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GOVERNMENT OF TAMIL NADU

STANDARD SIX

TERM - II

VOLUME - 3

SCIENCE
SOCIAL SCIENCE

A publication under Free Textbook Programme of Government of Tamil Nadu

Department Of School Education

Untouchability is Inhuman and a Crime

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FOREWORD

The Colourful world of children is full of excitement and spectacular thoughts! Their imaginative power can even attract the wild creatures to accompany them in a friendly manner. Their enthusiasum and innovative prescription can even trigger the non-living entities and enchant the poetic Tamil. It is nothing but a bundle of joy blended with emotions when you travel into their creative world.

We have tried our level best to achieve the following objectives through the new Text Books by gently holding the tender hands of those little lads.

- To tune their mind away from rote-learning and guide them into the world of creativity.
- To make the children be proud of their ancient history, culture, art and rich Tamil literature.
- To march triumphantly with confidence into the modern world with the help of Science and Technology.
- To facilitate them to extend their journey of learning beyond the text book into the world of wisdom.

These new Text Books are studded with innovative design, richer content blended with appropriate psychological approach meant for children. We firmly believe that these newly designed text books will certainly create a sparkle in your mind and make you explore the world afresh.

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PREFACE

The Science textbook for standard six has been prepared following the guidelines given in the National Curriculum Framework 2005. The book is designed to maintain the paradigm shift from the primary General Science to branches as Physics, Chemistry, Botany and Zoology.

The book enables the reader to read the text, comprehend and perform the learning experiences with the help of teacher. The Students explore the concepts through activities and by the teacher's demonstration. Thus the book is learner centric with simple activities that can be performed by the students under the supervision of teachers.

HOW TO USE THE BOOK

- ❖ The Second term science Book for has seven units.
- ❖ Two units planned for every month in addition computer science chapter has been introduced.
- ❖ Each unit comprises of simple activities and experiments that can be done by the teacher as demonstration if necessary student's can perform these activities.
- ❖ Colourful infographics and infobits enhances the visual learning.
- ❖ Glossary has been introduced to learned scientific terms.
- ❖ The "Do you know?" box can be used to enrich the knowledge of general science around the world.
- ❖ ICT Corner and QR code has been introduced in each unit for the first time to enhance digital science skills.

Lets use the QR code in the text books ! How ?

- Download the QR code scanner from the Google PlayStore/ Apple App Store into your smartphone
- Open the QR code scanner application
- Once the scanner button in the application is clicked, camera opens and then bring it closer to the QR code in the text book.
- Once the camera detects the QR code, a URL appears in the screen. Click the URL and go to the content page.

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SCIENCE TERM - II

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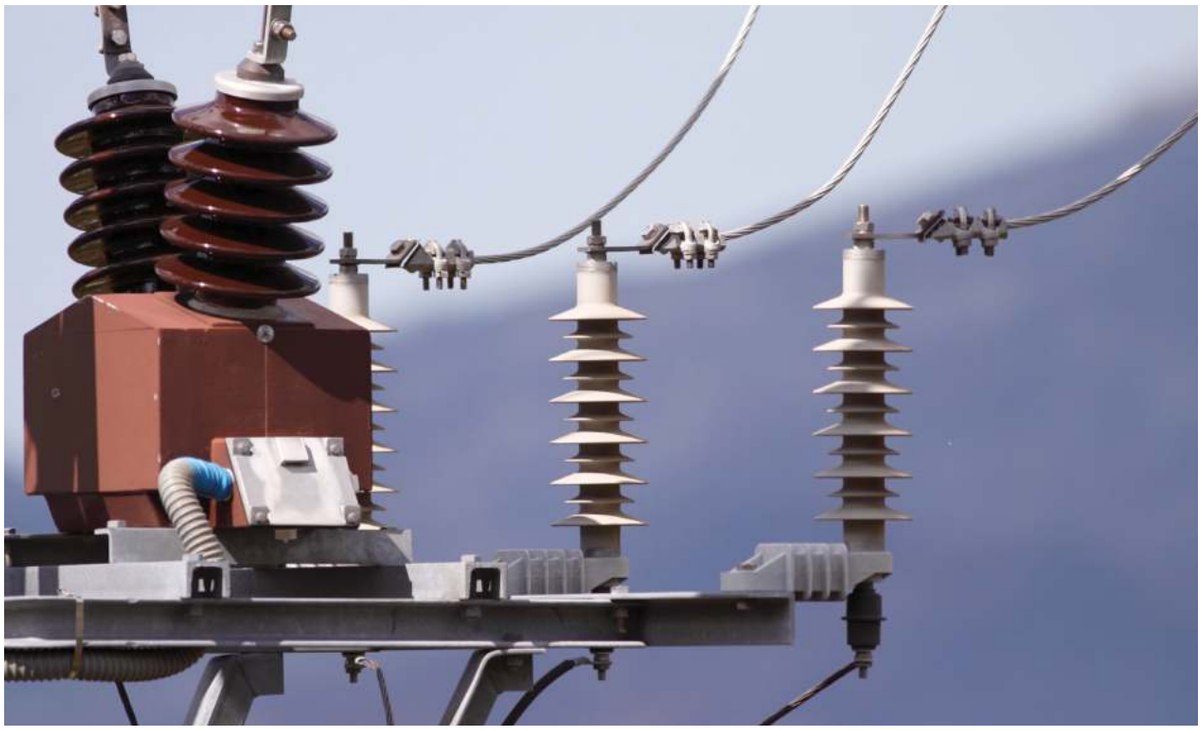


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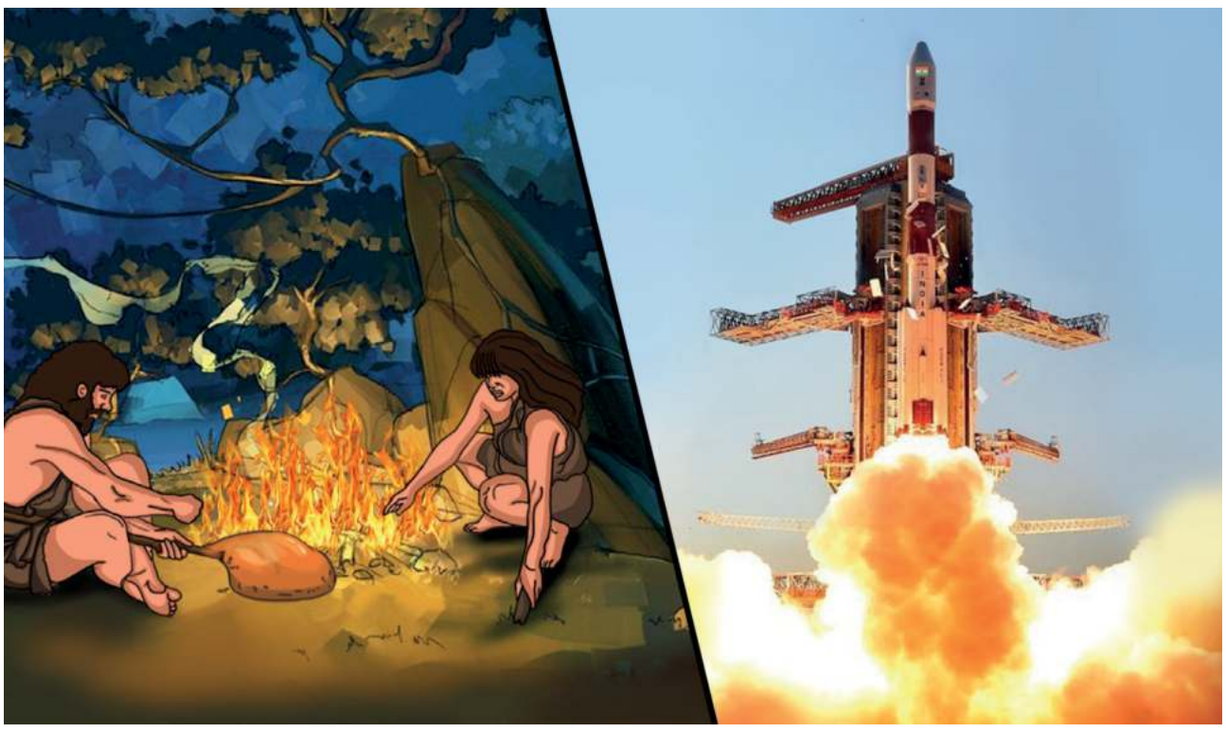
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SCIENCE

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Unit 1 Heat



Learning Objectives

- To list out the sources of heat
- To define heat
- To distinguish hot and cold objects
- To define temperature
- To differentiate heat and temperature
- To understand the conditions for thermal equilibrium
- To understand why thermal expansion take place in solids
- To list out the practical applications of thermal expansion in day - to - day life

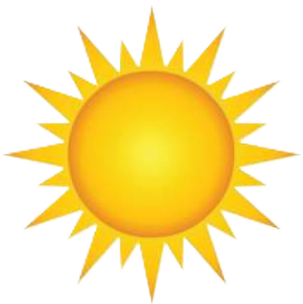
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Introduction

We are all familiar with heat. We feel it on our body when the sun shines. We use heat for cooking our food, We reduce the heat by adding ice cubes while preparing fruit juice. Let us learn about sources of heat.

1.1 Sources of heat

❖ **Sun**



We all know that the sun gives us light. Does it give us heat? After standing under the sun light for some time, touch your head. Does it feel hot? Yes, it feels hot because the sun gives out heat besides light. Now, You can understand why it is difficult to walk bare-footed on sunny days in the afternoon.

❖ **Combustion (Burning)**



Heat energy can be generated by the burning of fuels like wood, kerosene, coal, charcoal, gasoline/petrol, oil, etc., In your home, how do you get heat energy to cook food?

❖ **Friction**



Rub your palms for some time and then hold them to your cheeks. How do you feel? We can generate heat by rubbing two surfaces of some substances. In the past people used to rub two stones together to light fire.

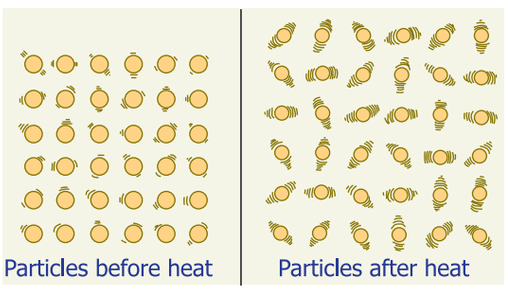
❖ **Electricity**



When electric current flows through a conductor, heat energy is produced. The water heater, iron box, electric kettle etc., work on this principle.

1.2 Heat

Molecules in objects are constantly vibrating or moving inside objects. We cannot see that movement with our naked eye. When we heat the object this vibration and movement of molecules increases and temperature of the object also increases.



Thus, **Heat is an energy that raises the temperature of a thing by causing the molecules in that thing to move faster.**

Heat is not a matter. It doesn't occupy space. It has no weight. Like light, sound and electricity, heat is a form of energy.

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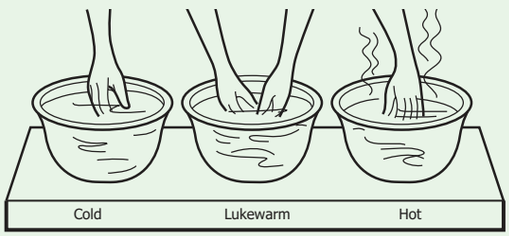
In short, Heat is the total kinetic energy of constituent particles of objects. **SI Unit of Heat is joule**. The unit calorie is also used.

1.3 Hot and cold objects

In our day-to-day life, we come across a number of objects. Some of them are hot and some of them are cold. How do we decide which object is hotter than the other?

We use the tip of our finger to find out whether the tea in a cup has enough heat to drink or whether milk has been cooled enough to set for making curds. We often determine heat by touching the objects. But is our sense of touch reliable?

Activity 1: Take three bowls. Pour very cold water in the first bowl. (you can also add ice cube for cooling). Place luke warm water in the second. Half fill the third with hot water (-not hot enough to burn!) Set them in a row on the table, with the lukewarm water in the center. Place your right hand in the cold water, and your left hand in the hot water. Keep them in for a few minutes. Then take them out, shake off the water and put both into the middle bowl. How do they feel?



Priya says,"My right hand tells me that the water in the bowl is hot and the left hand tells me that the same water is cold."

Write down in your own words what do you experience? Discuss in the class why this happens.

_____

_____

When you placed your left hand in the hot tub, the heat from the bowl made the molecules on your hand vibrate faster. When you keep the same hot hand in the second bowl the vibrations transferred from your hand to make the particles in the water vibrate. Therefore you feel loss of heat and hence your hand feels cold.

In the same way, your right hand which was placed in cold water, feels hot when you insert it into the lukewarm water. Because it takes heat energy from lukewarm water.

So, the same lukewarm water gives your hands different feeling according to the temperature of your hand. **Measuring temperature by touching is not correct.**

Thermometers are used to measure temperature accurately and quantitatively.

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1.4 Temperature

Definition of Temperature

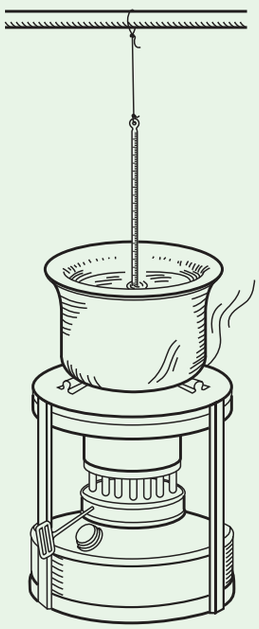
The measurement of warmness or coldness of a substance is known as its Temperature.

SI unit of temperature is kelvin. Celsius and Fahrenheit are the other units used. Celsius is called as Centigrade as well.

It determines the direction of flow of heat when two bodies are placed in contact.

Activity 2: The Temperature of Boiling Water

Take water in a vessel and place the vessel on a stove. Fix the thermometer as shown in figure (Caution: The thermometer should not touch the vessel in which the water is being heated. Otherwise the thermometer will be broken at high temperature.)



All students have to read the temperature of the water and note the reading on the blackboard. Do you notice that the temperature is raising?

What is the temperature of water when it is boiling?

_____

Does the temperature of the boiling water rise further after that?

_____

When boiling water is heated for some time, the water continues to receive more heat, but it's temperature does not rise further. The point at which the water boils and temperature becomes stable is called the **boiling point** of water.

Guess and Write:

(Check your assumption with the help of a thermometer.)

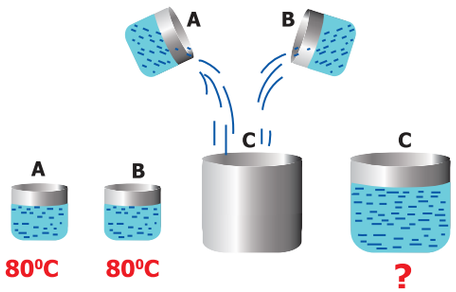
- Approximate temperature of the tea when you drink _____
- Approximate temperature of cool lemon juice when you drink _____

Normally, the room temperature of water is approximately 30°C. When we heat water, its temperature raises and it boils at 100°C. If we cool the water, it freezes at 0°C.

(Note : you have to say 30°C as 30 degree celsius or 30 degree centigrade)

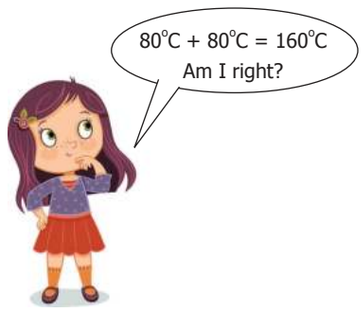
Is Neela correct?

Beaker A and B has water at 80° C.



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Then pour the water of A and B to an empty beaker C. Now, What is the temperature of the water in the beaker C? Neela says it will be 160°C.



What is your opinion? Does Neela say correctly? Make a guess and verify it experimentally.

_____

_____

DO YOU KNOW?

One day in 1922, the air temperature was measured at 59°C in the shade in Libya, Africa. The coldest temperature in the world was measured in the Antarctic continent. It was approximately – 89°C. The minus sign (–) is used when the temperature falls below the freezing point of water, which is 0°C. If water becomes ice at 0°C, you can imagine how cold – 89° C would be. Our normal body temperature is 37°C. Our body feels cool if the air temperature is around 15 to 20 degree Celsius.



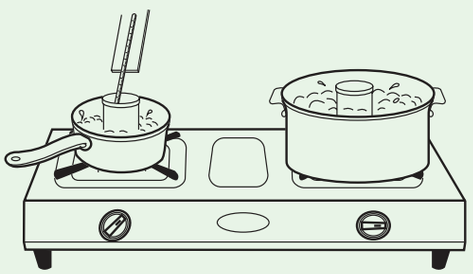
Can you estimate the night temperature in your village or city during winter?

1.5 Heat and Temperature

Heat and temperature are not the same thing, they in fact mean two different things;

- Temperature is related to how fast the atoms or molecules move or vibrate within the substance.
- Heat not only depends on the temperature of the substance but also depends on how many molecules are there in the object.
- Temperature measures the average kinetic energy of molecules. Heat measures the total Kinetic Energy of the molecules in the substance.

Activity 3: Take one litre water in a pan, and heat it on a stove. Calculate the time taken to start boiling. (i.e. the time taken to thermometer reading goes up to 100°C). Take five litre water in another pan and heat it on the same stove. Calculate the time taken by the water to start boiling.



In which pan the water starts to boil earlier?

- ☐ One litre water
- ☐ Five litre water.

Both, however, show a temperature of 100°C at the boiling point. Five litre

water takes more time to boil i.e. more heat is needed to boil the larger amount of water. So, five litre boiling water has more heat energy than one litre water.

Place an open can of lukewarm water in each pan. Observe their temperature to find out which can gets hotter.

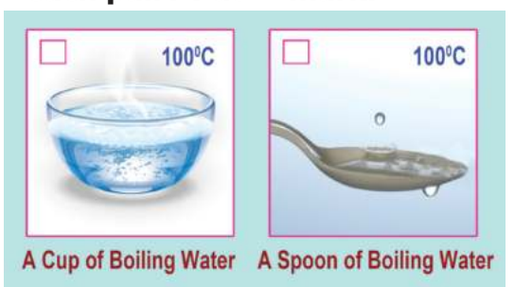
In which can water shows quick rise in temperature?

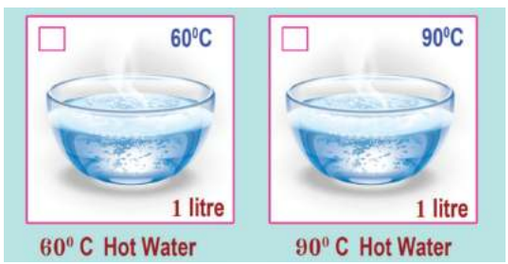
- ☐ Can in One litre boiled water
- ☐ Can in five litre boiled water.

You can see that, five litre water pan will raise the can of water to a higher temperature. Though, both pans of boiling water have the temperature of 100°C the five litre water can give off more heat energy than one litre water. Because it has more heat energy, and gives more energy to the water in the can.

Total heat is measured by **calorie,** the amount of heat needed to raise one gram of water by one degree centigrade.

❖ **Which has more heat energy in each pair? Put ✓ mark.**





Let Us Think

Pavithra is having tea while watching the pond near her house. Surely, tea is in higher temperature than the water in the pond. Now, a question is arising in Pavithra's mind. Which one has more heat energy, a cup of tea or the water in the pond? What do you think? _____

_____

_____

_____



Even though the temperature of the tea is higher than that of pond water, the volume of the water in pond is very high, hence the amount of molecules in the water in the pond is higher than the tea in the cup. So, pond has more heat energy than tea cup.

1.6 Flow of Heat

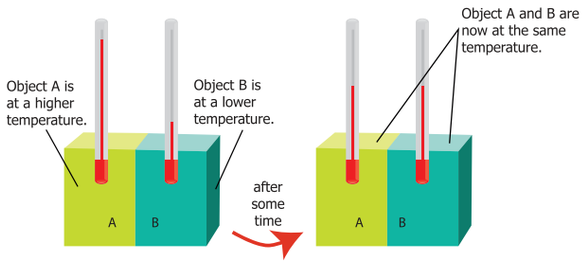
An analogy between temperature and water level:

Water **'flows'** when there is a difference in the **'levels'** of water in different places. It does not matter if there is more water in one place or another. Water from a puddle can flow into a reservoir or the other way around. The **'temperature'** of an object is like the water level – it

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determines the direction in which **'heat'** will flow. Heat energy flows from higher temperature to lower temperature.

Thermal contact and Thermal equilibrium



▲Two objects at different temperatures are put together

Consider two bodies A and B. Let the temperature of A be higher than that of B. On bringing bodies A and B in contact , heat will flow from hot body A to the cold body B. Heat will continue to flow till both the bodies attain the same temperature.

The temperature determines the direction of flow of heat.

1. You are holding a hot cup of coffee. Would the Heat energy transfer from



   a. Your body to the coffee, or

   b. The coffee to your body?



2. You are standing outside on a summer day. It is 40°C outside (note that normal body temperature is 37°C). Would the Heat energy transfer from.

   a. Your body to the air particles, or

   b. The air particles to your body?



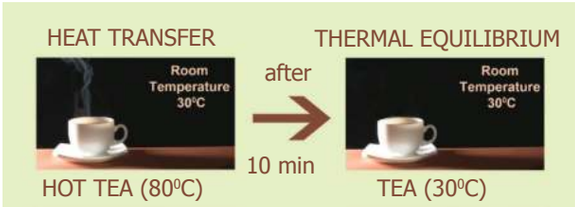
3. You are standing outside on a winter day. It is 23°C outside. Would the heat energy transfer from:

   a. Your body to the air particles, or

   b. The air particles to your body?

Two objects are said to be in **thermal contact** if they can exchange heat energy. **Thermal equilibrium** exists when two objects in thermal contact no longer affect each other's temperature.

For example, if a pot of milk from the refrigerator is set on the kitchen table, the two objects are in thermal contact. After certain period, their temperatures are the same, and they are said to be in thermal equilibrium.

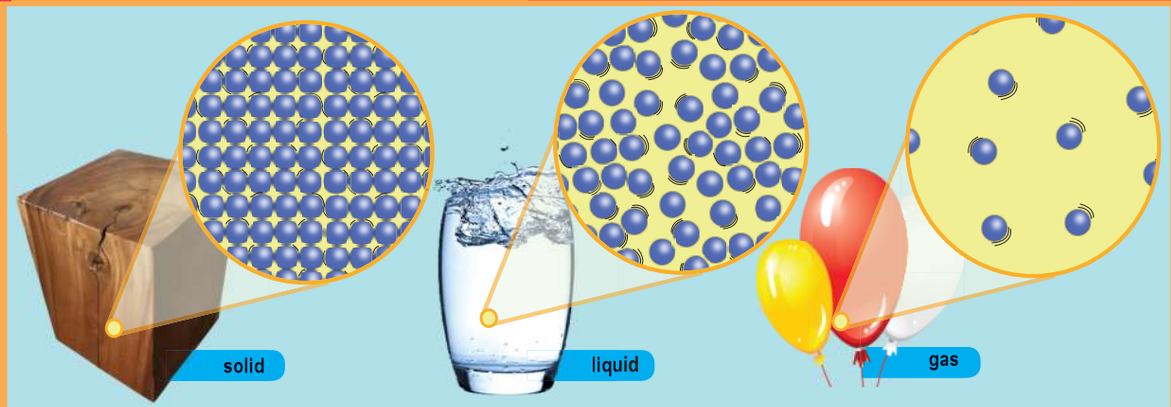


1.7 Expansion in solids

Sam is trying to open a tight jar, but he cannot open it. He asks his uncle to help. His uncle says that pour some hot water on the lid of the jar. Sam does so and tries to open it now. Wow! The jar is opened easily!

