetables, pulses, groundnut, walnut etc. help in raising the level of good cholesterol.

- ◆ What are the health problems that may arise from excessive consumption of fatty foods?
- ◆ What are the ways to increase the level of good cholesterol?

Lifestyle Diseases

So far, we have been discussing the changes in lifestyle and some of the health issues that may manifest due to it. What are lifestyle diseases? You may have heard about it. Lifestyle diseases are caused not by pathogens, but by an unhealthy lifestyle.

Lifestyle diseases are caused by unhealthy lifestyle. This is mainly due to unhealthy food habits, lack of exercise, inadequate sleep, smoking, alcoholism, stress etc.

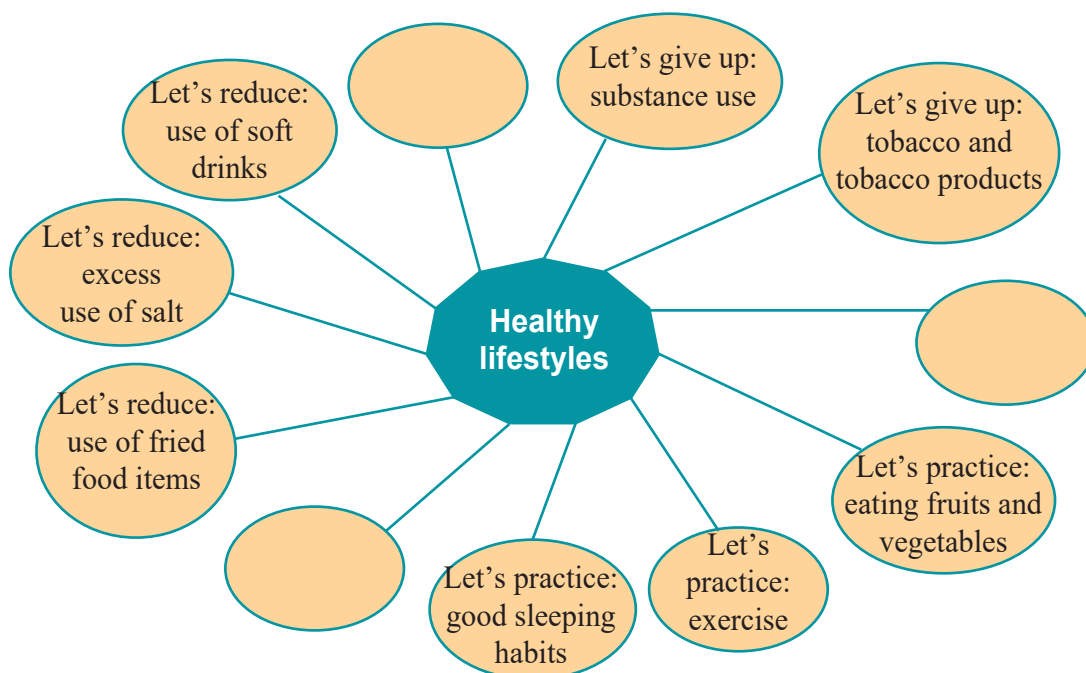
You have understood that many of the diseases mentioned earlier can be kept at bay if one follows proper lifestyle from a younger age itself. Some of the elders in your home may have such diseases. Won't you help them to lead a healthy life by making necessary changes in their lifestyle?

Cancer, heart diseases, liver cirrhosis, obesity, Type 2 diabetes, depression, hypertension etc. are examples of lifestyle diseases. Improper lifestyle can reduce our immunity. This may lead to many other diseases or aggravate them.

Tabulate the changes in lifestyle, the resulting health issues and their remedies. Present it in the class.

Changes in Lifestyle	Related Health Issues	Remedies
◆ Playing electronic game indoors	◆ Vision problems ◆ Pain in neck and back muscles ◆ Obesity	◆ ◆ ◆
◆	◆	◆
◆	◆	◆

Today we enjoy many living facilities. So, care should be given to sleep, exercise and proper diet. We should be able to keep lifestyle diseases at bay by giving up improper lifestyle. Examine the wordsun related to this given below. Certain lifestyles which should be completely given up, reduced or practiced are given in the wordsun. Complete the wordsun by adding more information related to it. Add suitable title and exhibit in the school bulletin board.



The health issues caused by smoking, alcoholism and substance use are more dreadful than the health problems caused by unhealthy lifestyle. Let's examine the physical, mental and social problems caused by these.

Physical Problems	Mental Problems	Social Problems
Immunity of the body decreases	Causes anxiety and depression	Keeps distance from friends and family members
Memory and analytical thinking decreases	Gets tempted to engage in illegal activities	Makes undesirable friendships
Causes lung and heart related diseases	Becomes aggressive quickly	Decreases interest in learning
◆	◆	◆

You have understood the issues caused by the use of drugs to individuals and society. Keeping drugs in our custody is as illegal as using them. So let's take the pledge "I will say 'No to Drugs' for a healthy life."

**NO
TO
DRUGS**

Let's Assess

- Find out the activities which provide exercise to the body.

Playing chess	Playing shuttle badminton
Dancing	Playing football
Playing video games	Playing violin
Engaging in agricultural activities	Listening to music

- Which of the following activities can help obese persons to reduce their weight?
 - Eat less
 - Play shuttle badminton
 - Take adequate rest
 - Reduce the use of salt
- What are the benefits of exercising?
- What are the health issues that faced by persons who sleep late at night?
- Unhealthy lifestyle leads to diseases. Is it right? Explain.

Extended Activities

- Enquire if anyone in your family has diabetes. Also enquire about the glucose level, changes made in the diet and physical issues experienced. Tabulate them.
- Collect information on games which provide physical exercise and prepare a sports magazine.

CHILDREN'S RIGHTS

Dear Children,

*Wouldn't you like to know about your rights? Awareness about your rights will inspire and motivate you to ensure your protection and participation, thereby making social justice a reality. You may know that a commission for child rights is functioning in our state called the **Kerala State Commission for Protection of Child Rights**.*

Let's see what your rights are:

- Right to freedom of speech and expression.
- Right to life and liberty.
- Right to maximum survival and development.
- Right to be respected and accepted regardless of caste, creed and colour.
- Right to protection and care against physical, mental and sexual abuse.
- Right to participation.
- Protection from child labour and hazardous work.
- Protection against child marriage.
- Right to know one's culture and live accordingly.
- Protection against neglect.
- Right to free and compulsory education.
- Right to learn, rest and leisure.
- Right to parental and societal care, and protection.

Major Responsibilities

- Protect school and public facilities.
- Observe punctuality in learning and activities of the school.
- Accept and respect school authorities, teachers, parents and fellow students.
- Readiness to accept and respect others regardless of caste, creed or colour.



Contact Address:

Kerala State Commission for Protection of Child Rights

'Sree Ganesh', T. C. 14/2036, Vanross Junction

Kerala University P. O., Thiruvananthapuram - 34, Phone : 0471 - 2326603

Email: childrights.cpcr@kerala.gov.in, rte.cpcr@kerala.gov.in

Website : www.kescpcr.kerala.gov.in

Child Helpline - 1098, Crime Stopper - 1090, Nirbhaya - 1800 425 1400

Kerala Police Helpline - 0471 - 3243000/44000/45000

Online R. T. E Monitoring : www.nireekshana.org.in

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements;
- (k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between age of six and fourteen years.