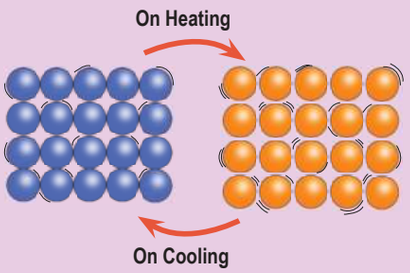
Do you have such experience? How do you open a tightly closed cap of the

HEAT - AN INTERNAL VIEW

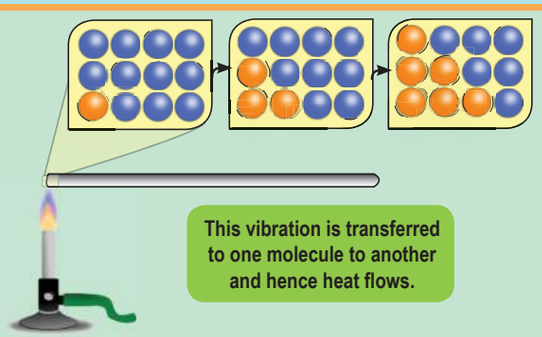


Substances are made up of molecules. The molecules in any object are in a state of vibration or movement. This cannot be seen with our naked eyes

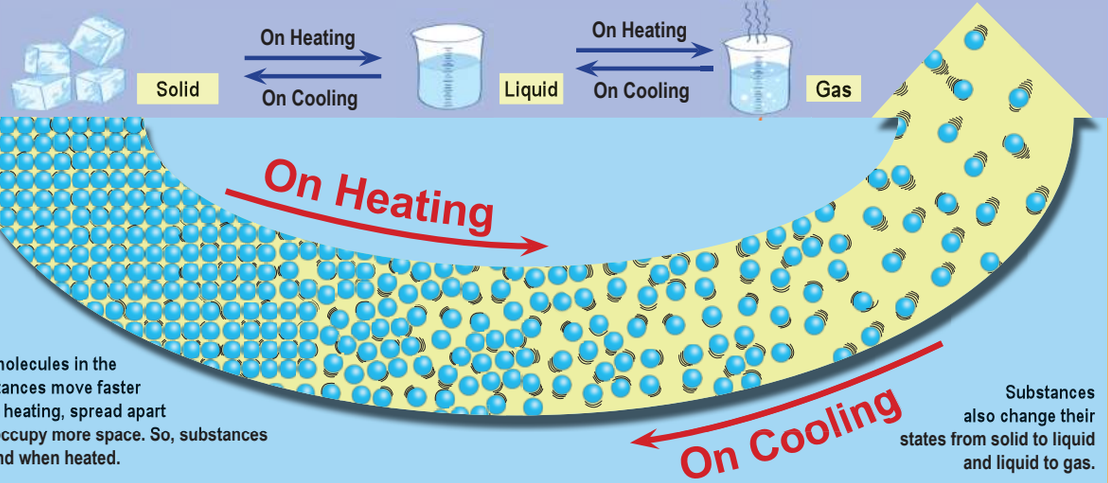
When substances are heated the vibration and movement are increasing



The total number of molecules remain unchanging after heating. Hence, No Change in weight.



This vibration is transferred to one molecule to another and hence heat flows.

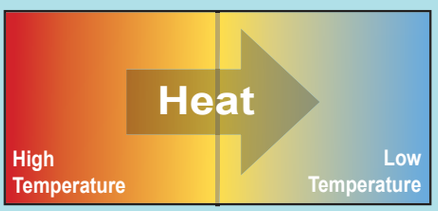


The molecules in the substances move faster when heating, spread apart and occupy more space. So, substances expand when heated.

Substances also change their states from solid to liquid and liquid to gas.



Water 'flows' when there is a difference in the 'levels' of water in different places. The 'temperature' of an object is like the water level – it determines the direction in which 'heat' will flow.



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pen which could not be opened by you normally?

Most substances expand when heated and contract when cooled. The change in length / area or volume (due to contraction / expansion) is directly related to temperature change.



Activity 4:

Hammer a nail into a tin can. Ease the nail out. Put it in again to make sure that the hole is large enough for the nail. Then, holding the nail with a pair of pliers, scissors or forceps, heat the nail over a candle, in hot water, or over the stove. Try to put it into the hole in the can.

I see that:_____

_____

You will see that, now it is hard to put the nail into the hole. Heat expands solids. The molecules in the solid move faster, spread apart and occupy more space.



The expansion of a substance on heating is called, the thermal expansion of that substance.

1.8 Linear and Cubical Expansion

A solid has a definite shape, so when a solid is heated, it expands in all directions i.e., in length, area and volume, all increase on heating.

The expansion in length is called linear expansion and the expansion in volume is called cubical expansion.

Why is the iron rim of a bullock cart wheel heated before it is fitted onto the wheel? Why is a small gap left between two lengths of railway lines?

We can perform an interesting experiment to find out an answer to these questions. All we need to do is to heat a cycle spoke.

Activity 5: Linear Expansion

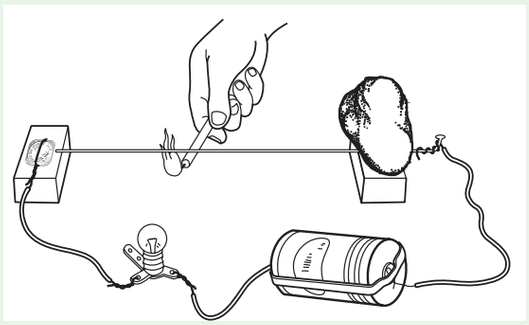
Take a bulb, dry cell, candle, cycle spoke, coin (or broad - headed nail) and two wooden blocks.

Place one end of the cycle spoke on a wooden block and connect an electric wire to it. Put a stone over the spoke to hold it firmly in place on the wooden block,

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as shown in Figure . The spoke should be parallel to the ground. Place the second wooden block under the free end of the spoke. Wrap some electric wire around the coin (or nail) and place it on the block. You may put a stone over the coin to hold it in place.

Connect a bulb and dry cell to the free ends of the wires connected to the coin and the spoke and make the circuit shown in the figure.



When the tip of the free end of the spoke touches the coin, the circuit is completed and the bulb lights up. Check to ensure this. If the bulb does not light up, it means the circuit is not complete, so check your connections properly. (**Note:** We will learn about electric circuit elaborately in electricity lesson.) Now slide a page of your book between the coin and spoke and then slide it out. That way you would get a gap between the coin and spoke equal to the thickness of the sheet of paper.

❖ Does the bulb light up? If it does not, what could be the reason?

_____

_____

You saw that the bulb does not light up when the spoke does not touch the coin. Now light the candle and heat the spoke with it.

❖ Did the bulb light up after the spoke was heated for some time?

_____

❖ If it did, then explain how the spoke touched the coin after it was heated.

_____

_____

❖ Why does the bulb go off some time after the candle is taken away from the spoke?

_____

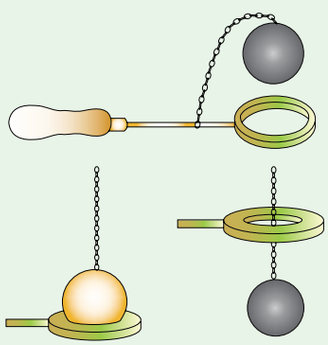
_____

❖ What happens to the length of the spoke when it is heated or cooled?

_____

Activity 6: Cubical Expansion

Take a metal ring and metal ball of such size that the ball just passes through the ring.



❖ Heat the ball and check whether it passes through the ring.

- ☐ Passed through
- ☐ Not passed through

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❖ Now let the ball cool down, and check whether it passes through the ring.

☐ Passed through

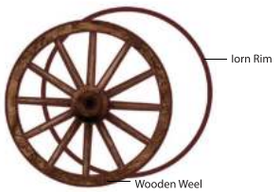
☐ Not passed through

Solids expand due to heat and come back to the original state if heat is removed.

1.9 Uses of Thermal Expansion

Fitting the iron rim on the wooden wheel

The diameter of the iron ring is slightly less than that of the wooden wheel. Therefore, it cannot be easily slipped on from the rim of wooden wheel.

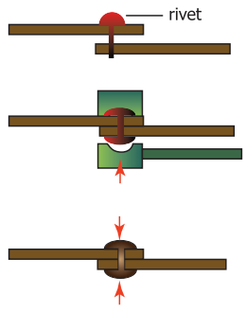


The iron ring is, therefore, first heated to a higher temperature so that it expands in size and the hot ring is then easily slipped over to the rim of the wooden wheel. Cold water is now poured on the iron ring so that it contracts in size and holds the wooden wheel tightly.

Rivetting

Rivets are used to join two steel plates together. Hot rivet is driven through the hole in the plates. One end of the rivet is hammered to form a new rivet head. When cooled, the rivet will contract and hold the two plates tightly together.





1.10 Thermal Expansion Examples

Give Reasons for the following

1. Gaps are left in between rails while laying a railway track.



_____

_____

_____

2. Gaps are left in between two joints of a concrete bridge.



_____

_____

_____

Cracking of a thick glass tumbler

Glass is a poor conductor of heat. When hot liquid is poured into the tumbler, the inner surface of the tumbler becomes hot and expands while the outer surface remains at the room temperature and does not expand. Due to this unequal expansion, the tumbler cracks.



Electric wires

Electric wires between electric posts contract on cold days and sag in summers. To solve this problem, we leave wires slack

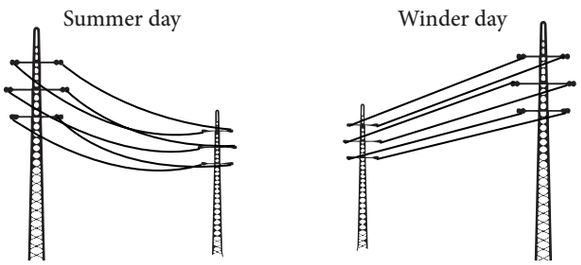
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Glassware used in kitchen and laboratory are generally made up of Borosilicate glass (pyrex glass). The reason is that the Borosilicate glass do not expand much on being heated and therefore they do not crack.



so that they are free to change length.

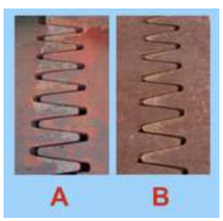


❖ The photographs below show an expansion joint at the end of a bridge in winter and in summer. Which season is shown in each picture? Explain how do you know?

_____

_____

_____



1.11 Numerical problems

1. I put a kettle containing 1 litre of cold water on the gas stove, and it takes 5 minutes to reach the boiling point. My friend puts on a small electric kettle, containing ½ litre of cold water, and it takes 5 minutes to get up to boiling point. Which gives more heat in 5 minutes?

a. the gas supply; or

b. the electricity supply?

Can you say how many times as much?

2. One calorie heat energy is needed to raise the temperature of the water from 30°C to 31°C. How much heat energy is needed to raise the temperature of the water from 30°C to 35°C.

Points to remember

- ❖ The main source of heat is sun, we can obtain heat from combustion, friction, and electricity.
- ❖ Heat is an energy that raises the temperature of a thing by causing the molecules in that thing to move faster
- ❖ Heat is the total Kinetic energy of constituent particles of objects.
- ❖ SI unit of Heat is joule (J).
- ❖ The measurement of warmness or coldness of a substance is known as its temperature.
- ❖ SI unit of temperature is kelvin.
- ❖ Temperature determines the direction of flow of heat when two bodies are placed in contact.
- ❖ Two objects are said to be in thermal contact if they can affect each other's temperature.
- ❖ Thermal equilibrium exists when two objects in thermal contact no longer affect each other's temperature.
- ❖ Most substances expand when heated and contract when cooled. The expansion of a substance on heating is called the thermal expansion of that substance.
- ❖ A solid has a definite shape, so when a solid is heated, it expands in all directions i.e., in length, area and volume, all increase on heating.

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ICT Corner

Heat

Through this activity you will be able to understand the 'Thermal Energy Transfer'.



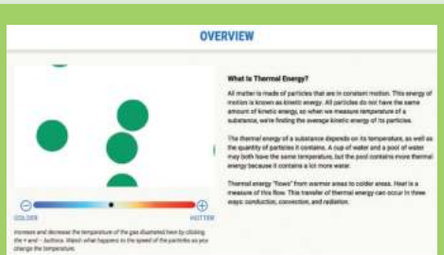
Step 1: Use the given URL in the browser. 'THERMAL ENERGY TRANSFER activity page will open.

Step 2: Click the = icon on the top left of the activity window, a list will drop down, from the list select a title.

Step 3: A small flash video window will open, click the play icon to play the video and observe.

Step 4: From the list select any title under the 'Example" list, a small flash activity window will open, click anyone of the tab given under the window to know the process of thermal transfer. Repeat the activity with different titles from the menu.

Step 1





Step 2

Step 3





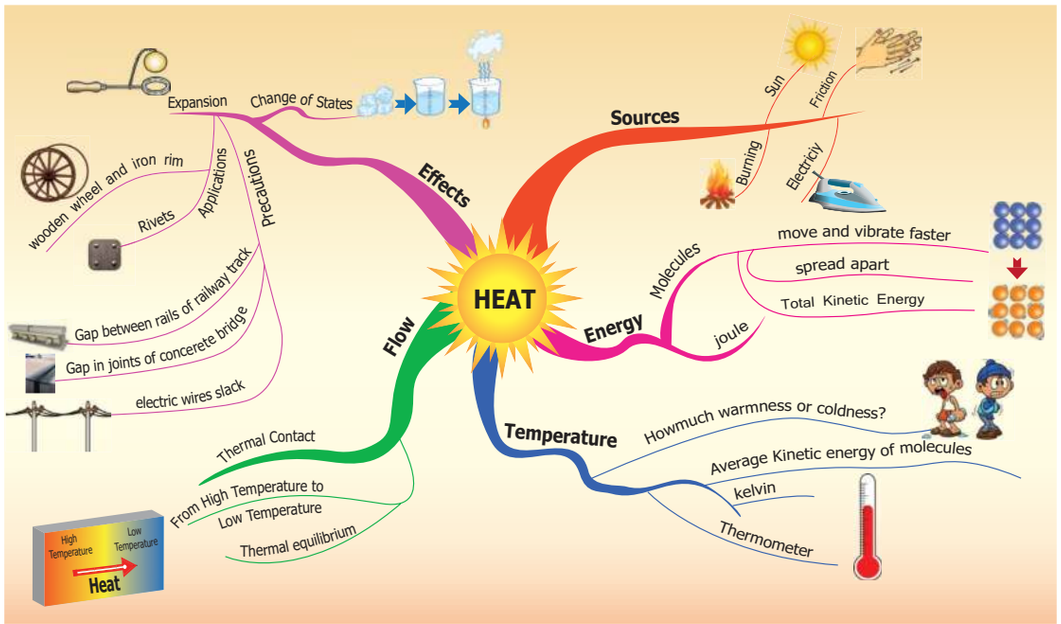
Step 4

THERMAL ENERGY TRANSFER URL:

http://d3tt741pwxqwm0.cloudfront.net/WGBH/conv16/conv16-int-thermalenergy/index.html#/intro

*Pictures are indicative only

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Evaluation

2OYCV

I. Choose the appropriate answer

1. When an object is heated, the molecules that make up the object
   a. begin to move faster
   b. lose energy
   c. become heavier
   d. become lighter
2. The unit of heat is
   a. newton
   b. joule
   c. volt
   d. celsius
3. One litre of water at 30°C is mixed with one litre of water at 50°C. The temperature of the mixture will be
   a. 80°C
   b. More than 50°C but less than 80°C
   c. 20°C
   d. around 40°C
4. An iron ball at 50°C is dropped in a mug containing water at 50°C. The heat will
   a. flow from iron ball to water.
   b. not flow from iron ball to water or from water to iron ball.
   c. flow from water to iron ball.
   d. increase the temperature of both.

II. Fill in the blanks

1. Heat flows from a _____ body to a _____ body.
2. The hotness of the object is determined by its _____
3. The SI unit of temperature is _____
4. Solids_____ on heating and_____ on cooling.

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5. Two bodies are said to be in the state of thermal_____ if there is no transfer of heat taking place.

III. True or False. If False, give the correct statement

1. Heat is a kind of energy that flows from a hot body to a cold body.
2. Steam is formed when heat is released from water.
3. Thermal expansion is always a nuisance.
4. Borosilicate glass do not expand much on being heated.
5. The unit of heat and temperature are the same.

IV. Give reasons for the following

1. An ordinary glass bottle cracks when boiling water is poured into it, but a borosilicate glass bottle does not.
2. The electric wire which sag in summer become straight in winter.
3. Rivet is heated before fixing in hole to join two metal plates.

V. Match the following

1.	Heat	-	$0^{\circ}C$
2.	Temperature	-	$100^{\circ}C$
3.	Thermal Equilibrium	-	kelvin
4.	Ice cube	-	No heat flow
5.	Boiling water	-	joule

VI. Analogy

1. Heat : Joule :: Temperature : _____
2. ice cube : $0^{\circ}C$ :: Boiling water :_____
3. Total Kinetic Energy of molecules: Heat :: Average Kinetic Energy : _____

VII. Give very short answer

1. Make a list of electrical equipments at home which we get heat from.
2. What is temperature?
3. What is thermal expansion?
4. What do you understand by thermal equilibrium?

VIII. Give short answer

1. What difference do you think heating the solid will make in their molecules ?
2. Distinguish between heat and temperature.

IX. Answer in detail

1. Explain thermal expansion with suitable examples.

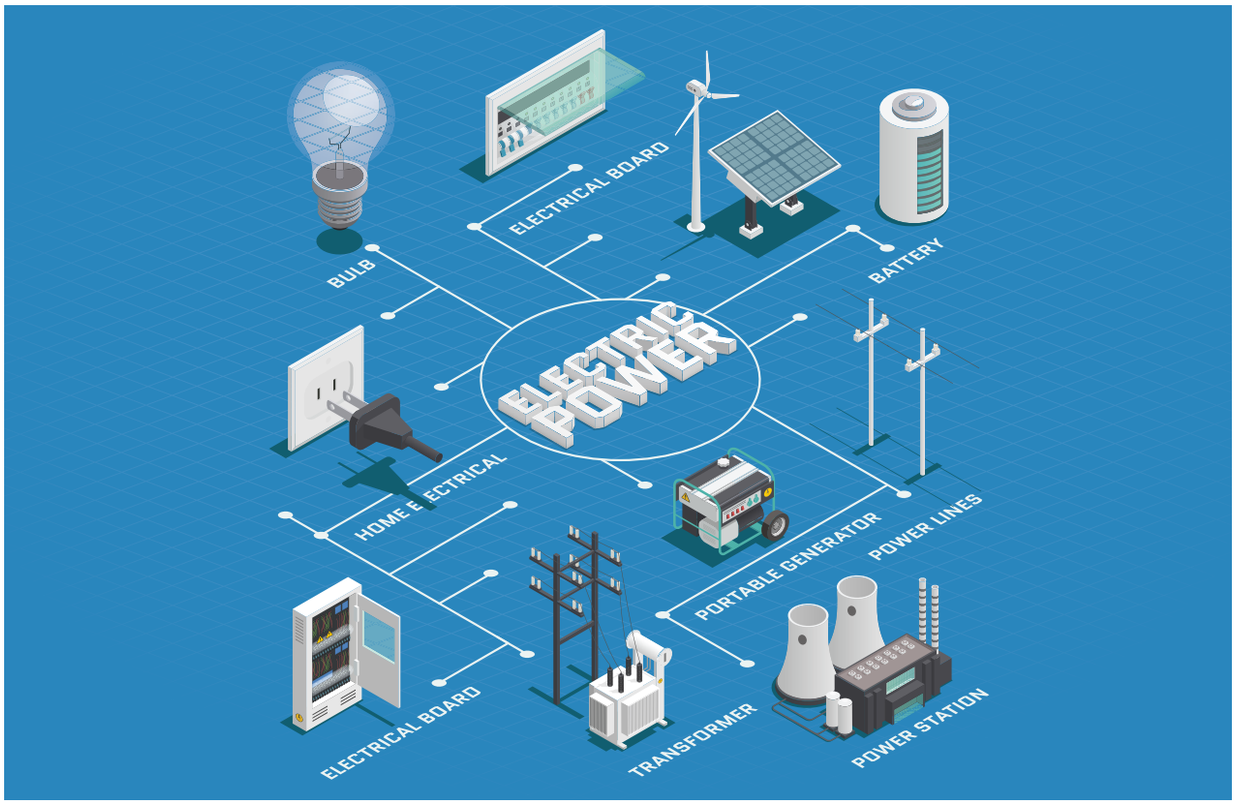
X. Questions based on Higher Order Thinking Skills

1. When a window is accidentally left open on a winter night, will you feel uncomfortable because the cold is getting in, or because the heat is escaping from the room?
2. Suppose your normal body temperature were lower than what it is. How would the sensation of hot and cold change?
3. If you heat a circular disk with a hole, what change do you expect in the diameter of the hole? Remember that the effect of heating increases the separation between any pair of particles.

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Unit 2 Electricity



Learning Objectives

- To know the sources of electricity
- To be aware of the equipments working on electricity
- To know the different kinds of electric cells and understand their applications
- To be able to use different types of cells in different applications
- To understand the symbols of circuits and apply them in different circuits
- To identify conductors and insulators
- To be able to make their own batteries

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Introduction

We use electricity in our day to day life. Have we ever wondered from where do we get this electricity? How does this electricity work? Can we imagine a day without electricity? If you ask your grandfather, you can come to know a period without electricity. They used oil lamps for light, cooked on fires of wood or coal. By the advent of electricity, our day to day works are made easy and the world is on our hands. What are the appliances those work on electricity? What are the materials those allow electricity to flow through? What are electric circuits? What are electric cells and batteries? Come on, let us descend into this lesson to know more about electricity.

Activity 1:

List out the electrical appliances used in your home.

_____

_____

_____

_____

2.1 Sources of Electricity

Selvan and Selvi are twins. They are studying in sixth standard. They visited their grandparent's village during summer vacation. At 6 O'clock in the evening Selvan's Grandfather switched on the light. The whole house was illuminated. Seeing this Selvan asked his grandfather "How do we get light by switching on the switch?" So, his grandfather took him to the nearest electricity board and enquired about the electricity.

Let us look in to the conversation given below.

Selvan: Sir, How do the electric bulb lighten up when we switch on the switch?

Engineer: Due to electricity.

Selvan: Oh! From where do we get this electricity?

Engineer: We get electricity from *thermal power, hydel power, tidal power, wind power, solar power* etc., as sources of electricity.

Selvan: Sir! Are these plants exist everywhere?

Engineer: No, these plants are constructed depending upon the natural resources available at that particular place. For example, we have thermal power plant in Neyveli, Tamilnadu as lignite is available there.

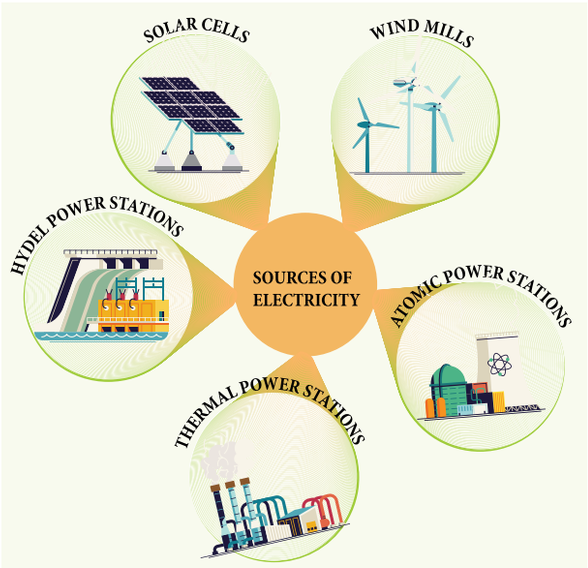
Selvan: Yes, I have seen wind mills near the hills of Tirunelveli District which has potential wind resource. Thank you sir, for your valuable information.

Grandfather: (while walking back to home) Do you think we get electricity only from the above mentioned sources.

Selvan: (while entering into the home, noticing the clock on the wall) Grandpa! look at that wall clock, How does it work?.

Grandfather: It needs electrical energy to work. Apart from the above mentioned sources, we get electricity from cells, and batteries.

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Selvan: Yes, Grandpa , now I am going to discuss about all these with Selvi.

What do you infer from the above dialogue? **Any device from which electricity is produced is called the source of electricity.** We get electricity from different sources.

The Major Electric power stations in Tamilnadu are: Thermal stations (Neyveli in Cuddalore District, Ennore in Thiruvallur District), Hydel power stations (Mettur in Salem District, Papanasam in Tirunelveli District), Atomic power stations (Kalpakkam in Kanchipuram District, Koodankulam in Tirunelveli District), and Wind mills (Aralvaimozhi in Kanyakumari District Kayatharu in Tirunelveli District). Apart from these Solar panels which are prevalent in many places are used to produce electricity.

Let us discuss in shortly about working power stations.

1. Thermal Power stations

In thermal power stations, the thermal energy generated by burning coal, diesel or gas is used to produce steam. The steam thus produced is used to rotate the turbine. While the turbine rotates, the coil of wire



kept between the electromagnet rotates. Due to electro magnetic induction electricity is produced. Here heat energy is converted into electrical energy.

2. Hydel power stations



In hydel power stations, the turbine is made to rotate by the flow of water from dams to produce electricity. Here kinetic energy is converted into electrical energy. Hydel stations have long economic lives and low operating cost.

3. Atomic power stations

In atomic power stations, nuclear energy is used to boil water.



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The steam thus produced is used to rotate the turbine. As a result, electricity is produced. Atomic power stations are also called as nuclear power stations. Here nuclear energy is converted into mechanical energy and then electrical energy.

4. Wind mills



In wind mills, wind energy is used to rotate the turbine to produce electricity. Here kinetic energy is converted into electrical energy.

2.2 Cell

A device that converts chemical energy into electrical energy is called a cell.

A chemical solution which produces positive and negative ions is used as electrolyte. Two different metal plates are inserted into electrolyte as electrodes to form a cell. Due to chemical reactions, one electrode gets positive charge and the other gets negative charge producing a continuous flow of electric current.

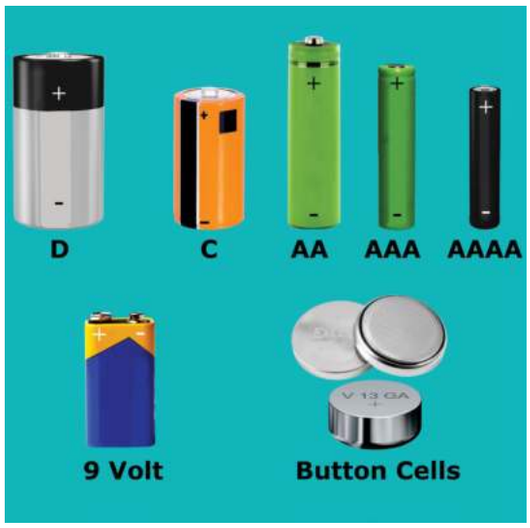
Depending on the continuity of flow of electric current cells are classified in to two types. They are primary cells and secondary cells.

Primary Cells

They can not be recharged. So they can be used only once. Hence, the primary cells are usually produced in small sizes.

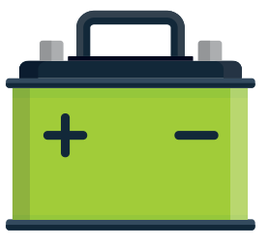
Examples

cells used in clocks, watches and toys etc., are primary cells.



Secondary Cells

A cell that can be recharged many times is called secondary cell. These cells can be recharged by passing electric current. So they can be used again and again. The size of the secondary cells can be small or even large depending upon the usage. While the secondary cells used in mobiles are in the size of a hand, the cells used in automobiles like cars and buses are large and very heavy.





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Examples

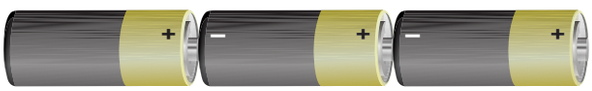
Secondary Cells are used in Mobile phones, laptops, emergency lamps and vehicle batteries.

Activity 2: From the following pictures, identify those use primary cell and secondary cell. Mark Primary cell as **'P'** Secondary cell as **'S'**.



Battery

Often, we call cells as 'batteries'. However only when two or more cells are combined together they make a battery. A cell is a single unit that converts chemical energy into electrical energy, and a **battery is a collection of cells**.



Battery

Activity 3: Take a dry cell used in a flashlight or clock. Read the label and note the following

1. Where is the '+' and '–' symbol?

2. What is the output voltage?

Look at the cells that you come across and note down the symbols and voltage.

Warning

All experiments with electricity should only be performed with batteries used in a torch or radio. Do not, under any circumstance, make the mistake of performing these experiments with the electricity supply in your home, farm or school. Playing with the household electric supply will be extremely dangerous!

2.3 Electric Circuits

Grandfather asked Selvi to bring torchlight. While taking the torchlight, it fell down and the cells came out. She puts the cells back and switched it on (Fig. A)

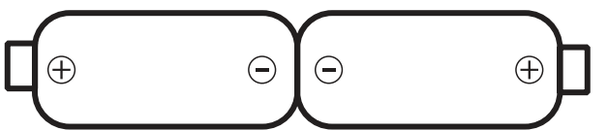


Fig: A

The torchlight did not glow. She thought the torchlight was worn out. She was afraid that grandfather might scold her. She started crying. Her uncle came there and asked the reason for crying. She conveyed the matter. Her uncle removed the cells and reversed them (Fig B)

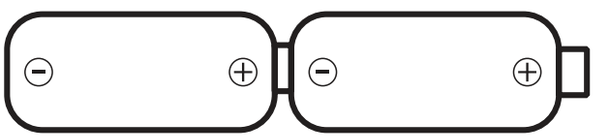
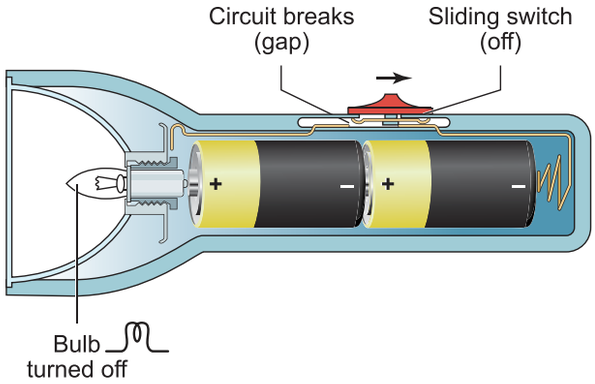


Fig: B

Now, the torch glows. Selvi's face also glows. Uncle told her the reason and explained her about electric circuits.

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Inside view of torch



An **electric circuit** is the continuous or unbroken closed path along which electric current flows from the positive terminal to the negative terminal of the battery. A circuit generally has:

a) **A cell are battery**- a source of electric current

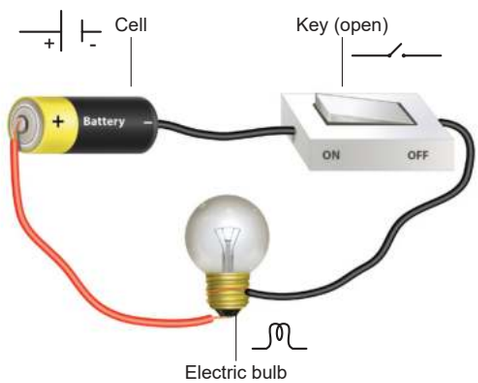
b) **Connecting wires**- for carrying current

c) **A bulb**- a device that consumes the electricity

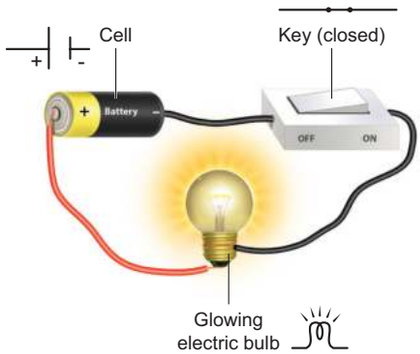
d) **A key or a switch**- this may be connected anywhere along the circuit to stop or allow the flow of current.

a. Open Circuit

In a circuit if the key is in open (off) condition, then electricity will not flow and the circuit is called an open circuit. The bulb will not glow in this circuit.



b. Closed Circuit



In a circuit if the key is in closed (on) condition, then electricity will flow and the circuit is called a closed circuit. The bulb will glow in this circuit.

Can you make a simple switch own by simple things available to you?

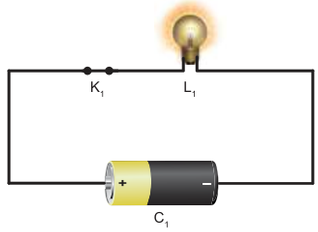
Types of Circuits

1. **Simple Circuit**
2. **Series Circuit**
3. **Parallel Circuits**

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1. Simple Circuit

A circuit consisting of a cell, key, bulb and connecting wires is called a simple circuit.

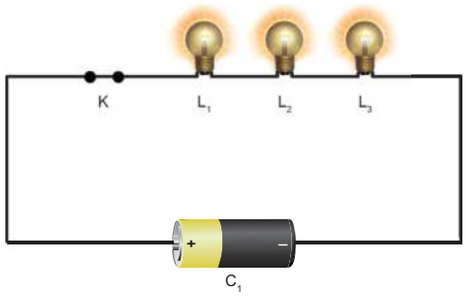


2. Series Circuit

If two or more bulbs are connected in series in a circuit, then that type of circuit is called series circuit. If any one of the bulbs

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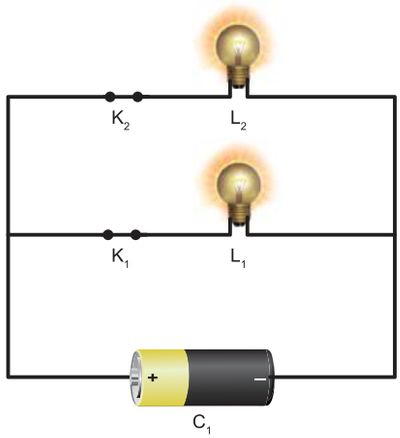
is damaged or disconnected, the entire circuit will not work.



3. Parallel Circuit

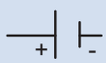
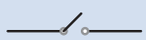
If two or more bulbs are connected in parallel in a circuit, then that type of circuit is called parallel circuit.

If any one of the bulb is damaged or disconnected the other part of the circuit will work. So parallel circuits are used in homes.



Symbols of Electric Components

In the circuits discussed above, we used the figures of electric components. Using electric components in complicated circuits is difficult. So, symbols of the components are used instead of figures. If these symbols used in electric circuits, even complicated circuits can be easily understood.

Sl.no.	Electric component	Figure	Symbol	Remarks
1	Electric cell	 Cell		Longer terminal refers positive and shorter terminal refers negative.
2	Battery	 Battery		Two or more cells connected in series
3	Switch-open		 Open	Switch is in off position
4	Switch-closed		Closed	Switch is in on position
5	Electric bulb			The bulb does not glow
				The bulb glows
6	Connecting wires			Used to connect devices.

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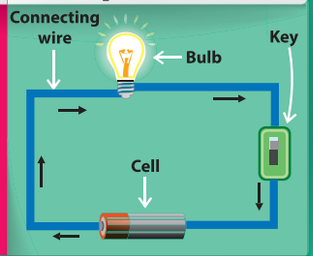
The flow of electric charge in a circuit is called Electric Current.

electricity



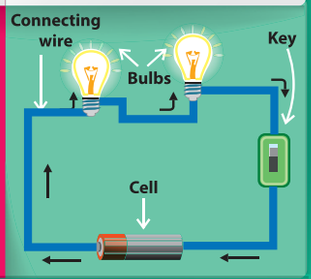
01 Simple Circuit

A circuit consisting of a cell, key, bulb and connecting wires is called a simple circuit



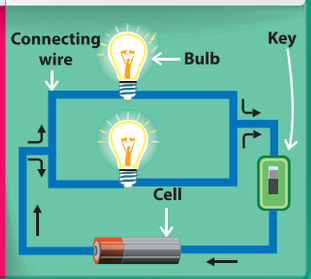
02 Series Circuit

A circuit consisting of a battery, key, bulbs and connecting wires connected in series is called a series circuit



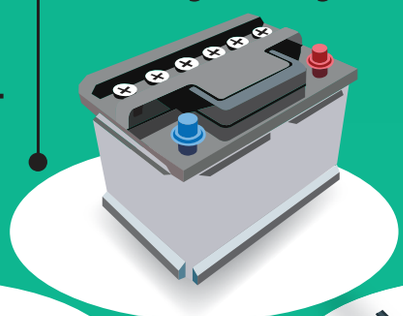
03 Parallel Circuit

A circuit consisting of a battery, key, bulbs and connecting wires connected in parallel is called a parallel circuit



SECONDARY CELL

Secondary cells can be recharged by passing current and used again and again.



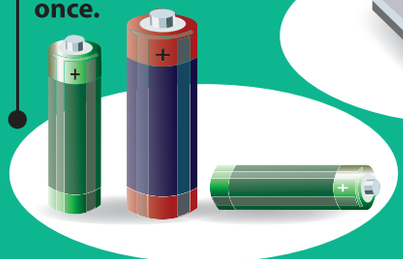
CONNECTING WIRE

Connecting wires are made up of conductors & covered with insulators



PRIMARY CELL

Primary cells can be used only once.



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DO YOU KNOW?

Electric Eel is a kind of fish which is able to produce electric current. This fish can produce an electric shock to safeguard itself from enemies and also to catch its food.



More to Know

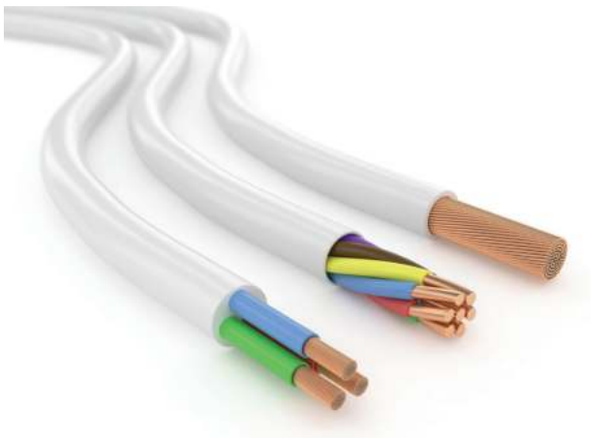
Ammeter is an instrument used in electric circuits to find the quantity of current flowing through the circuit. This is to be connected in series.



2.4 Conductors and Insulators

Will electric current pass throw all materials?

If an electric wire is cut, we could see a metal wire surrounded by another material. Do you know why it is so?



Conductors

The rate of flow of electric charges in a circuit is called electric current. **The materials which allow electric charges to pass through them are called conductors.** Examples: Copper, iron, aluminum, impure water, earth etc.,



Insulators (Non-Conductors)

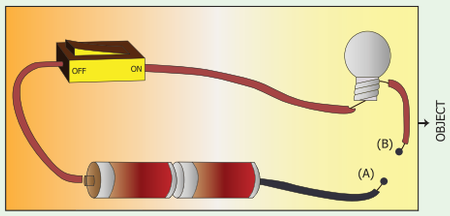
The materials which do not allow electric charges to pass through them are called insulators or non-conductors.

Examples: plastic, glass, wood, rubber, china clay, ebonite etc.,



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Activity 4: Connect the objects given in the table between A and B and write whether the bulb glows or not.



S l . No.	Objects	Materials of the objects	Glow or not glow
1.	Pin		
2.	Match stick		
3.	Safety pin		
4.	Pencil		
5.	Metal spoon		
6.	Rubber		
7.	Pen		
8.	Wooden scale		
9.	Hairpin		
10.	Glass piece		

Safety measures to safeguard a person from electric shock

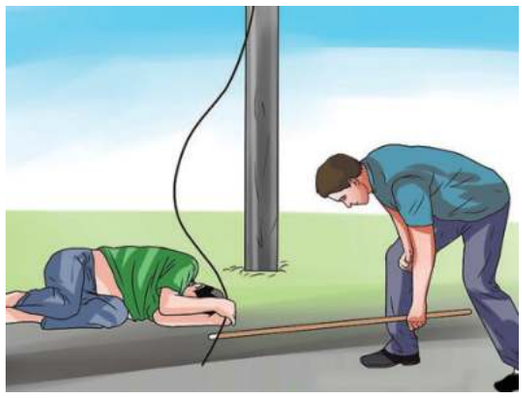
I. Switch off the power supply.

II. Remove the connection from the switch.

III. Push him away using non - conducing materials.

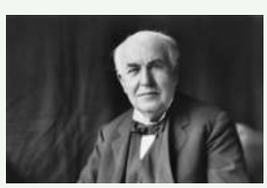
IV. Give him first aid and take him to the nearest health centre.

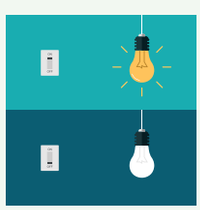




More to Know

Thomas Alva Edison (February 11, 1847 – October 18, 1931) was an American inventor. He invented more than 1000 useful inventions and most of them are electrical appliances used in homes. He is remembered for the invention of electric bulb.


Thomas Alva Edison



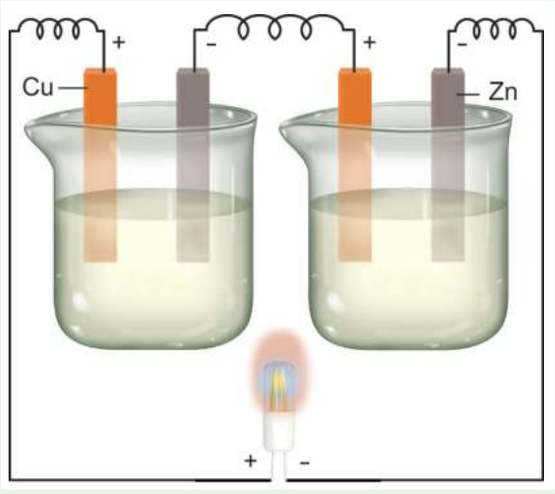
Activity 5:

Produce electricity using copper plates, zinc plate, connecting wires, key, beaker and porridge (rice water) [the older the porridge the better will be the current]

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Arrange copper and zinc plates in series as shown in the figure. Half fill two beakers with porridge. Connect the copper plate with the positive of and LED bulb and zinc to the negative. Observe what happens.

Now you can replace porridge with curd, potato, lemon etc.



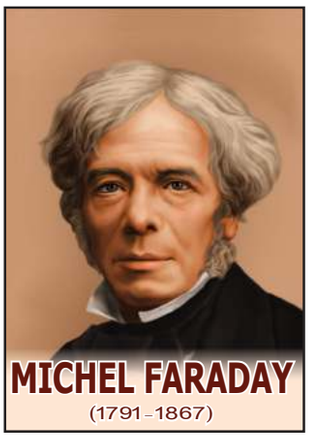
B4WKG

Points to remember

- Any device from which electricity is produced, is called the source of electricity.
- There are many sources of electricity such as thermal power stations, hydel electric power stations, wind mills, atomic power station etc.
- Device that converts chemical energy into electrical energy is called a cell.
- Electric cells are of two types depending on the continuity of flow of electric current.
- Primary cell is a cell that is designed to be used once and discarded.
- A cell that can be recharged many times is called secondary cell.
- Two or more cells combined together to make a battery.
- An electric circuit is the continuous or unbroken closed path along with electric current flows from the positive terminal to the negative terminal of the battery.
- A circuit consisting of a cell, key, bulb and connecting wires is called a simple circuit
- If two or more bulbs are connected in series in a circuit, then that type of circuit is called series circuit.
- If two or more bulbs are connected in parallel in a circuit, then that type of circuit is called parallel circuit.
- Symbols of electrical components are used to represent complicated circuits in simple way.
- The materials which allow electric charges to pass through them are called conductors.
- The materials which do not allow electric charges to pass through them are called insulators or non-conductors.

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Scientist for the People



A poor blacksmith's family in South London.

Michael! this is our food for one week...

y.. y.. yes, mom, I will adjust with this...

Recite fourth table, do you?

o.. o.. one.. f..f..four... i.. i..

hey! stammering...

Fraday couldn't continue his school studies because of poverty.

He joined in book binding works.

Used to read those books in leisure times.

Your books are bound. Would you please take the book "Conversations on Chemistry" of Jane Marcet by tomorrow?. I am reading that.

Wonderful! You read that book!?

Sir, I did those experiments too.

Your quest for knowledge wondering me. I have the tickets for scientist Humphry Davy's Lecture. Do you want to attend it?

Thanks Sir! Sure!

Faraday continuously listen to the lectures of Humphry Davy in Royal Society.

Take notes.

Sir, may I join as your assistant?

Humphry Davy

You have wonderfully taken my lecture notes. Definitely join.

Just you have appointed an ordinary man?

Wrong. Don't discriminate.

Faraday had lot of interests and skills.

Faraday did so many experiments in his leisure time.

He invented dynamo, and designed the forerunner of the electric motor.

Two milestones in technology.

Faraday's scientific lectures attracted the people.

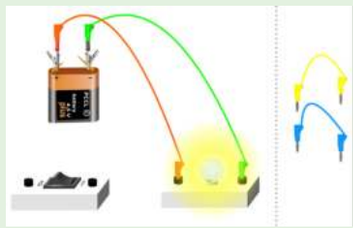
Sure. Faraday should be given 'SIR' title.

Sorry! I don't want of any awards. Science should be used for people. To my last breath, I want to be a scientist for people.

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ICT Corner

Electricity



Through this activity you will be able to form a simple circuit.

Step 1: Use the given URL in the browser. 'Simple Circuit will open.

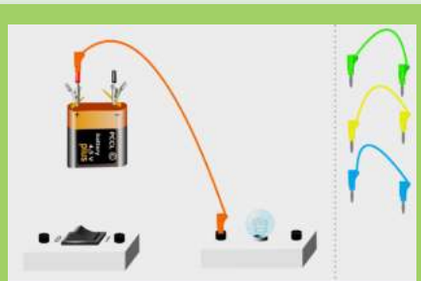
Step 2: In right side of the activity window there are diagrams of some wires and in the left side diagrams of a battery, switch and a bulb are given.

Step 3: By using the mouse drag and drop the wires to the battery and switch to make connections. Click on the switch, if the circuit is formed correctly the bulb will glow.

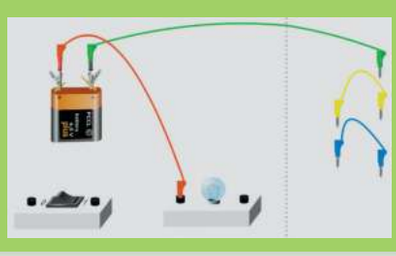
Step 4: Use the second URL to try Series and parallel circuits.

Step 1





Step 2



Step 3

Simple Circuit's URL:

http://www.physics-chemistry-interactive-flash-animation.com/electricity_electromagnetism_interactive/simple_circuit.htm

Series and parallel circuits url

http://www.physics-chemistry-interactive-flash-animation.com/electricity_electromagnetism_interactive/components_circuits_association-series_parallel.htm

*Pictures are indicative only

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Evaluation

EG7HN

I. Choose the appropriate answer

1. The device which converts chemical energy into electrical energy is

   a. fan b. solar cell

   c. cell d. television

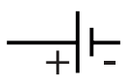
2. Electricity is produced in

   a. transformer b. power station

   c. electric wire d. television

3. Choose the symbol for battery

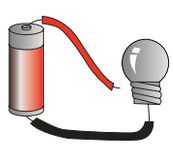
a. 

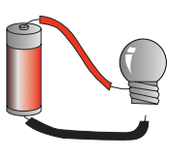
b. 

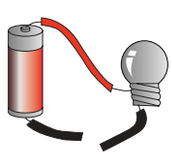
c. 

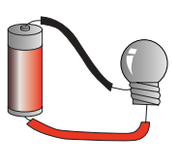
d.

4. In which among the following circuits does the bulb glow?

a. 

b. 

c. 

d. 

5. _____ is a good conductor

   a. silver b. wood

   c. rubber d. plastic

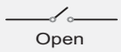
II. Fill in the blanks

1. _____ are the materials which allow electric current to pass through them.
2. Flow of electricity through a closed circuit is _____.
3. _____ is the device used to close or open an electric circuit.
4. The long perpendicular line in the electrical symbol represents its _____ terminal.
5. The combination of two or more cells is called a _____.

III. True or False. If False, give the correct statement

1. In a parallel circuit, the electricity has more than one path.
2. To make a battery of two cells, the negative terminal of one cell is connected to the negative terminal of the other cell.
3. The switch is used to close or open an electric circuit.
4. Pure water is a good conductor of electricity.
5. Secondary cell can be used only once.

IV . Match the following

sl.no.	Symbol	Description
1		open key
2		cell
3		bulb glows
4		battery
5		bulb does not glow

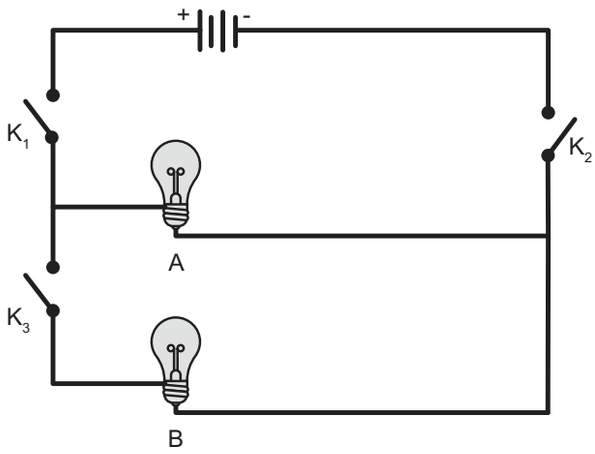
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V. Arrange in sequence

A CELL	A DEVICE	ELECTRICAL ENERGY
IS CALLED	IN TO	CHEMICAL ENERGY
THAT CONVERTS		

VI. Give very short answer

1. In the given circuit diagram, which of the given switch(s) should be closed. So that only the bulb A glows.



2. Assertion (A) : It is very easy for our body to receive electric shock.

   Reason (R) : Human body is a good conductor of electricity.

   a. Both A and R are correct and R is the correct explanation for A.

   b. A is correct, but R is not the correct explanation for A.

   c. A is wrong but R is correct.

   d. Both A and R are correct and R is not the correct explanation for A.

3. Can you produce electricity from lemon?

4. Identify the conductor from the following figures.






5. What type of circuit is there in a torch light?

6. Circle the odd one out. Give reason for your choice.

   Switch, Bulb, Battery, Generator.

VII. Give short answer

1. Draw the circuit diagram for series connection.

2. Can the cell used in the clock gives us an electric shock? Justify your answer.

3. Silver is a good conductor but it is not preferred for making electric wires. Why?

VIII. Answer in detail

1. What is the source of electricity? Explain the various power stations in India?

2. Tabulate the different components of an electric circuit and their respective symbols.

3. Write short notes on conductors and insulators.

IX. Question based on Higher Order Thinking Skills

1. Rahul wants to make an electric circuit. He has a bulb, two wires, a safety pin and a piece of copper. He does not have any electric cell or battery. Suddenly he gets some idea. He uses a lemon instead of a battery and makes a circuit. Will the bulb glow?

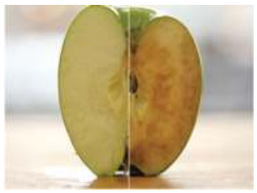
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X. Search ten words in the given word grid and classify them as conductors and insulators

A	G	H	R	N	A	E	J	U	R
R	H	A	E	A	R	T	H	M	A
E	R	S	S	A	L	G	U	M	Q
T	P	L	A	S	T	I	C	N	T
A	T	I	R	O	N	A	A	O	N
W	J	A	E	I	W	O	O	D	T
A	B	D	M	C	O	P	P	E	R
E	R	U	B	B	E	R	M	P	T
S	L	R	H	E	S	S	A	I	I
A	T	N	A	S	B	H	N	L	R

S.No.	CONDUCTORS	INSULATORS

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Unit 3 Changes Around Us



Learning Objectives

- To recognize and enlist a few changes that happens in our day-to-day life
- To classify the observed changes as,
  - slow / fast, reversible / irreversible
  - physical and chemical changes
  - desirable / undesirable, natural / human made
- To explain the process of dissolution
- To distinguish between a solvent and a solute

40RTQ

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Observe the pictures in the previous page and fill in the gaps.

Initial stage	Changing stage
Seed	Sapling
	Night
Rock	
raw fruit	

What is common in all the above pairs?

_____

Introduction

What is a change?

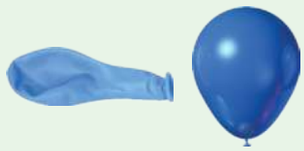
The process in which something becomes different from what it was earlier? It is the observable difference between initial state and the final state of any substance.

Change is the law of nature. In our day - to - day life we see many changes around us. Weather changes periodically (daily/ seasonly), season change periodically. A paper burns readily while it takes a few days for an iron nail to rust. It takes a few hours for milk to turn into curd but vegetables get softened in a few minutes when cooked.

The what happens during a change? The above said changes are accompanied by change in the properties like shape, colour, temperature, position and composition. Some changes can be observed while some are not possible to notice.

Can you list some of the changes that you have observed in your daily life?

Activity 1: What happens when you blow air into a balloon?



- Is there any change in size?
  ☐ Yes ☐ No
- Is there any change in shape?
  ☐ Yes ☐ No
- Is there any other change?

_____

3.1 Classification of Changes

There are different types of changes that occur around us. Some changes take place very quickly while others take hours, days or even years. Some changes are temporary while some are permanent. Some changes produce new substances while others do not. Some changes are natural while others are made by human beings. Some changes are desirable to us but some changes are not desirable.

We shall now try to classify changes on the basis of certain similarities and differences.

- **slow and fast changes**
- **reversible and irreversible changes**
- **physical and chemical changes**
- **desirable and undesirable changes**
- **natural and man - made changes**

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3.1.1 Slow and Fast changes

Activity 2: Look at the pictures and discuss about the duration for the changes to take place.



Slow changes

Changes which take place over a long period of time (hours / days / months / years) are known as slow changes.

Examples: growth of nail and hair, change of seasons, germination of seed.

Fast Changes

Changes which take place within a short period of time (seconds or minutes) are known as fast changes.

Examples: Bursting of balloon, breaking of glass, bursting of fire crackers, burning of paper.

3.1.2 Reversible and Irreversible changes

Reversible change

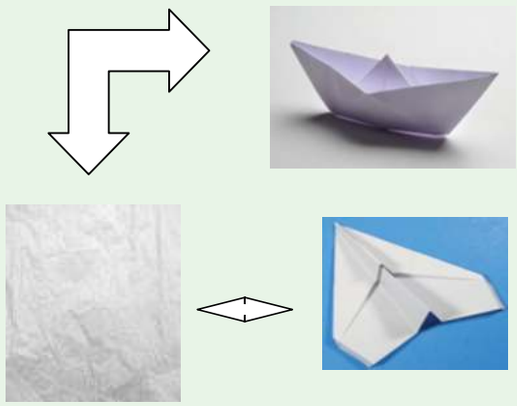
Changes which can be reversed (to get back the original state) are known as reversible changes.

Examples: Touch me not plant (Responding to touch), stretching of rubber band, melting of ice.

Touch me not plant



Activity 3: Try to make a boat and an aeroplane one by one using the same piece of paper. This means the change of shape discussed here is reversible.



Irreversible change

Changes which cannot be reversed or to get back the original state are known as irreversible changes.

Activity 4: What kind of changes are they?



a) Burning of a candle.

_____

b) Piercing a balloon with a pin.

_____

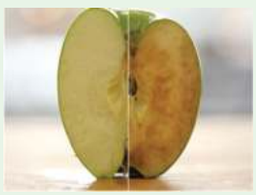
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Examples : Change of milk into curd, digestion of food, making idly from batter.



3.1.3 Physical and Chemical Changes

Activity 5: Take an apple and cut it into two halves.



Cut one half into pieces and share it with your friends.

Is there any change in the composition of the apple while cutting?

No, only the shape and size have changed. This can be called a **physical change.**

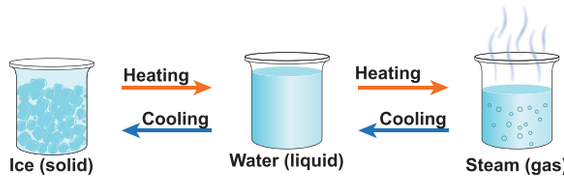
Leave the other half on the table for some time. You can see brown patches formed on the cut surface because of the reaction between some substances in the apple and the air around it. This is a **chemical change.**

Physical changes

Physical changes are the temporary changes in which there is change in the physical appearance or physical state of the substance but not in its chemical composition. Here no new substance is formed.

Example: Melting of ice, the solution of salt or sugar, stretching of rubber band.

Let us now understand **the physical changes that take place in water**. You already know that water exists in three states as solid, liquid and gas. Change of state takes place either by heating or cooling. By heating energy is supplied and by cooling energy is taken away. These are the reasons for the changes.



Let us name a few processes connected with the changes in states of water.

Change	Process
ice into water on heating	melting
water into steam on heating	vapourisation
steam into water on cooling	condensation
water into ice on cooling	freezing

More to Know

The change of state from solid to gas directly is called **sublimation.**

Example : Camphor

Let us understand one more physical change

Dissolution

The spreading of the solid particles (broken into individual molecules) among the liquid molecules is called as dissolution.

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- **Solvent** is a substance that dissolves the solute.
- **Solute** is a substance that is dissolved in a solvent to make a solution.
- When solute is dissolved in a solvent it forms a **solution**.

Solute + Solvent ⟶ Solution



Water is known as the universal solvent. It dissolves a wide range of substance.

Activity 6: Take half a cup of water, add one spoon full of sugar and stir well.



a. What do you observe?

_____

b. What happened to the sugar?

_____

c. Where is it gone?

_____

d. The solute in the above solution is _____.

e. The solvent in the above solution is _____.

f. Have you seen a glass of water and a glass of sugar solution looking alike? _____

Chemical changes

Chemical changes are the permanent changes in which there is a change in the chemical composition and new substance is formed.

Examples: Burning of wood, Popping of popcorn, Blackening of silver ornaments, and Rusting of iron.

Physical Change	Chemical Change
No new substance formed in this change.	New substance formed in this change.
No change in the chemical composition.	There a is change in the chemical composition.
It is a temporary change.	It is a permanent change.
It is reversible.	It is irreversible.

Activity 7: Look at the pictures and write whether they are **physical** or **chemical** changes.



_____



_____



_____



_____

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3.1.4 Desirable and Undesirable Changes

Activity 8: Look at the pictures and write whether they are **desirable** or **undesirable** changes.

forest fire



_____

decaying of fruit



_____

egg to chicken



_____

Wind mills



_____

Activity 9: Identify the type of changes

Natural / Human made

Floods



_____

Carpentry



_____

Planting of seedlings



_____

Land slides



_____

Desirable changes

The changes which are useful, not harmful to our environment and desired by us are known as desirable changes.

Examples: Ripening of fruit, growth of plants, cooking of food, milk changing to curd.

Undesirable changes

The changes which are harmful to our environment and not desired by us are known as undesirable changes.

Examples: Deforestation, decaying of fruit, rusting of iron.

3.1.5 Natural and human made changes

AZ7BX

Natural changes

Changes which take place in nature on their own and are beyond the control of human beings are known as Natural changes.

Examples: Rotation of the earth, Changing phases of the Moon, Rain.

Human made or artificial changes

The changes which are brought about by human beings are known as human made or artificial changes. They will not happen on their own.

Examples: Cooking, Deforestation, Cultivating crops, construction of buildings.

Points to remember

- Everything in this world undergoes changes. Changes occur in position, shape, size, state, colour, temperature, composition etc.,

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- Fast change – short period of time.

  Slow change – long period of time.

- Reversible change – can get back to its original state.

  Irreversible change – cannot get back to its original state.

- Desirable change - changes that are useful and harmless to our environment.

  Undesirable change - changes that are harmful to our environment.

- Natural change - changes that take place in nature on their own.

  Human made change - changes that are brought about by human beings.

- A solute when dissolved in a solvent makes a solution.

- The process of dissolving the solute in solvent is called dissolution.



ICT Corner

Changes Around Us



Through this activity you will be able to understand reversible & irreversible changes.

Step 1: Use the given URL in the browser. 'Reversible and irreversible changes's page will open. Use the arrow marks on both sides of the substance to choose another substance to test.

Step 2: Click and drag the substance into the beaker, observe whether it dissolves or not. Click the Dissolving / Reversing button to switch between the both activities.

Step 3: In the Reversing activity, with some substances you can choose either to cool or to Heat them. With other substances you can choose either to Heat or to filter them by clicking the respective buttons.

Step 4: Click on the Reset button to clear.

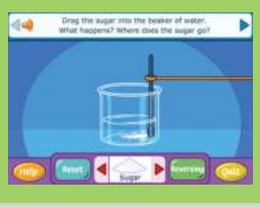
Step 1





Step 2

Step 3





Step 4

Reversible and irreversible changes's URL:

http://www.bbc.co.uk/schools/scienceclips/ages/10_11/rev_irrev_changes_fs.shtml

*Pictures are indicative only

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Evaluation

WZ8B1

I. Choose the appropriate answer

1. When ice melts to form water, change occurs in its

   a. position b. colour

   c. physical state d. composition

2. Drying of wet clothes in air is an example of

   a. Chemical change

   b. Undesirable change

   c. irreversible change

   d. physical change

3. Formation of curd from milk is

   a. a reversible change

   b. a fast change

   c. an irreversible change

   d. an undesirable change

4. Out of the following an example of a desirable change is

   a. rusting b. change of seasons

   c. earthquake d. flooding

5. Air pollution leading to acid rain is a

   a. reversible change

   b. fast change

   c. natural change

   d. human made change

II. Fill in the blanks

1. Magnet attracts iron needle. This is _____ change. (a reversible / an irreversible)

2. Boiling of egg results in _____ change. (a reversible / an irreversible)

3. Changes that are harmful to us are _____. (desirable / undesirable)

4. Plants convert carbon-di-oxide and water into starch. This is an example of _____ change. (natural / human made)

5. Bursting of fire crackers is a _____ change whereas germination of seeds is a _____ change. (slow / fast)

III. True or False. If False, give the correct statement

1. Growing of teeth in an infant is slow change.

2. Burning of match stick is a reversible change.

3. Change of new moon to full moon is human made.

4. Digestion of food is a physical change.

5. In a solution of salt in water, water is the solute

IV. Analogy

1. Curdling of milk : irreversible change :: Formation of clouds : _____change

2. Photosynthesis : _____ change :: burning of coal : Human – made change

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3. Dissolution of glucose : reversible change :: Digestion of food: _____ change

4. Cooking of food : desirable change :: decaying of food : _____change

5. Burning of matchstick :_____ change: Rotation of the Earth : Slow change

V. Circle the odd one out. Give reason for your choice

1. Growth of a child, Blinking of eye, Rusting, Germination of a seed

2. Glowing of a bulb, lighting of a Candle, breaking of a coffee mug, curdling of milk

3. Rotting of an egg, condensation of water vapour, trimming of hair, Ripening of fruit

4. Inflating a balloon, popping a balloon, fading of wall paint, burning of kerosene

VI. Give very short answer

1. What kind of a change is associated with decaying of a plants?

2. You are given some candle wax. Can you make a candle doll from it? What kind of change is this?

3. Define a slow change.

4. What happens when cane sugar is strongly heated? Mention any two changes in it.

5. What is a solution?

VII. Give short answer

1. What happen when paper is burnt? Explain.

2. Can deforestation be considered a desirable change? Explain.

3. What type of changes is associated with germination of a seed? Explain

VIII. Answer in detail

1. Give one example for each case that happens around you.

   a. Slow and fast change

   b. Reversible and irreversible change

   c. Physical and chemical change

   d. Natural and man-made change

   e. Desirable and undesirable change

IX. Question based on Higher Order Thinking Skills

1. When a candle is lit the following changes are observed.

   a. Wax melts.

   b. Candle keeps burning.

   c. The size of the candle decreases.

   d. The molten wax solidifies

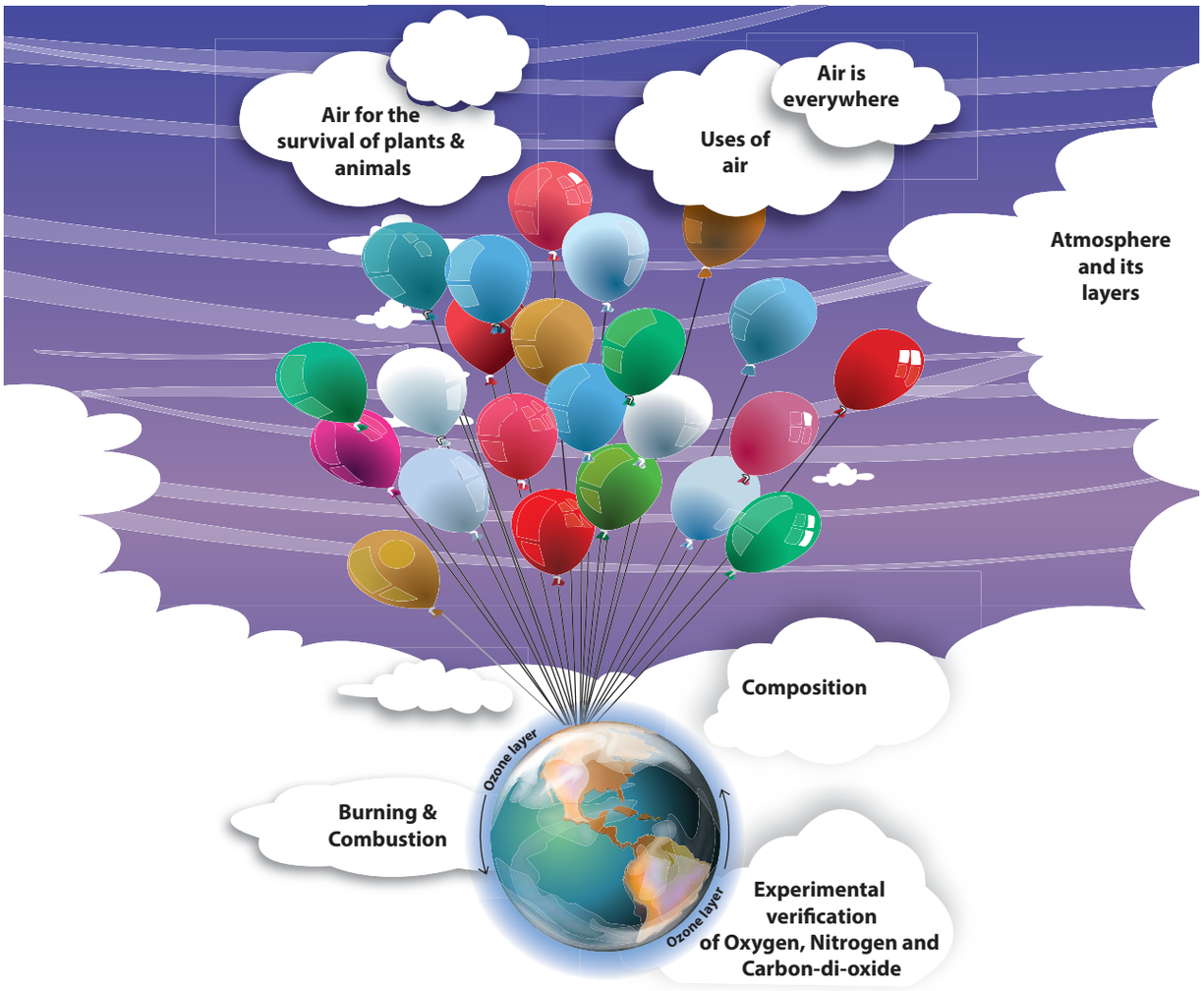
   e. Which of the changes can be reversed? Justify your answer.

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Unit 4 Air

HD087



Learning Objectives

- To identify the components and uses of air
- To develop skills in performing experiments and arriving at conclusions
- To clarify the role of oxygen in the process of burning
- To realize the significance of air for the survival of plants and animals on earth
- To appreciate the need of air in protecting our atmosphere

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Introduction

Air is present everywhere around us. We cannot see air. But we can feel its presence in so many ways. For example, we feel air when the trees rustle, clothes hanging on a clothes-line sway, pages of an open book flutters when the fan is switched on, when kites fly in the sky. We cannot see, touch or taste air but we can feel it. It is the air that makes all these movements possible. Thus, we can understand that **air is present all around us.**

Air is necessary for us to live. We can live without food for some days, without water for a few hours, but cannot survive without air for more than a few minutes. So, **air is very important for all living beings to survive.**

When air is moving it is called wind. It is cool and soothing as breeze. When air moves with force, it is called storm. It can even uproot trees and blow off the roof tops. Air is necessary for breathing and also for combustion. Shall we do an activity?

Activity 1: Air is everywhere

Let us take an empty glass bottle. Is it really empty or does it have something inside?

Now, shall we turn the glass bottle upside down? Can you agree that there is still something inside the empty glass bottle? Let us do the following activity to find what is there inside an empty glass bottle.

Dip the open mouth of the bottle into



the trough filled with water as shown in Fig 1. Observe the bottle. Does water enter the bottle? _____

Now tilt the bottle slightly. Now again dip the open mouth of the bottle as shown in Fig 2. Do you think that water will enter the bottle? _____

Kindly observe the Fig 2 carefully. You can see bubbles coming out of the bottle.

When you perform the experiment, can you hear the bubbly sound? can you now guess what was inside the bottle? _____

Yes, you are right. It is **"air"** that was present in the bottle.

The bottle was not empty at all. In fact, it was filled completely with air even when you turned it upside down. That is why we notice that water does not enter the bottle when it is pushed in an inverted position, as there was no space for air to escape.

When the bottle was tilted, the air was able to come out in the form of bubbles, and water filled up the empty space that the air has occupied.

Hence **we can see that air fills all the space inside the bottle.**

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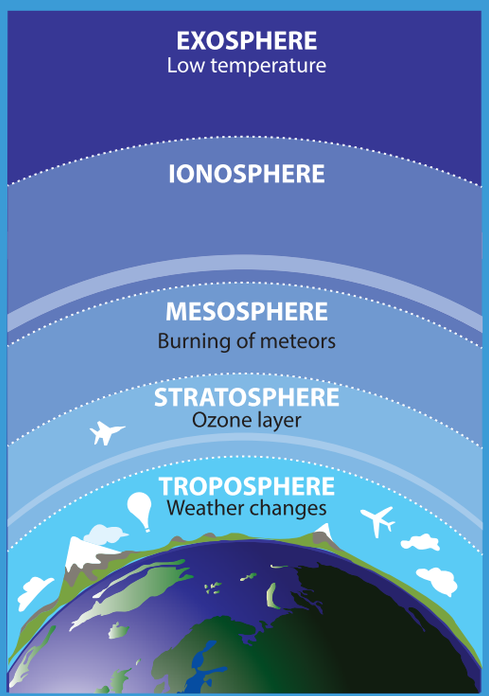
AIR

OI8M0

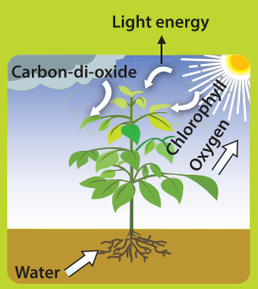




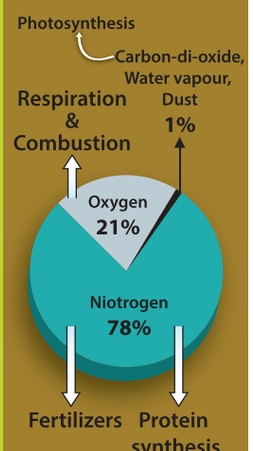
ATMOSPHERE AND ITS LAYERS



AIR FOR SURVIVAL OF PLANTS AND ANIMALS



COMPOSITION



USES OF AIR

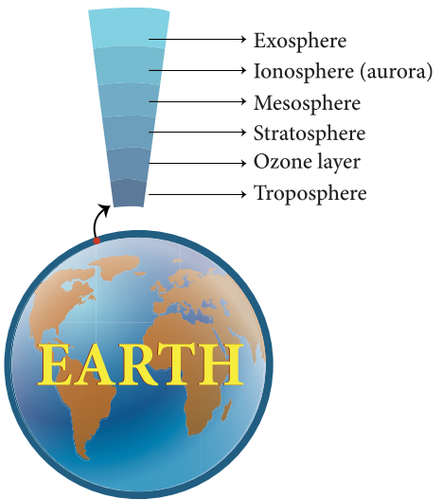


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4.1 Atmosphere

Our earth is surrounded by a huge envelope of air called the atmosphere. Atmosphere extends to more than 800km above the surface of earth and is held in place by the earth's gravity. The atmosphere protects us from many harmful rays coming from the sun. The air envelope is thicker near the earth's surface and as we go higher the density and the availability of air gradually decreases. This is because, as we go higher, the force of gravity decreases, so it is not able to hold large amount of air.

The atmosphere is made of five different layers – **the troposphere, the stratosphere, the mesosphere, the ionosphere and the exosphere.**



The troposphere is the layer closest to the earth. It is the layer in which we live. It extends upwards for about 16km above the surface of the earth. Movement of wind takes place in this layer. It also contains water vapour, which is responsible for making clouds. This layer is responsible for the weather we experience on earth. Aircrafts usually fly above this layer to avoid strong winds and bad weather.

The stratosphere lies above the troposphere. This layer has the ozone layer in it. The ozone layer protects all life on earth from the harmful ultraviolet rays of the sun.



A weathercock shows the direction in which the air is moving at a particular place. You can also make a wind sock to find the direction of the wind. Can you try it yourself?





4.2 Experimental verification of presence of Oxygen, Carbon-di-oxide and Nitrogen in Air

Is air a thing or a composite mixture?

For long time, that is, until eighteenth century, human thought 'air' as a fundamental constituent of matter. However an ingenious experiment conducted by Joseph Priestley in 1774 showed that **"air is not an elementary substance, but a composition,"** or mixture of gases. He was also able to identify a colourless and highly reactive gas which was later named **'oxygen'** by the great French chemist Antoine Lavoisier.

Priestley took a tub of water and made a float and placed a candle on it. He covered

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Fig-1



Candle Glows

Fig-2



Candle is put-off as there was no oxygen

Fig-3



Mouse is inserted

Fig-4



Mouse died as there was no oxygen in candle glass jar.

Fig-5



Mint plant is introduced

Fig-6



Candle continued to glow because mint provides oxygen

Fig-7



Candle glows, mouse survies with a mint plant inside.

the candle with a glass jar. [As the bottom portion of the jar was filled with water, no air can enter or exit and hence the jar was completely sealed **(Fig-1)**]. As you would have guessed the candle flame was extinguished in a very short time. He used a magnifying glass to focus the sun rays to light the candle. Thus he tried to relight the candle many times without opening the sealed jar **(Fig-2).** The candle could not be relit. What can we make out of it?

It was clear that something in the air was being used for burning and being converted into another substance. Once the substance in the air that was aiding the burning was completely used by the burning flame and converted into another substance, the flame went out.

[Later chemist named the substance necessary for burning as oxygen and during the process of burning oxygen is converted mostly into carbon dioxide.]

Now as the jar was inside the water, Priestley could gently lift the jar and place a live mouse inside it without allowing outside air to enter the jar **(Fig-3).** Without oxygen, as you would have guessed, the mouse died **(Fig-4).** It was clear that oxygen was necessary for the survival of the mouse.

In the next step, he gently lifted the jar and placed a mint plant **(Fig-5).** (**Note**: Look at the Figure- 5; you could see that the plant is inserted into the bell jar when the jar is very much inside the water. This is done to ensure that the outside air is not entering into the bell jar.) Plant being a living thing like mouse, perhaps he thought, would die. Instead, the plant survived. After placing the mint plant, he lit up the candle and it continued to burn **(Fig-6).**

In fourth experiment, he took a jar, burned a candle and converted all oxygen into carbon dioxide. He placed a mint plant

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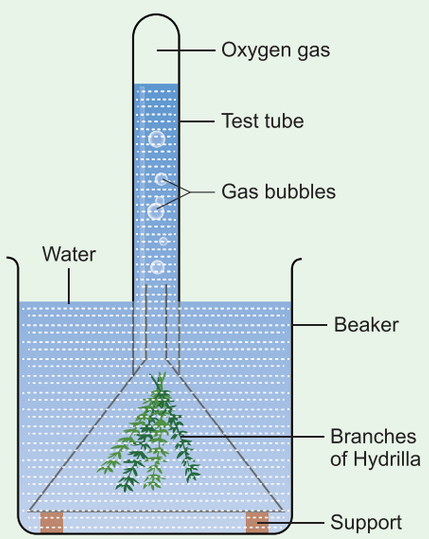
and a mouse into this jar. Both the plant and the mouse survived **(Fig-7).** He found that plants and animals have a synergy. Animals consume oxygen and release carbon-di-oxide and plants take up carbon dioxide and release oxygen.

During 1730 – 1799, Jan Ingenhousz showed that sunlight is essential to plants to carry out photosynthesis and also to purify air that is fouled by breathing animals or by burning candles.

From these experiments **it was clear that "air" is a composite mixture of many gases like oxygen and carbon-di-oxide.**

Proof for release of oxygen in photosynthesis

Activity 2: Take a healthy branch of Hydrilla and place it in a funnel. Invert the funnel in a beaker of water as shown in the figure. Invert a test tube over the stem of the funnel. The stem of the funnel should be kept immersed inside the water.

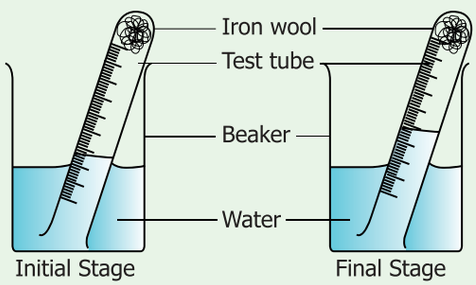


Leave the beaker in sunlight for some time. You will notice some bubbles rising in the test tube. The bubbles contain oxygen released by the plant during photosynthesis. If we show a glowing splinter to the collected air, it burns brightly. **This shows that the collected gas is oxygen.**

Test for the proportion of oxygen and nitrogen in air

Activity 3: We know that iron undergoes rusting with oxygen and forms iron oxide. This process can be used to estimate the percentage of oxygen in air, which has been removed by the rusting reaction.

Take a small portion of iron wool, press it into a 20 ml graduated test tube and wet it with water. Tip away excess of water. Take a 500ml beaker and fill half of the beaker with water. Invert the test tube and place it in air. Leave the arrangement at least for a week without making any disturbance to the test tube.



Observe the changes that had happened in the iron wool and to the level of water inside the test tube. We could

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see that the water level has increased inside the test tube. The rise in water is because of oxygen in air which has been removed by the rusting reaction. **This will be about 20% which is approximately the percentage of oxygen in the air.**

More to Know!

Daniel Rutherford, a Scottish chemist, discovered nitrogen. He removed oxygen and converted it into carbon-di-oxide using an inverted bell jar using a burning candle. He passed this air without oxygen through lime water and removed carbon-di-oxide also.

Once the carbon-di-oxide was removed in that air, neither a candle burned nor a plant breathed. Hence he was sure that the remaining air that he had, did not have oxygen and carbon-di-oxide. He was able to produce a gas, which showed the same property of the air without oxygen and carbon-di-oxide. Hence this gas was named **'nitrogen'.**

Test for Carbon-di-oxide in air

Pour some lime water in a glass tumbler. Bubble some air using a straw through the limewater. After a few minutes, look at the lime water carefully. The lime water will produce a white precipitate and that the lime water will eventually turn to a milky white solution. **This shows the presence of carbon-di-oxide in air.**

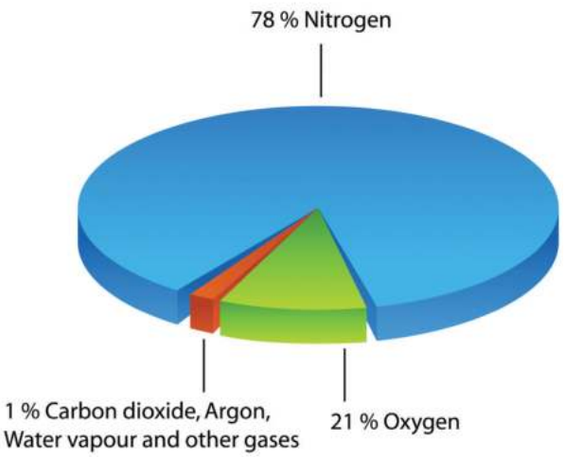


4.3 Composition of Air

From Priestley's experiment which was followed by Ingenhousz and Rutherford, we came to know that air was not just one substance. We will now describe what air is made up of. This is called composition of air.

The major component of air is nitrogen. Almost four – fifth of air is nitrogen. The second major component of air is oxygen. About one – fifth of air is oxygen. In addition to nitrogen and oxygen gases, air also contains small amount of carbon–di–oxide, water vapour and some other gases like argon, helium etc. The air may also contain some dust particles.

The composition of air in terms of percentage of its various components can be written as follows:



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The composition of air changes slightly from place to place and also from season to season. For example,

- Air over industrial cities usually has a higher amount of carbon-di-oxide in it than the air over open spaces.
- Air in coastal areas may have more water vapour than inland areas.
- Air also contains more water vapour in rainy season.
- The amount of dust in the air is more in windy places than other areas.

Test for the presence of dust particles in air

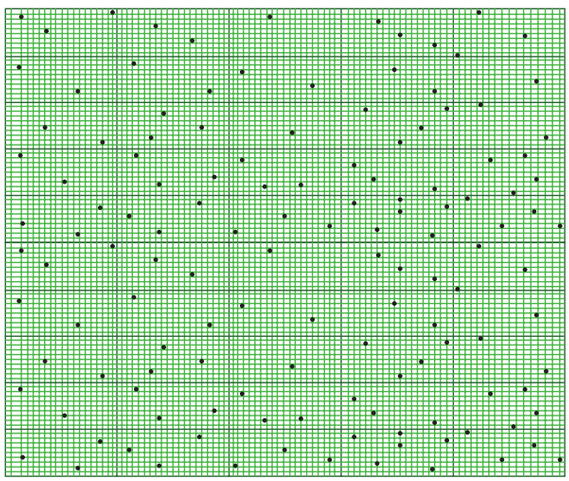
You might have seen the sunlight entering into a dark room through a narrow slit and making shiny dust particles dancing merrily on the path of sunlight. Actually, the air in a room always contains some dust particles, but they are so small that normally they are not visible to us. When a beam of sunlight falls on them, the tiny dust particles become visible.

Shall we do an activity to calculate the amount of dust particles in air from our area?

Take a graph sheet. Using marker pens draw a 5x5 cm square on the graph. Apply a thin film of grease on the graph sheet. This sheet will serve as dust collector. Make four or five graph sheets.

Discuss in the whole class, as where to place the dust collectors, how long to collect dust particles and place the dust collectors in agreed positions.

Ensure that the dust collectors do not get blown away. After the time scheduled for performing this activity is reached, remove the paper and count the number of collected dust particles in the marked area in all the sheets, using a magnifying glass at the dust collector. We can see something similar to the diagram below:-



Then, calculate the mean number of dust particles in the marked area.

$$Mean = \frac{total\ number\ of\ dust\ particles\ on\ collector}{number\ of\ squares\ on\ collector}$$

The range of the dust can also be calculated as given below:-

Range = Maximum value – minimum value

Collect details from all the areas where we have kept the dust collector sheets. Tabulate the recordings in the table given below:-

Location of dust collector	Mean number of dust particles per small square	Range

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❖ Which area do you think will have the most dust?

_____

❖ Which area do you think will have the least dust?

_____

Test for water vapour in air



Take a few ice cubes in a glass. Keep it on the table for a few minutes. Observe what happens. You could see tiny droplets of water all over the outer surface of the glass. From where do these droplets come? **The water vapour present in the air condenses on the cold surface of the glass. This shows that air contains water vapour.**

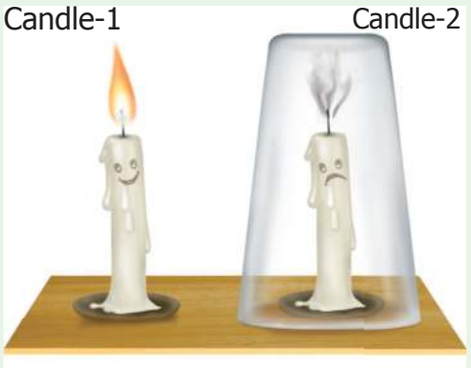
4.4 Burning and Combustion

When we burn a candle, paper, kerosene, coal, wood or cooking gas (LPG), oxygen is needed. The oxygen needed for the burning of candle, paper, kerosene, coal, wood and cooking gas comes from the air around us. Thus, for burning a substance continuously so as to make fire, a continuous supply of fresh air is needed. If we cut off the supply of fresh air to a burning substance, then the burning substance will not get oxygen necessary for burning to continue and hence the substance will stop burning. In rockets, as they go high in the atmosphere, the availability of oxygen is considerably reduced. Therefore in rockets along with the fuel, oxygen is also carried for combustion.

The process of burning of a substance in the presence of oxygen and releasing a large amount of light and heat is called **burning**. If the process does not emit flame then it is called **combustion.**

Activity 4: Oxygen is necessary for burning

Place two candles on a table. Ensure that both the candles are of same size and height. Mark them as candle 1 and candle 2 using a chalkpiece. Light both the candles. Now, cover candle 2 with glass tumbler as shown in the figure Observe the happenings at both the



candles.

What does happen to candle 1?

_____

What does happen to candle 2?

_____

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Can you guess why did the covered candle extinguish?

_____

Let us summarize the happenings.

The candle 1 continues to burn, unless it is blown – off by strong moving air or any other external force. This is because fresh air is continuously available to the candle for its burning process.

Candle 2 glows for a while and then gets put – off. When the burning candle is covered with a glass tumbler, the candle can use the oxygen available in the air inside the glass tumbler. Since only a small amount of air is present inside the glass tumbler – only a small portion of oxygen is available for the candle to continue glowing. When all the oxygen of the air inside the gas jar is used up, then the burning candle gets extinguished.

Now, repeat the candle – glowing experiment taking four containers of different sizes. For example, you can take a 250ml conical flask, a 500ml bottle, a one – litre jar, a two – litre jar. Cover the burning candle one by one with these containers and find out how long it takes for the candle to extinguish in each case. Record your observations in the following table.

S. No.	Volume of the container (ml)	Time taken for candle to extinguish (second)

Can you write interpretation based on your observations at the table?

_____

4.5 Importance of air for survival of plants and animals

Respiration in plants

Plants require energy for their growth and hence respiration also occurs in plants. During respiration, plants take in oxygen and release carbon–di–oxide, just as animals do. Gaseous exchange with air in atmosphere takes place in plants with the help of tiny holes called stomata present on their leaves.

Photosynthesis

Plants manufacture food by a process called photosynthesis. During photosynthesis, carbon-di-oxide from the air and water from the soil react in the presence of sunlight to produce food. Most plants possess a green pigment called chlorophyll and it is also used-up in the process of photosynthesis. The word equation given below explains the process of photosynthesis.

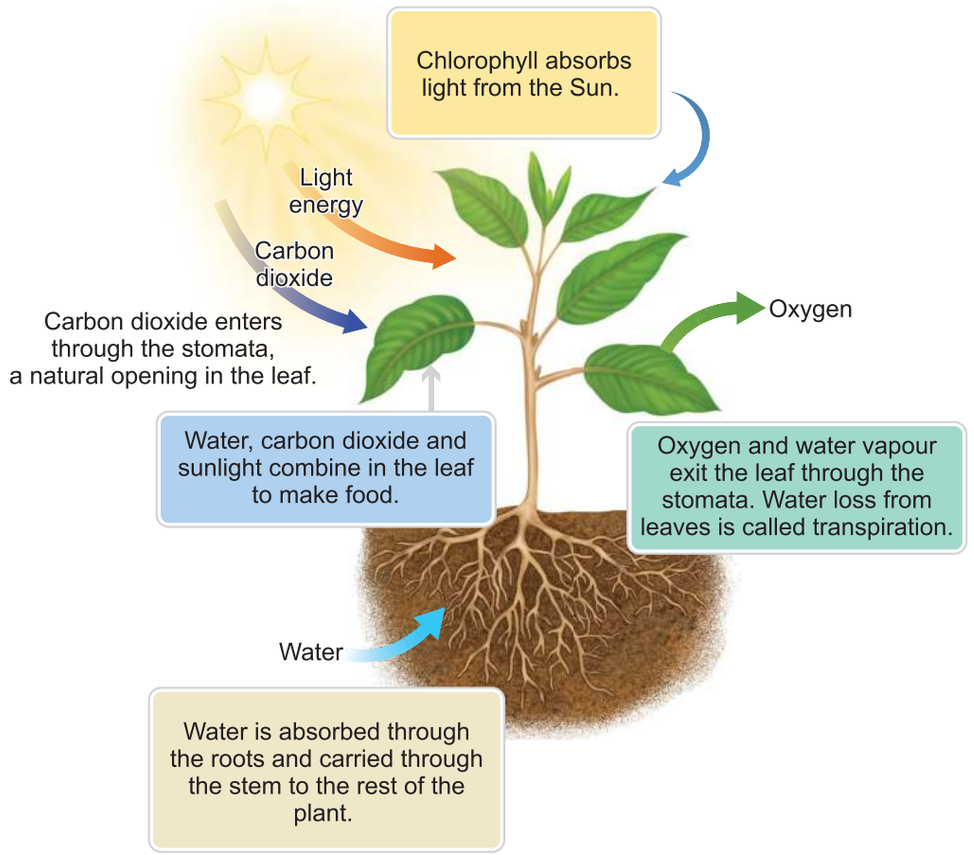
$$\text{Carbon-di-oxide + water} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{Food + Oxygen}$$

Plants release oxygen during photosynthesis which is much more than the oxygen consumed by the plants, during respiration.

Respiration in Animals

When we breathe in air, the oxygen present in the air reacts chemically with digested food within the body to produce carbon-di-oxide gas, water vapour and energy.

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This energy is required to carry out many processes in the body such as movement, growth and repair. This process by which oxygen reacts with digested food to form carbon-di-oxide, water vapour and energy is called respiration. The process can be represented by a word equation as given below :-

Food + Oxygen → Carbon-di-oxide + water + Energy

Carbon-di-oxide formed during respiration dissolves in the blood and is exhaled out of the body through the lungs. The inhaled and exhaled air thus contain the same substances but in different proportion, except nitrogen which is present in the same amount. Inhaled air contains more oxygen while the exhaled air contains more carbon-di-oxide.

Let us have a look at the following table to compare the composition of air in inhaled and exhaled air.

Component	Inhaled air	Exhaled air
Nitrogen	78%	78%
Oxygen	21%	16%
Carbon-di -oxide	0.03%	4%
Water vapour	Variable amount	amount increases in exhaled air
Noble gases	0.95%	0.95%
Dust	Variable amount	none
Temperature	Room temperature	Body temperature

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Respiration of plants and animals in water

The water in ponds, lakes, rivers and seas have some amount of dissolved air containing oxygen in it. The plants and animals that live in water use the oxygen dissolved in water for breathing. For example, frogs respire through their skin, fish respire using their gills.

DO YOU KNOW?

When carbon-di-oxide is cooled to -57^0 C, it directly becomes a solid, without changing to its liquid state. It is called **dry ice** and is a good refrigerating agent. Dry ice is used in trucks or freight cars for refrigerating perishable items such as meat and fish while transporting them.



4.6 Uses of Air

- Air is used by plants and animals for breathing.
- Air is used for burning fuels like wood, coal, kerosene, LPG etc.
- Compressed air is used to fill tyres of various kinds of vehicles.
- Air plays an important role in maintaining the water cycle in the nature.
- Ozone layer, present in the atmosphere, helps in preventing harmful radiations of the sun from reaching the earth's surface.
- Under extra – ordinary conditions such as:

a. a patient having breathing difficulties,



b. a mountaineer climbing a high mountain,

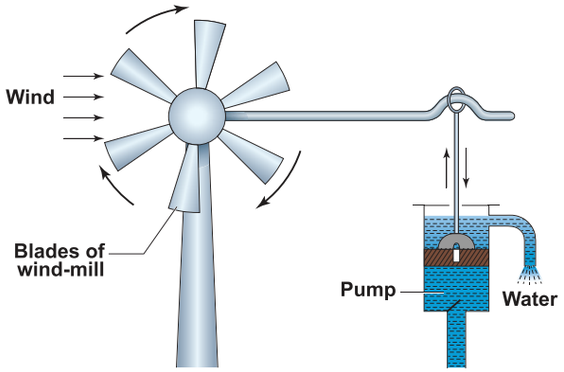


c. a diver going deep into the sea- oxygen gas cylinders are used for breathing purposes.



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❖ Blowing air is used to turn the blades of wind mills.



The wind mills are used to draw water by running pumps, run flour mills and to generate electricity.

Points to Remember

❖ Air is every where around us.

❖ Our earth is surrounded by a huge envelope of air called the atmosphere.

❖ The process of burning of a substance in the presence of oxygen and releasing a large amount of light and heat is called combustion.

❖ Priestley helped us in understanding the presence of oxygen in air that is produced by plants during photosynthesis which can be used by animals for respiration.

❖ Ingenhousz experiment helped us to know the role of sunlight in evolving Oxygen during photosynthesis.

❖ Air contains 78% Nitrogen, 21% Oxygen, 1% of carbon-di-oxide, water vapour, Noble gases, and dust particles.

❖ Composition of air changes slightly from place to place and also from season to season.

❖ In plants,

$$\text{Carbon-di-oxide + water} \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \text{Food + Oxygen}$$

❖ In animals,

$$\text{Food + Oxygen} \longrightarrow \text{Carbon-di-oxide + water + Energy}$$

❖ Aquatic plants and animals use oxygen dissolved in water for breathing.

❖ The atmosphere is made of five different layers – the troposphere, the stratosphere, the mesosphere, the ionosphere and the exosphere.

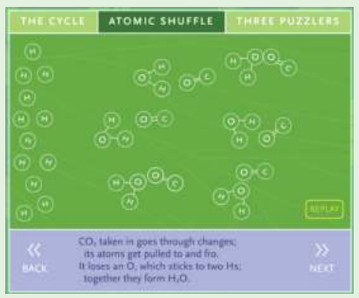
❖ Ozone layer, present in the atmosphere helps in preventing harmful radiations hitting the earth directly.

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ICT Corner

Air



Through this activity you will be able to understand the atomic level of the process that plants use to convert solar energy into chemical energy.

Step 1: Use the given URL in the browser. 'Illuminating Photosynthesis page will open.

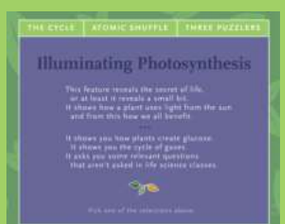
Step 2: Three buttons given on the top of the activity window to explore. Click the 'The Cycle' button, in this window you can open the curtain and water the plant by click on the curtain and the watering pot.

Step 3: Explore the atomic level process of the photosynthesis by clicking the 'Atomic Shuffle' button.

Step 4: Click 'Replay" to view the process again and 'Next' to view the next level of the process.

Step 1





Step 2

Step 3





Step 4

Illuminating Photosynthesis URL:

http://www.bbc.co.uk/schools/scienceclips/ages/10_11/rev_irrev_changes_fs.shtml

DWKP1

*Pictures are indicative only

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Evaluation

L69PM

I. Choose the appropriate answer

1. _____ is the percentage of nitrogen in air.

   a. 78% b. 21%

   c. 0.03% d. 1%

2. Gas exchange takes place in plants using _____.

   a. Stomata b. Chlorophyll

   c. Leaves d. Flowers

3. The constituent of air that supports combustion is _____.

   a. Nitrogen b. carbon-di-oxide

   c. Oxygen d. water vapour

4. Nitrogen is used in the food packaging industry because it _____.

   a. provides colour to the food

   b. provides oxygen to the food

   c. adds proteins and minerals to the food

   d. keeps the food fresh

5. _____ and _____ are the two gases, which when taken together, make up about 99 percentage of air.

   I.Nitrogen

   II. carbon-di-oxide

   III. Noble gases

   IV. Oxygen

   a. I and II b. I and III

   c. II and IV d. I and IV

II. Fill in the blanks

1. _____ is the active component of air.
2. The gas given out during photosynthesis is _____.
3. _____ gas is given to the patients having breathing problems.
4. _____ can be seen moving in a beam of sunlight in a dark room.
5. _____ gas turns lime water milky.

III. True or False. If False, give the correct statement

1. Inhaled air contains a large amount of carbon-di-oxide.
2. Planting trees help in decreasing global warming.
3. The composition of air is always exactly the same.
4. Whales come up to the water surface to breathe in oxygen.
5. The balance of oxygen in atmosphere is maintained through photosynthesis in animals and respiration in plants.

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IV. Match the following

1.	Moving Air	-	Photosynthesis
2.	Layer in which we live	-	Troposphere
3.	Stratosphere	-	Wind
4.	Oxygen	-	Ozone layer
5.	carbon-di-oxide	-	Combustion

V. Arrange the following statements in correct sequence

1. Plants manufacture food by a process called photosynthesis.
2. Plants require energy for their growth.
3. Plants take in oxygen and release carbon-di-oxide just as animals.
4. Plants take carbon-di-oxide from the atmosphere, use chlorophyll in the presence of sunlight and prepare food.
5. Such oxygen is available to animals and human beings for breathing.
6. During this process, oxygen is released by plants.

VI. Analogy

1. Photosynthesis : _____ :: Respiration : Oxygen
2. 78% of air : Does not support combustion :: _____ : Supports combustion

VII. Observe the given figure carefully and answer the questions.



1. What will happen if we remove plants from the aquarium?
2. What will happen if we remove the fish from the aquarium and keep it (with green plants) in a dark place?

VIII. Give very short answer

1. What is atmosphere? Name the five layers of atmosphere.
2. How do the roots of land plants get oxygen for breathing?
3. What should be done if the clothes of a person catch fire accidentally? Why?
4. What will happen if you breathe through mouth?

IX. Give short answer

1. Biscuits kept open on a plate during monsoon days lose its' crispness. Why?
2. Why do traffic assistants wear a mask on duty?

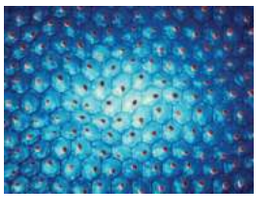
X. Answer in detail

1. How do plants and animals maintain the balance of oxygen and carbon-di-oxide in air?
2. Why is atmosphere essential for life on earth?

XI. Question based on Higher Order Thinking Skills

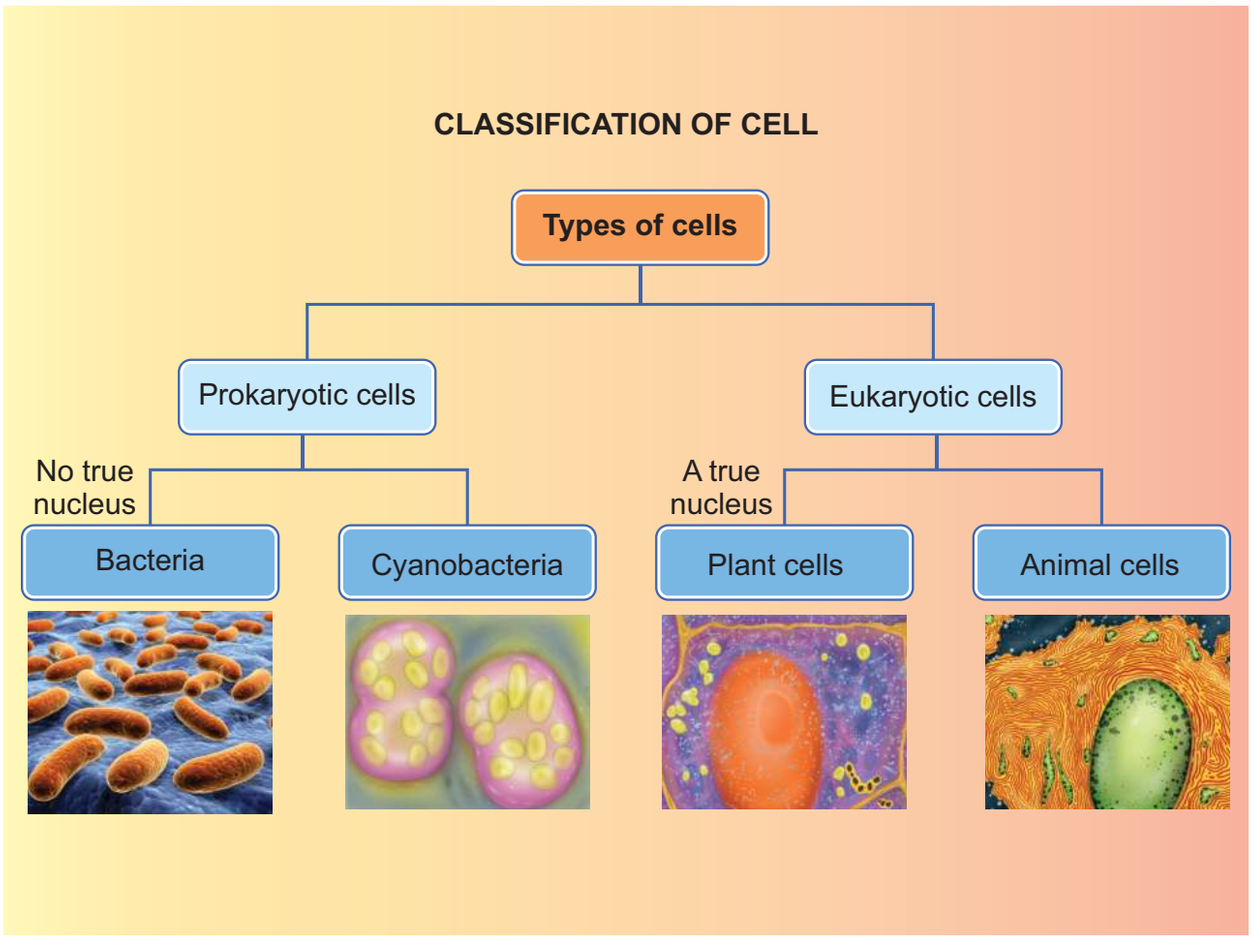
1. Can you guess why fire extinguishers throw a stream of carbon-di-oxide while putting - off fire?

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Unit 5 The Cell

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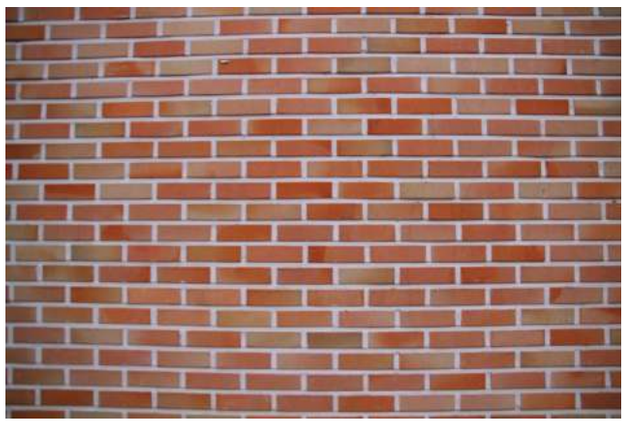


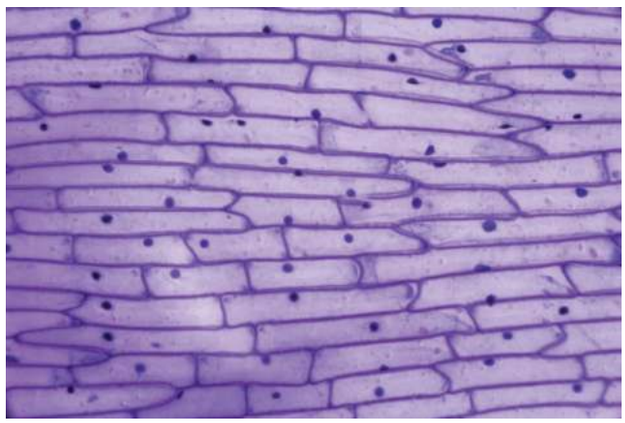
Learning Objectives

- To know that all living things are made up of cells
- To observe the cell structure using microscope
- To understand the structure of a cell
- To explain the components of a cell
- To understand the structural difference between animal and plant cell

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Introduction





Observe the two pictures given above. Do you observe any similarity between them?

Close your eyes and imagine a brick wall. What is the basic building block of the wall? A single brick, of course.

Like a brick wall, your body is composed of basic building blocks, and are named as **"Cells".**

The **cell is the basic structural and functional unit of every living organism.**

The cell is self-sufficient to carry out all the fundamental and essential functions of an organism.

5.1 The Cell

All living things are made of one or more cells. There are variety of cell types however, they all have some common characteristic features.

XENOA

More to Know

Can you see a cell with your naked eye?

Cells are very minute and said to be microscopic and cannot be seen with our naked eyes.

They can be observed only through a specialized scientific instrument called "microscope".

Now a days an electron microscope is used to magnify and observe the cells.



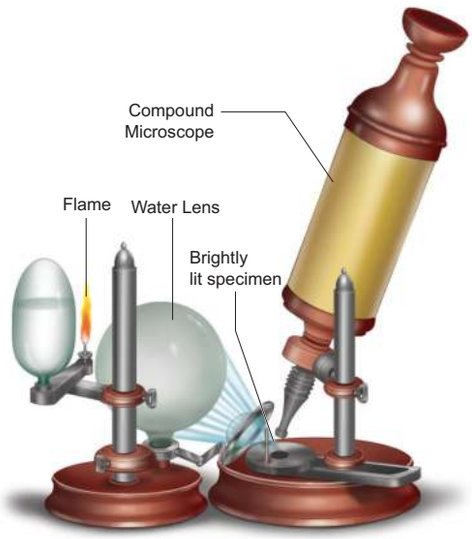


5.1.1 Discovery of the cell

The Englishman Robert Hooke was a scientist, mathematician, and inventor. He improved microscope which was used

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in those days, and built a compound microscope. He placed water-lens beside the microscope to focus the light from an oil-lamp on specimens to illuminate them brightly. So that he was able to see the minute parts of the objects clearly.





Robert Hooke

One day Hooke made thin sections of the cork and observed them through his microscope. He observed many small identical chambers which were hexagonal in shape. He was surprised.

After that he observed many objects like Butterfly's wings, Bee's compound eyes etc.,

Based on this observations, Hooke published a book named Micrographia in the year 1665, where he first used the term Cell. He described the structure of tissue using the term cell.

In Latin the word 'cellua' means a small chamber.

The branch of science that deals with the study of cells is called **'Cell Biology'.**

5.2 The Structural Organization Of The Cell

A typical cell consists of three major parts:

1. An outer **cell membrane.**
2. A liquid **cytoplasm.**
3. A **nucleus.**

Analogous to the body's internal organ, like eyes, heart, lungs, etc..., organelles are specialized structures and perform valuable functions necessary for normal cellular operation. Many distinct structures called **Organelles** lie within the cell.

5.2.1 Size of the cell

The size of cells may vary from a micrometer (a million of a metre) to a few centimeters. Most cells are microscopic and cannot be seen with the naked eye. They can be observed only through the Microscope.

Smallest size of the cell is present in Bacteria. The size of the bacterial cell ranges from 0.01 micrometer to 0.5 micro meter.

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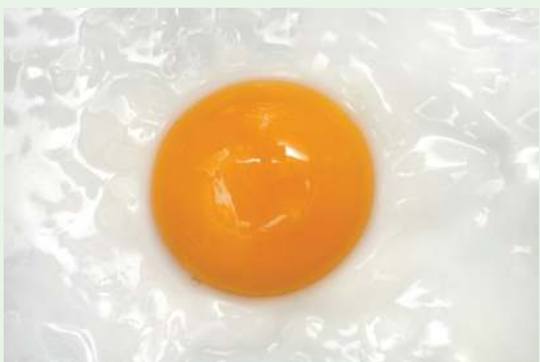
Activity 1:

Aim: To observe the structure of a single cell (Hen's egg).

Materials Needed: A Hen's egg and a plate.

Method: Crack the shell and break open the egg in a plate.

Observation: The egg has a yellow part and a transparent part surrounding it. The white transparent part (albumin) is jelly-like and represents the cell's cytoplasm, while the yellow part (yolk) is thicker and represents the cell's nucleus. On the internal side of the shell can be seen a thin membrane-like structure, which represents the cell membrane.



On the other hand the largest cell is the egg of an ostrich with 170 millimeter width. We can see this with the naked eye.

In Human body the nerve cells are believed to be the longest cells.



Cell size has no relation to the size of an organism. It is not necessary that the cells of, say an Elephant be much larger than those of a Mouse.

5.2.2.Shapes

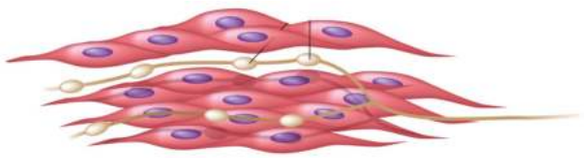
Cells are of different shapes. For example some shapes are given in the below pictures.



Nerve cell



Red Blood cell



Muscle cell

5.2.3.Number

The number of cells present in different organisms may vary. Organisms may be either unicellular (single cell) or multicellular. Organisms such as Bacteria, Amoeba, Chlamydomonas, and Yeast are unicellular.

On the other hand, organisms such as Spirogyra, Mango, and Human beings are multicellular. (i.e) made up of a few hundreds to millions of cells.

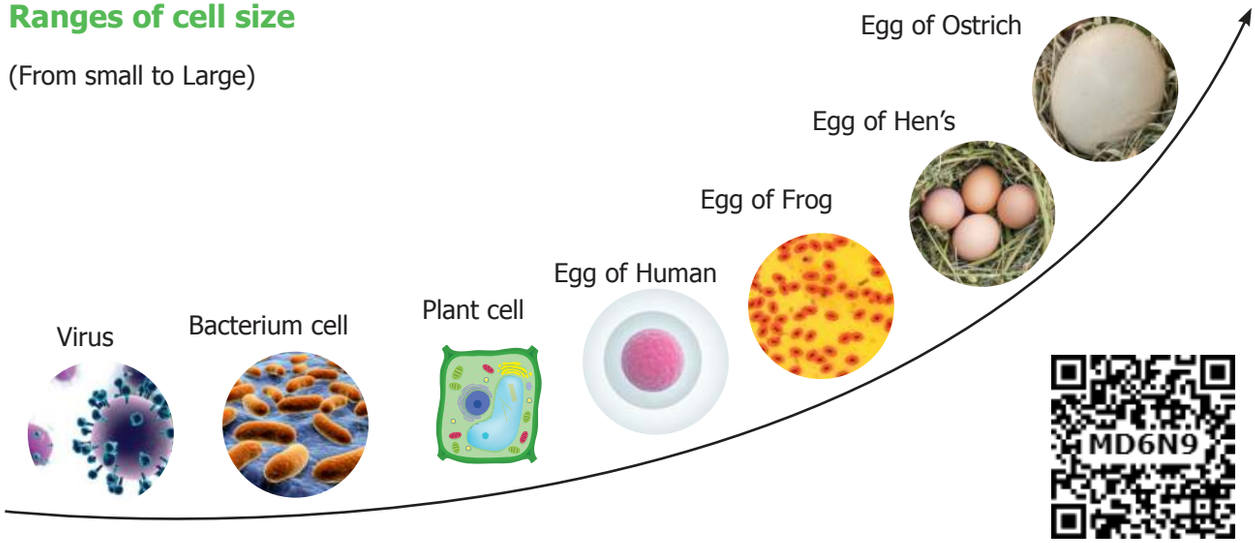


Approximate number of cells in the Human body is 3.7 X10^{13} or 37,000,000,000,000.

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Ranges of cell size

(From small to Large)



5.3 TYPES OF CELL

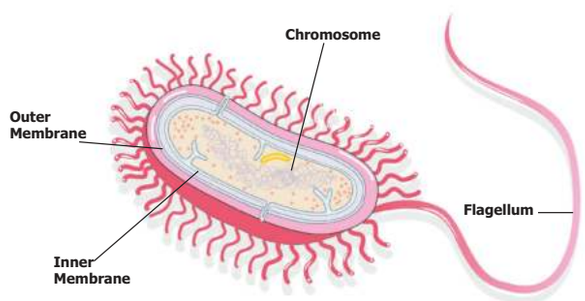
Generally cells are classified into two types. First one is Prokaryotic cell .It has no true nucleus and no nuclear membrane. Another one is Eukaryotic cell. It has true nucleus consisting of nuclear membrane.

5.3.1 Prokaryotic cell

The unicelluar organisms like Bacteria has Prokaryotic cells. It has no true nucleus. This type of nucleus is called as nucleoid. No nuclear membrane is around this nucleoid. These cells were the first form of life on Earth. It is ranging from 0.003 to 2.0 micro meter in diameter.

Eg. Escherichia coli bacteria.

Structure of Prokaryotic cell Eg.Escherichia coli

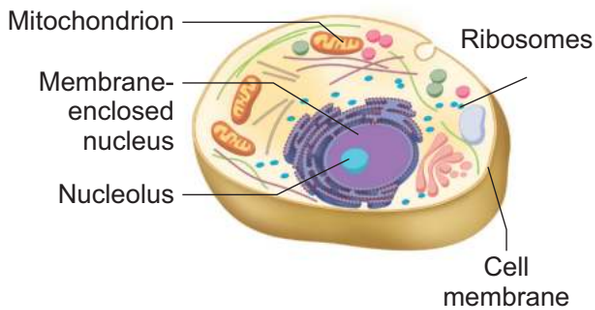


5.3.2 Eukaryotic cell

Cell which has true nucleus is called as eukaryotic cell. It is bigger than prokaryotic cell. It's organelles are bounded by membrane.

Ex. Plants,animals, most of the fungi and algae.

Eukaryote



Activity 2:

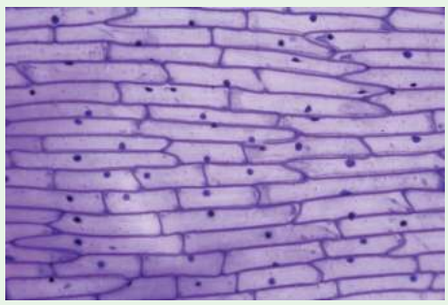
Aim: To observe onion peel cells under a microscope

Materials Required: Glass slide, cover slip, onion, iodine solution, knife and microscope.

Procedure: Take an onion and cut it into two halves along its length. Take

out one of its fleshy leaves. With the help of a pair of forceps, remove a transparent, thin peel from the inner surface of the leaf. Take a glass slide and put a drop of water at the centre. Place the peel on the drop of water. Pour a drop of iodine solution on the peel. Now place a cover slip over the material. Observe under the microscope.

Observation: You will be able to see rectangular cells of the onion peel, with a nucleus in each of them.



Differences between Prokaryotic cell and Eukaryotic cell

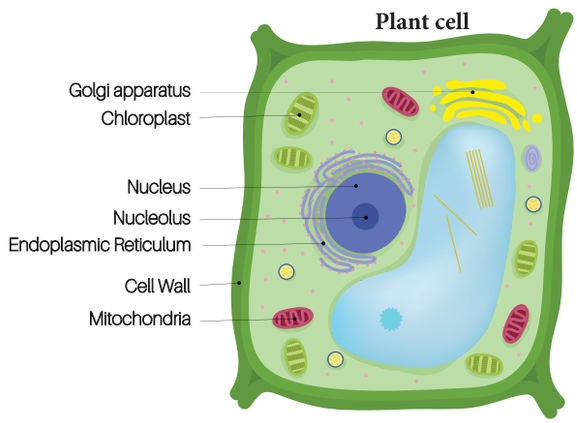
Prokaryotic cell	Eukaryotic cell
It's diameter ranges from 1 to 2 micron	It's diameter ranges from 10 t0 100 micron
Absence of membrane bound organelles	Presence of membrane bound organelles
Nucleus is not surrounded by nuclear membrane	True nucleus is surrounded by nuclear membrane
Absence of nucleoli	Presence of nucleoli

5.3.3. Plant cell and Animal cell

Both plant and animals are made up of cells. Both cells are eukaryotic in nature, having a well defined membrane – bound nucleus.

Plant cell

- ❖ It is usually larger in size. It is hard in nature.
- ❖ Plant cells have a cell wall in addition to their cell membrane.
- ❖ Plant cells have chloroplast which contain chlorophyll
- ❖ Plant cells have large vacuoles. Centrioles are absent.

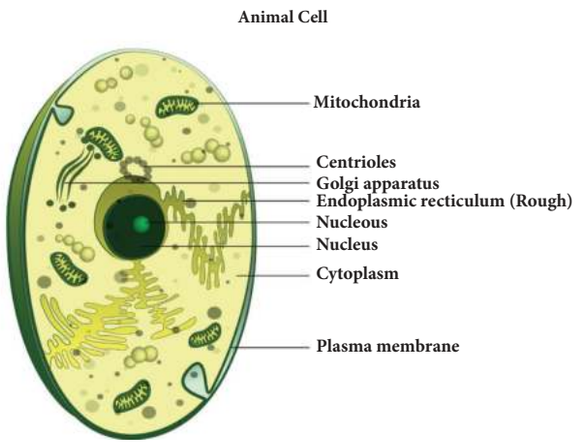


Animal cell

- ❖ Animal cells are generally smaller than plant cells. It is not so hard as plant cell.
- ❖ Cell wall is absent.
- ❖ Chloroplast is absent.

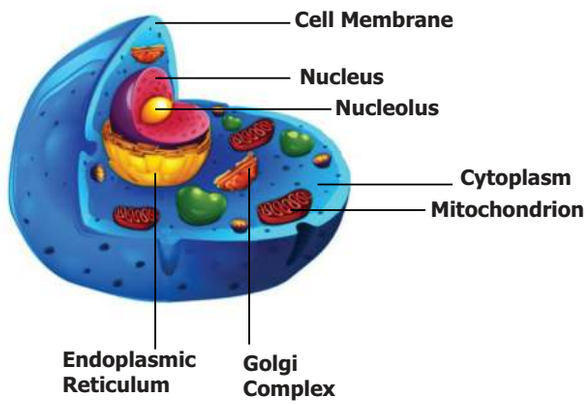
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- An animal cell may have many small vacuoles.
- Centrioles are found in animal cells.



3 Dimension - cell structure

1. How does a cell look like?
2. What is its shape and size?



The above cell shows a three dimensional view. We can see the three sides of the cell structure. You can also view the size, shape and location on the organelles of the cell.

3-D view is appealing because it is more like reality.

In 3-D, view we can see the entire view of the cell. It exposes the accurate size and shape and shows the correct location of the cell organelles.

Activity 3:

Aim:

To rectify the variation between 2-D shape and 3-D shape.

Materials required:

Polythene bag, water, marble ball (golli gundu)

Procedure:

Take a polythene bag with water. Put a marble ball into the polythene bag. Then draw a picture in your note book about this task.

If you draw a picture in round shape. It will be called 2-Dimensional picture.

If you draw a picture in spherical shape it is called 3-Dimensional.

Result:

Now you can realize your misconception. So, the animal cells are spherical in shape and structure, not in a round shape.

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5.3.4.Cell components and their functions

S.No	Cell Components	Main Functions	Special Name
1	Cell wall	• Surrounds and protects the cell • Make the cell stiff and strong	Supporter and protector
2	Cell membrane	• Holds and protects the cell • Controls the movement of materials in and out of the cell	Gate of the cell
3	Cytoplasm	• A watery, gel-like material in which cell parts move	Area of movement
4	Mitochondria	• Produce and supply most of the energy for the cell	Power house of the cell
5	Chloroplasts	• Contain green pigment chlorophyll • Capture the energy of sunlight and use it to produce food for the cell by photosynthesis.	Food producers for the cell (Plant cell)
6	Vacuoles	• Store food, water, and chemicals	Storage tanks
7	Nucleus	• Acts as 'brain' of the cell • Regulates and controls all the cell activities	Control centre
8	Nucleus membrane	• Surrounds and protects the nucleus control the movement of materials in and out of the nucleus	Gate of the nucleus

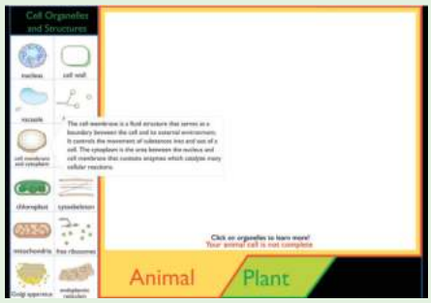
Points to Remember

- ❖ Cells are the basic units of all living organisms.
- ❖ There are two major cell types such as prokaryotic and eukaryotic cell.
- ❖ Both plant and animal cells have unique organelles which are capable of carrying out specialized functions.
- ❖ Plant cells have two unique components such as cell wall and chloroplasts compared to animal cells.

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ICT Corner

The Cell



Through this activity you will be able to understand the differences between Plant and Animal Cell, their organelles and their functions.

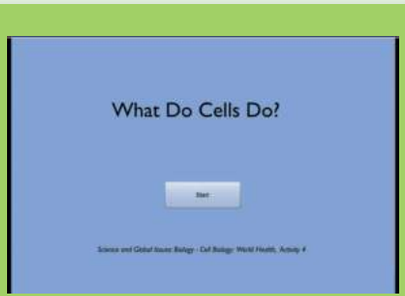
Step 1: Use the given URL in the browser. 'What do Cells do? Page will open. Click the Start Button to begin the activity.

Step 2: Click continue to proceed to the activity, a column with cell organelles is given. Your task is to build a plant cell and animal cell. Roll the mouse over each organelle to learn about it.

Step 3: Use the mouse to drag the appropriate organelles to build the cell.

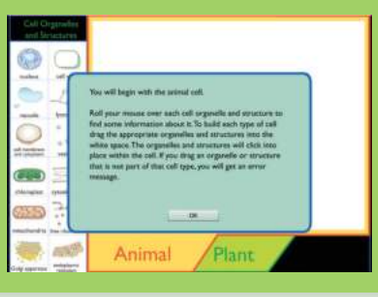
Step 4: After finishing the animal cell, continue the same process to finish the plant cell.

Step 1





Step 2



Step 3

What do Cells do? URL:

http://sepuplhs.org/high/sgi/teachers/cell_sim.html

*Pictures are indicative only

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Evaluation

F1QW0

I. Choose the appropriate answer

1 The unit of measurement used for expressing dimension (size) of cell is ____

a. centimeter b. millimeter

c. micrometer d. meter

2. Under the microscope Priya observes a cell that has a cell wall and distinct nucleus. The cell that she observed is

a. a plant cell b. an animal cell

c. a nerve cell d. a bacteria cell

3. The 'control centre' of the eukaryotic cell is

a. Cell wall b. Nucleus

c. Vacuoles d. Chloroplast

4. Which one of the following is not an unicellular organism?

a. Yeast b. Amoeba

c. Spirogyra d. Bacteria

5. Most organelles in an eukaryotic cell is found in the

a. Cell wall b. cytoplasm

c. nucleus d. Vacuole

II. Fill in the Blanks

1. The instrument used to observe the cell is _____

2. I take part in food production of a cell. Who am I? ____

3. I am like a policeman. Who am I ____?

4. The Term " cell" was coined by _____

5. The egg of an Ostrich is the _____ single cell.

III. True or False. If False, give the correct answer.

1. A cell is the smallest unit of life.

2. Nerve cell is the longest cell

3. Prokaryotes were the first form of life on earth.

4. The organelles of both plants and animals are made up of cells.

5. New cells are produced from the existing cells.

IV. Match the following

1.	Control center	-	Cell membrane
2.	Food producer (Plant cell)	-	Mitochondria
3.	Gate of the nucleus	-	Nucleus
4.	Gate of the cell	-	Chloroplasts
5.	Energy producer	-	Nuclear membrane

V. Arrange in a correct sequence

1. Elephant, Cow, Bacteria, Mango, Rose plant.

2. Hen's Egg, Ostrich's egg, Insect's egg.

VI. Analogy

1. Prokaryote : Bacteria :: Eukaryote :_____

2. Spirogyra : Plant cell :: Amoeba : _____

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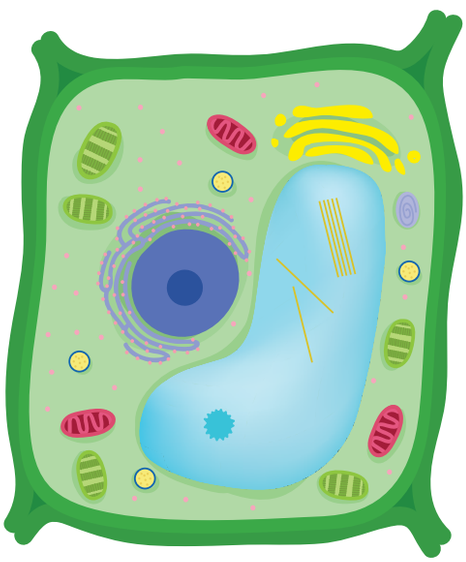
3. Food producer : Chloroplasts :: Power house :____

VII. Give very short answer

1. Who discovered the cell in 1665?
2. What type of cells do we have?
3. What are the essential components of a cell?
4. What are the organelles found only in plant cell?
5. Give any three examples of eukaryotic cell?
6. Which one is called as "Area of movement"?
7. Shiva said " Bigger onion has larger cells when compared to the cells of smaller onion"! Do you agree with his statement or not ? Explain Why?

VIII. Give short answer

1. Why cells are called building blocks of life?
2. Identify any four parts of the Plant cell.



3. Distinguish between prokaryotic and eukaryotic cells
4. Make sketches of animal and plant cells which you observe under microscope.
5. Write about the contribution of Robert Hooke in cell biology.

IX. Answer in detail

1. Tabulate any five cell organelles and their function.
2. Draw a neat labelled diagram of a prokaryotic cell.

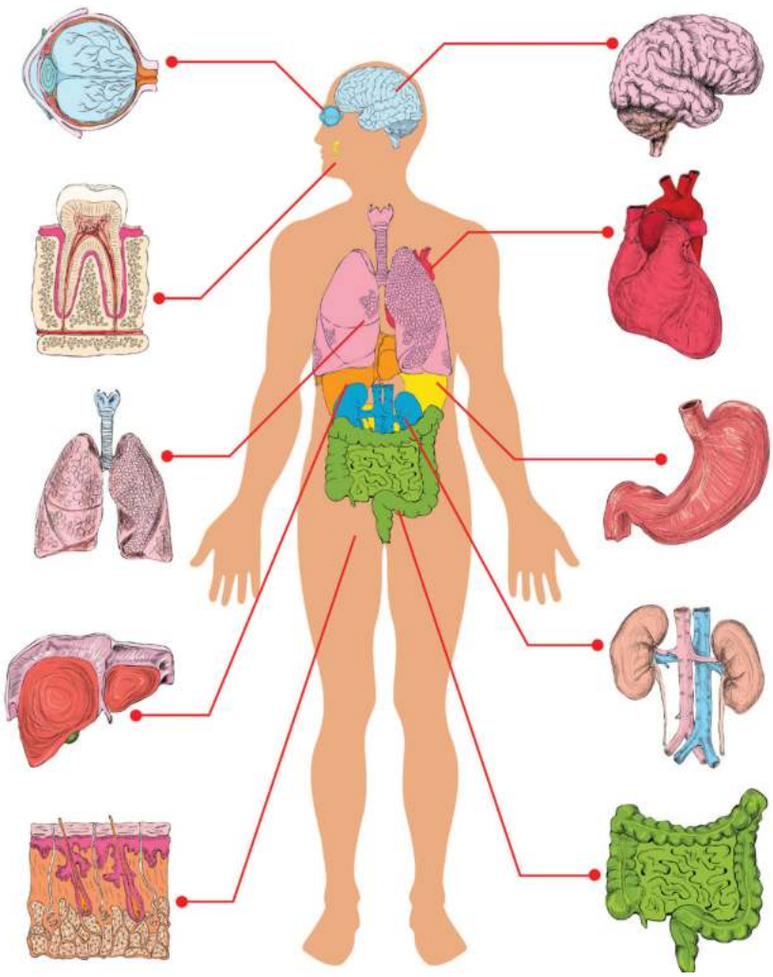
X. Project

1. Use your imagination and create 3-D model of a plant cell?
2. You can use numerous food materials such as jelly and some cake to make a cell body. Cell organelles can be made using nuts and dry fruits. You can display the model in your class room and invite teachers or students from other classes. If they rise questions on the project try to give answer.

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Unit 6 Human Organ systems



Learning Objectives

- To understand the structure and function of organs and organ systems of human body
- To gain knowledge of various human body systems and their coordination
- To understand the importance of the life processes such as Digestion, Absorption, Respiration, Excretion

5M4BA

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Introduction

Organ systems are formed by the association of organs which are organized from tissues. This kind of organization helps the organism to perform various activities more efficiently. A group of organs that work together to perform a particular function is known as an **organ system.** The Human body has eight major organ systems. They are

❖Skeletal System ❖Muscular System

❖Digestive System ❖Respiratory System

❖Circulatory System ❖Nervous System

❖Endocrine System ❖Excretory System

In this lesson, let us study more about the structure and function of these organ systems of our body.

6.1 Skeletal System

The skeletal system consists of bones, cartilages and joints. Bones provide a frame work for the body. Bones along with muscles help in movements such as walking, running, chewing and dancing etc.,

The adult human skeletal system consists of 206 bones and few cartilages, ligaments and tendons. Ligaments help in connecting bone to bone. Tendons connect bone to muscle. The two major divisions of the skeletal system are **Axial skeleton and Appendicular skeleton.**

Axial skeleton forms the upright axis of the body which includes

- ❖ **Skull**
- ❖ **Vertebral column**
- ❖ **Rib cage**

RIJK9

Appendicular skeleton consist of the bones of the limbs along with their pectoral and pelvic girdles.

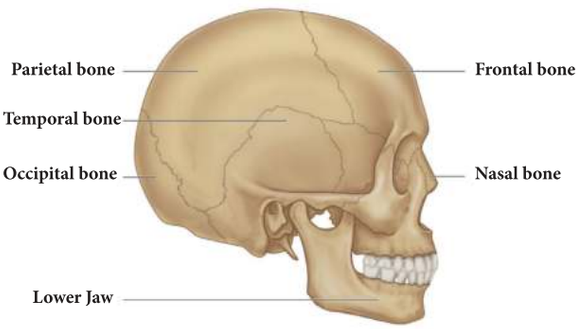
Activity 1: Sit absolutely still. Observe the movements taking place in your body. You must be blinking your eyes time to time. Observe the movements in your body as you breathe. Write down the movements in your note book.

We are able to move a few parts of our body easily in various directions and some, only in one direction. Why we are not able to move some parts at all directions?

Skull

The skull is made up of cranial bones and facial bones. It protects the brain and the structures of the face. The hyoid bone present at the base of the buccal cavity and the auditory ossicles (Malleus, Incus and Stapes) are also included in the skull. Lower jaw bone is the largest and strongest bone in the human face.

Skull



Vertebral Column

Vertebral column extends from the base of the skull. It protects the spinal cord. It is formed by a number of serially arranged small bones called **vertebrae** (singular : vertebra)

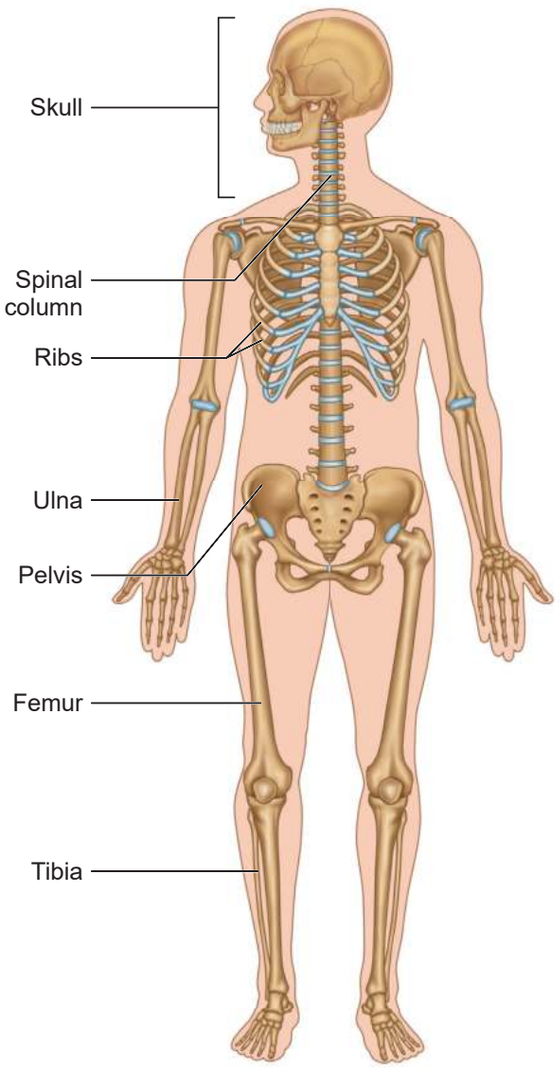
Rib cage

The rib cage is made up of 12 pairs of curved, flat rib bones. It protects the delicate vital organs such as heart and lungs.

Limbs

Man has two pairs of limbs namely upper limbs (fore limbs) and lower limbs (hind limbs). Fore limbs are used for holding, writing etc., while hind limbs are used for walking, sitting etc.,

Skeletal System



Girdles

The fore limbs and hind limbs are attached to the axial skeleton with the help of pectoral and pelvic girdle respectively.

Activity 2: To show that we can bend or move our body only at those points where the bones meet.

Materials required: A wooden scale and string.

Method: Ask your friend to tie a wooden scale and your arm together. So that the elbow is at the centre. Even if you try hard, you cannot bend your elbow.



Conclusion: A single bone cannot bend. The different bones joined together at the elbow, help the elbow to bend.

DO YOU KNOW?

1.The smallest bone in our body is present inside the ear. It is called **Stapes**. It is only 2.8 millimeters long (average length). The longest bone in the body is the **thigh bone.** (Femur)

2. A new born baby has more than 300 bones. As the baby grow, some bones are joined together, hence the skeleton of an adult has 206 bones.

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6.2 Muscular System

In the body, muscular system along with the skeletal and nervous system, is responsible for the body movements.

Muscles can contract and therefore, help in moving other parts of the body. It maintains the posture and body position. There are three types of muscles namely

- **Skeletal muscle**
- **Smooth muscle**
- **Cardiac muscle**

Activity 3: Move your lower arm up and down gently. Feel the contraction and relaxation of your biceps and triceps muscles. The muscles present in the upper arm help in the contraction of front biceps muscles (become short and thick), and also relaxation of rear triceps muscles (become long and thin). You can feel the muscles on top that go stiff. When the arm is moved downwards, the front muscles relax and the rear muscles contract.

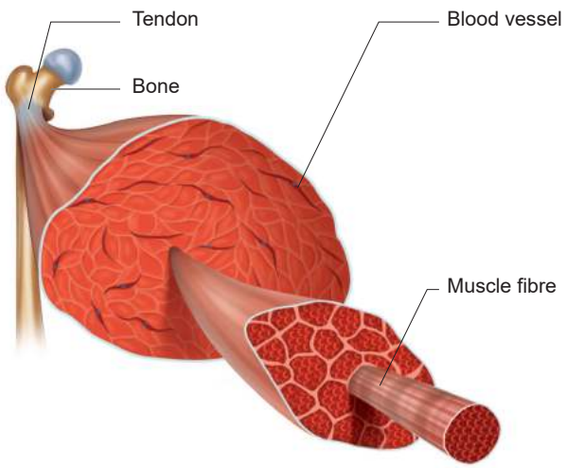
How do muscles work?

Muscles of the body can only pull and they cannot push. Two muscles are required to move a bone at a joint. When one muscle contracts, the other muscle relaxes.

For example, to move 'the lower arm up and down two type of muscles called biceps and triceps are required. When we raise our lower hand, the biceps in front become short by contraction and the triceps at the back stretch to pull up the arm. When we lower our arm, the triceps at the back contract and biceps stretch to pull the arm down.

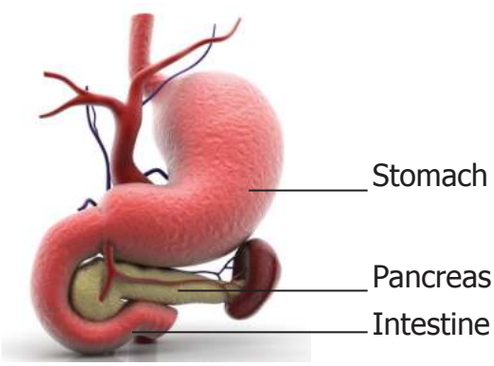
Skeletal Muscles

Skeletal muscles of our body are attached to the bones. They are called **Voluntary muscles** because they can be controlled by our will. Example: Muscles of arm.



Smooth muscles

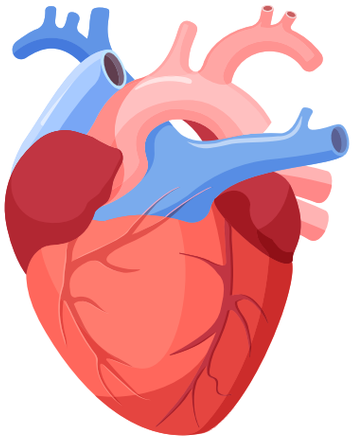
Smooth muscles are found in the walls of the digestive tract, urinary bladder, arteries and other internal organs. They are called **'Involuntary muscles'** because they are not controlled by our will.



Cardiac muscles

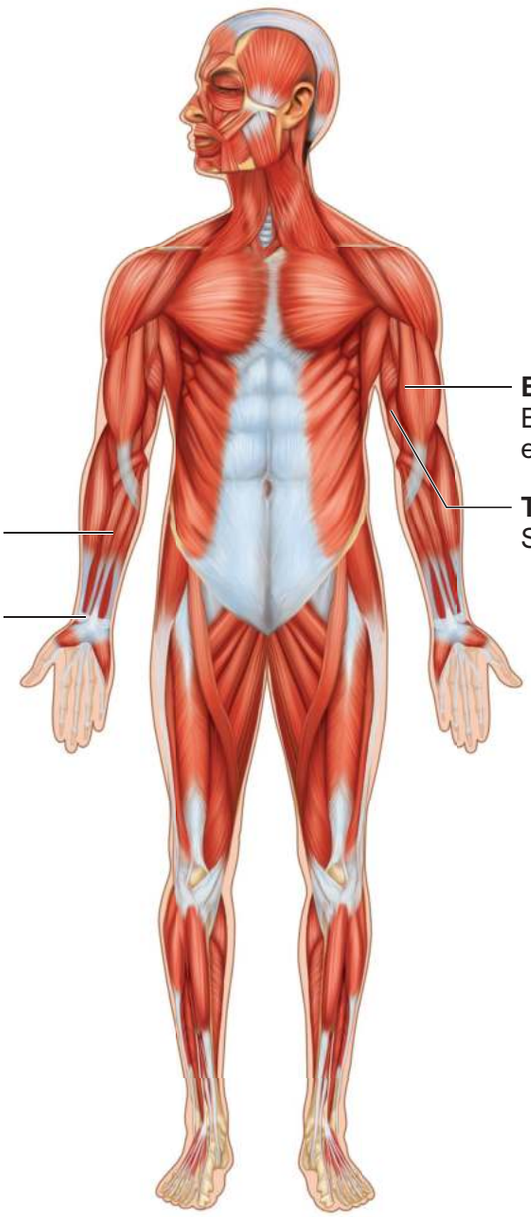
The walls of the heart is made up of cardiac muscles. They are capable of rhythmic, contraction continuously and involuntary in nature.

Heart



Muscular System

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6.3 Digestive System

Digestive system consists of the alimentary canal and associated glands. This system is involved in the conversion of complex food substances into simple forms and absorption of digested food.

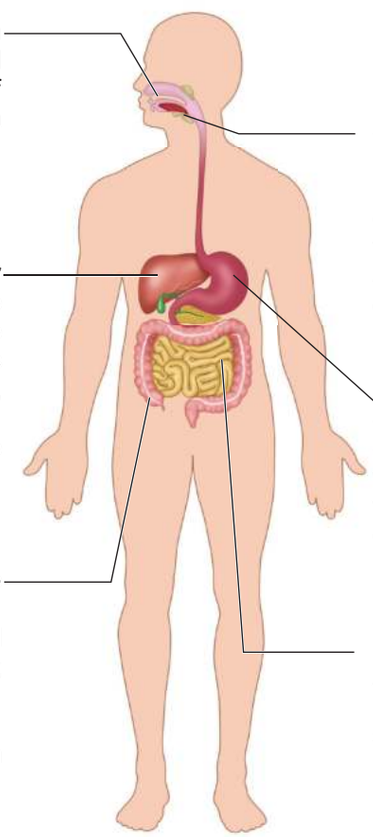
The digestive glands associated with the alimentary canal are salivary glands, liver, and pancreas. They secrete enzymes which help in the process of digestion of food in the digestive tract or alimentary canal.

The alimentary canal is about 9 meters long. Stomach is a major organ for digestion of food materials. Absorption of digested food occurs in the small intestine.

Parts of Alimentary canal	
1.	Mouth
2.	Buccal cavity
3.	Pharynx
4.	Oesophagus or Food pipe
5.	Stomach
6.	Small Intestine
7.	Large Intestine
8.	Anus

Associated glands for digestion	
1.	Salivary glands
2.	Gastric glands
3.	Liver
4.	Pancreas
5.	Intestinal glands

Digestive System



Mouth
Starts mechanical and chemical digestion of food with the help of teeth, tongue and saliva

Liver
Blood carrying nutrients from the small intestine passes through the liver, which filters it and breaks down and synthesizes proteins, converts glucose into glycogen, and also produces bile

Small intestine
A long tube about six metres in which most of chemical digestion occurs; nutrients are absorbed from here into the bloodstream

Salivary glands
Produces saliva, which helps to lubricate food for easier swallowing; contains antibacterial agents and the enzyme salivary amylase, which breaks down strach

Stomach
Stores, mixes, and digests food with the gastric juice it produces, which consists of mucus, enzymes,and hydrochloric acid.

Large intestine
Absorbs water from the food that have not been digested in the small intestine; also absorbs some important vitamins that are produced by the large number of bacteria it harbours

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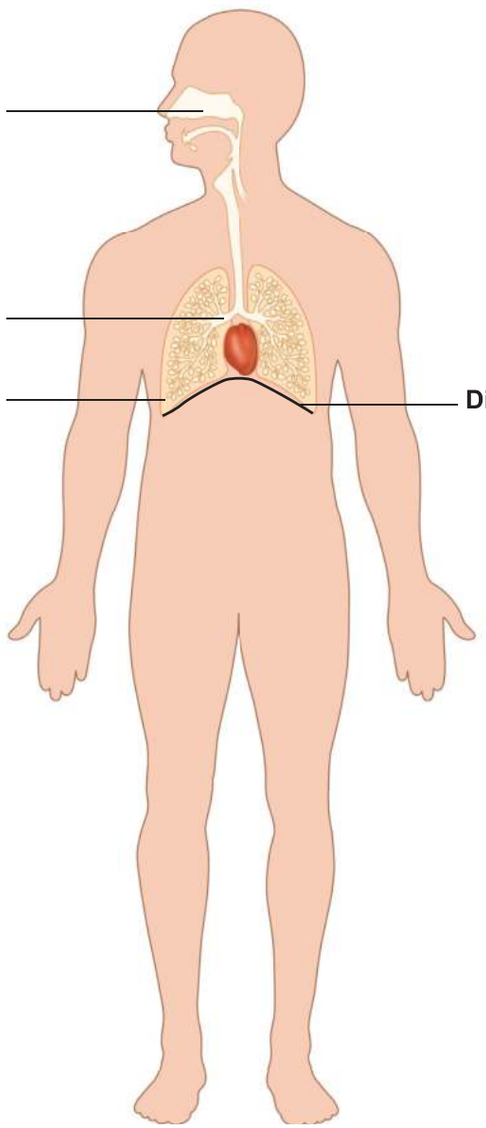
6.4 Respiratory System

Respiratory system is involved in exchange of respiratory gases and there by helps us to breathe. The human respiratory system consists of nostrils, nasal cavity, pharynx, larynx, trachea, bronchi and lungs. It helps in the movement of air in and out of the body. Exchange of O_2 and CO_2 occurs between air in the lung and blood. The entry of food into the wind pipe is prevented by a flap like structure called **Epiglottis**.

Lungs

Lungs are the main respiratory organ. They are located within the chest cavity. The trachea, commonly called **windpipe**, is a tube supported by cartilaginous rings that connects the pharynx and larynx to the lungs, allowing the passage of air. The trachea divides into right and left bronchi and enter into the lungs. They divide further and ends in small air sacs called **alveoli**. The lungs are covered by a double layered **pleura**. Diffusion of gases (O_2 and CO_2) occurs across the alveolar membrane.

Respiratory System



RAL47

When we inhale, where does the air go?

Nostrils
↓
Nasal cavity
↓
Pharynx
↓
Larynx
↓
Trachea
↓
Bronchus
↓
Bronchiole
↓
Alveolus

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Exchange of gases by the respiratory system involves three different processes such as;

1. **External Respiration:** Intake of O_2 from the air and releasing of CO_2 from the lungs occurs through nostrils.
2. **Internal Respiration:** Taking in of oxygen and giving out CO_2. The circulatory system transports O_2 and CO_2 to and from all parts of the body. Hemoglobin in the red blood cells (RBCs) transport O_2 and CO_2.
3. **Cellular Respiration:** Cells take in O_2 and release CO_2

Activity 5:

Aim: To prove that exhaled air is rich in carbon- di- oxide

Materials required: Two glass jars with lime water and a straw

Procedure: Leave the first jar with lime water undisturbed, blow air in to the second jar with the help of a straw

Observation: Lime water turns milky in few seconds in the second jar. The CO_2 gas alone can change the lime water into milky white.

Conclusion: Carbon-di-oxide is present in the air that we exhale.



Each lung has about 300 million air sacs or alveoli.

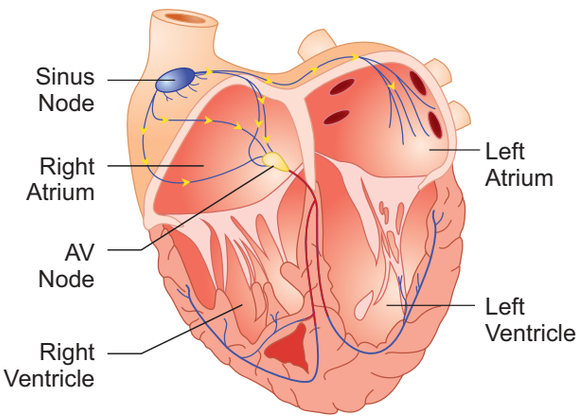
Yawning helps us to take in more amount of O_2 and to give out CO_2.

6.5 Circulatory system

The circulatory system is one of the important system consisting of heart, blood vessels and blood. It transports respiratory gases, nutrients, hormones and waste materials within the body. It protects the body from harmful pathogens and also regulates the body temperature.

Heart

Heart is located in the thoracic cavity between the two lungs. The heart is four chambered and is surrounded by a double layered membrane called **pericardium**. The heart pumps blood continuously throughout our life time.



Blood vessels

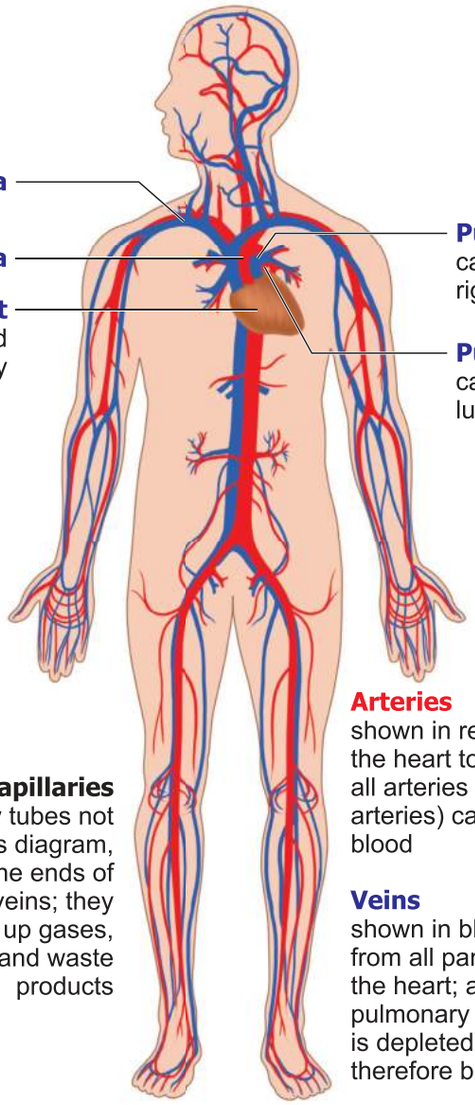
Three types of blood vessels are present in the body. They are **arteries, veins and capillaries.** They form a closed network through which the blood is circulated.

Blood

Blood is a fluid connective tissue of red colour containing plasma and blood cells. There are three types of blood cells namely, Red blood corpuscles (RBCs), White Blood corpuscles (WBCs) and Blood Platelets. RBCs are produced in the bone marrow.

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Circulatory System



Activity 6: Place the middle and index fingers of your right hand on the inner side of your left wrist. Can you feel a throbbing movement. Why do you feel the throbbing? This throbbing is called the **pulse** and it is due to the blood flowing in the arteries. Count the number of pulse in one minute.

How many pulse beats could you count in one minute? The number of beats per minute is called the **Pulse rate**. A resting person usually has a pulse rate between 72 to 80 beats per minute.



Find other places in your body where you can feel the pulse. Record your own pulse beats and your classmates as beats per minute; Compare the values.

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Donate Blood

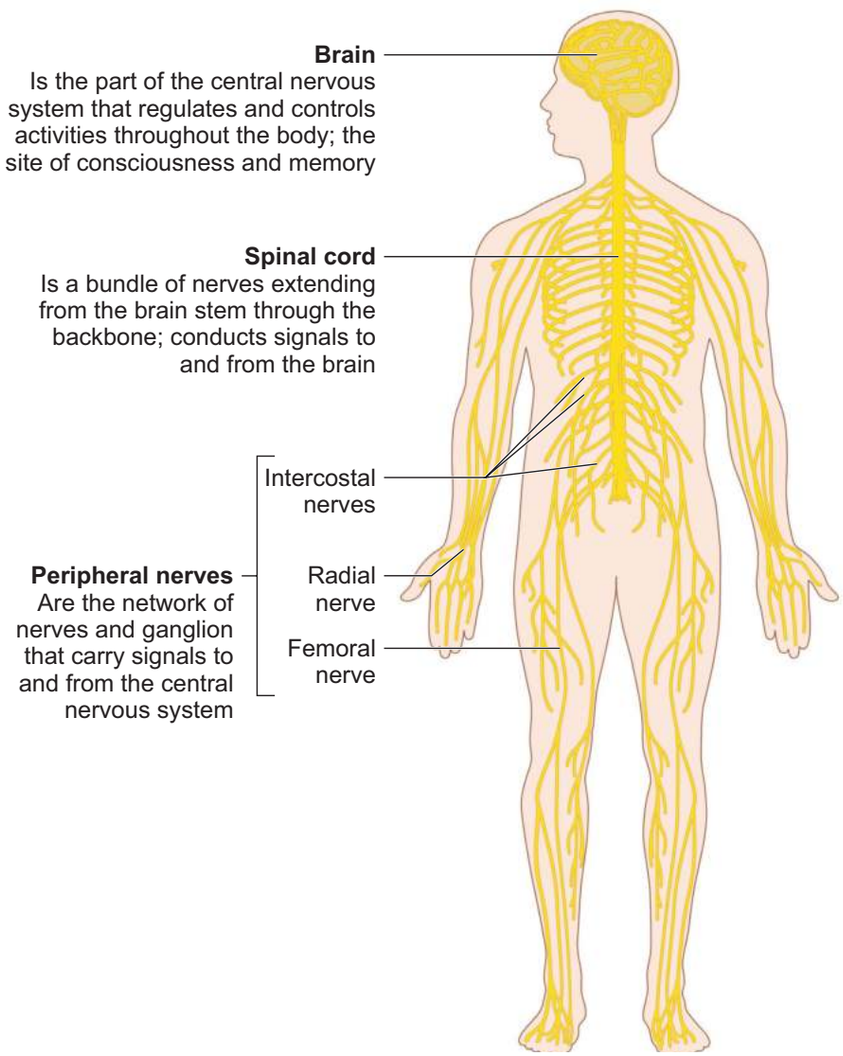
Hospitals have blood banks where blood can be temporarily stored before it is given to the patients in need. Every healthy person over 18 years of age can donate blood. So that, it can be given to persons in need during emergencies of accidents or operations. Blood donation saves their life.



6.6 Nervous System

Nervous system is well developed in human and is composed of neurons or nerve cells. This system includes brain, spinal cord, sensory organs and nerves. The two important functions of the nervous system along with the endocrine system are **conduction and co-ordination.**

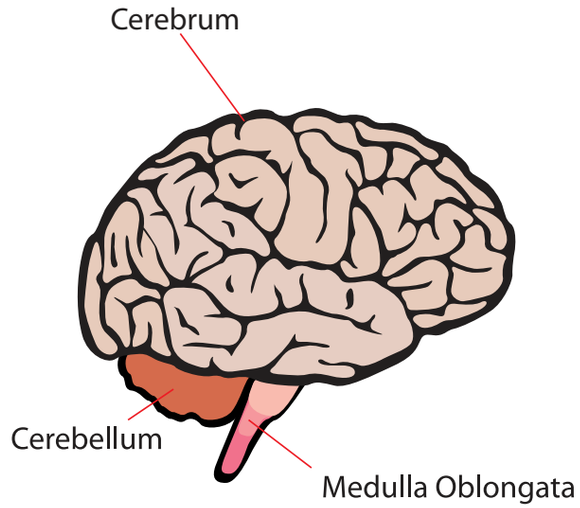
Nervous System



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Brain

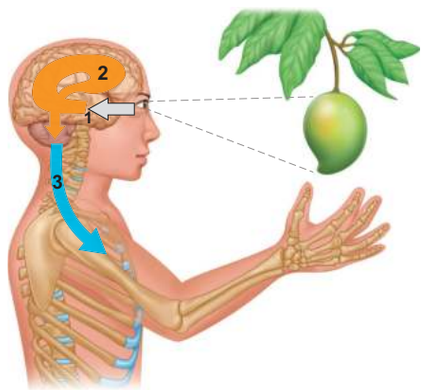
The brain is a complex organ which is placed inside the cranium. It is protected by a three layered tissue coverings called **meninges**. Brain has three regions namely fore brain, mid brain and hind brain. It is the controlling centre of the body.



Spinal cord

It is the extension of medulla oblongata of the hind brain and is enclosed within the vertebral column. Spinal cord connects the brain to different part of the body through nerves.

The Functions of the Nervous System



1. Sensory Input

The conduction of signals from sensory receptors.

2. Integration

The interpretation of the sensory signals and the formulation of responses.

3. Motor output

The conduction of signals from the brain and spinal cord to effectors, such as muscle and gland cells.



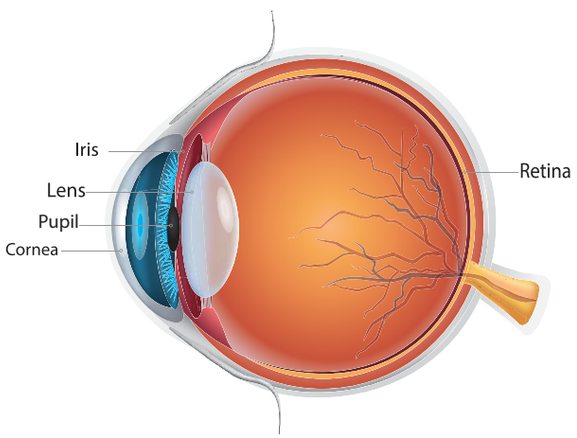
Brain is said to store as many as 100 million bits of information in a life time.

6.7 Sense organs

Sense organs are like the windows to the outside world. There are five sense organs in our body such as eyes, ears, nose, tongue and skin. They make us aware of our surroundings. We are able to see, hear, smell, taste and feel, only through sense organs.

Eyes

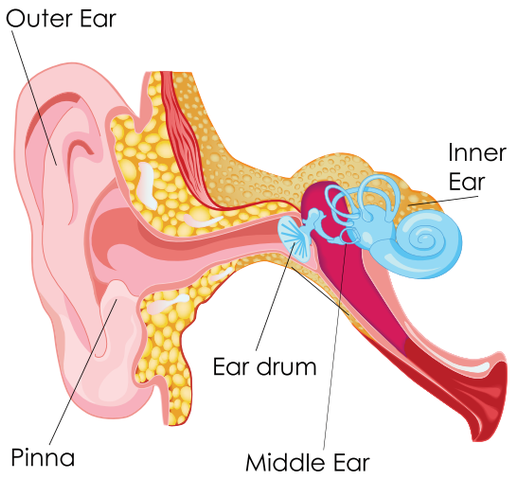
Eyes help us to see things around us i.e., their colour, shape, size whether they are near or far, moving or at rest. The eyelids and eyelashes keep the eyes safe. The eye has three main parts namely cornea, iris and pupil.



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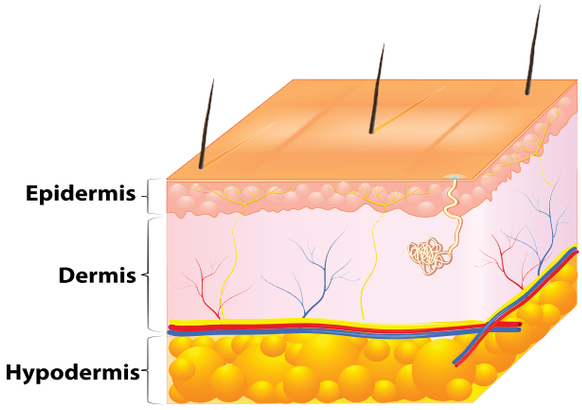
Ears

Ears help to hear and differentiate sounds around us. The ears also help us in maintaining the balance of the body when we are walking, running or climbing. The ear has three major parts, **the outer ear, the middle ear and the inner ear.** The outer ear in human beings is made up of an external flap called **pinna**.



Skin

Skin is the largest sense organ as it covers the whole body. The skin helps to feel the things around us by touching, that is whether they are hot or cold, smooth or rough, dry or wet, hard or soft. Skin covers the body and protects it from germs. It also keeps the body moist and regulates the body temperature.



Functions of the skin

1. Skin forms an effective barrier against infection by microbes and pathogens.
2. Skin helps us to synthesize vitamin D using sunlight.

Take Care of Your Sense organs

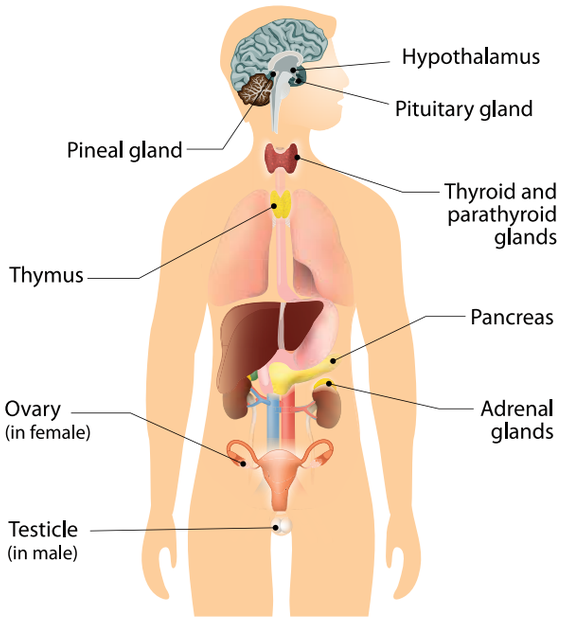
- ❖ Do not read in very bright or very dim light and also in moving vehicle.
- ❖ Avoid exposing eyes to screens of television, computer, laptop and cell phone for a long time.
- ❖ Do not rub your eyes harshly.
- ❖ Wash your eyes gently with clean water, two or three times a day.
- ❖ Ears should be protected from hard blows.
- ❖ One should never try to prick ears with toothpicks or hairpins, which are dangerous practices because it may puncture the ear drum and cause ear infection.
- ❖ One should bath at least once a day to keep skin clean and fresh.

6.8 Endocrine System

Endocrine system regulates various functions of the body and maintains the internal environment. Endocrine glands are present in the body, produce chemical substances called **hormones**.

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Endocrine System



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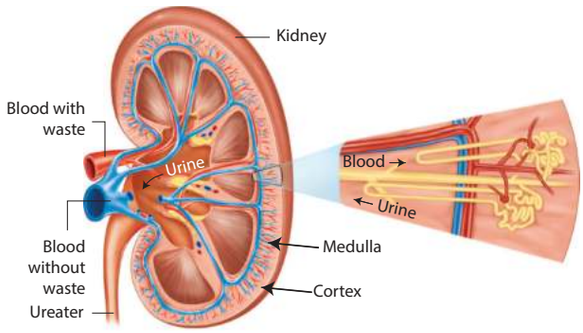
Glands	Location
Pituitary gland	At the base of brain
Pineal Gland	At the base of brain
Thyroid Gland	Neck
Thymus Gland	Chest
Pancreas (Islets of Langerhans	Abdomen
Adrenal Gland	Above the kidney
Gonads	Pelvic cavity

6.9 Excretory System

The nitrogenous wastes are removed from the body by the excretory system. It is composed of kidneys, ureters, urinary bladder and urethra.

Kidneys

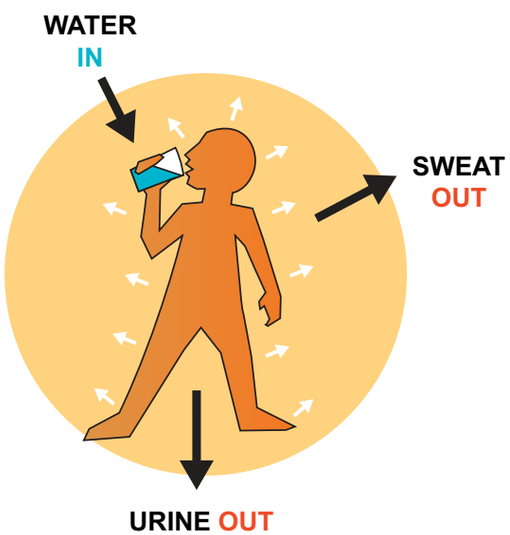
These are bean shaped structures present in the abdominal cavity. The functional units of the kidney are called **Nephrons** which filter the blood and form the urine.





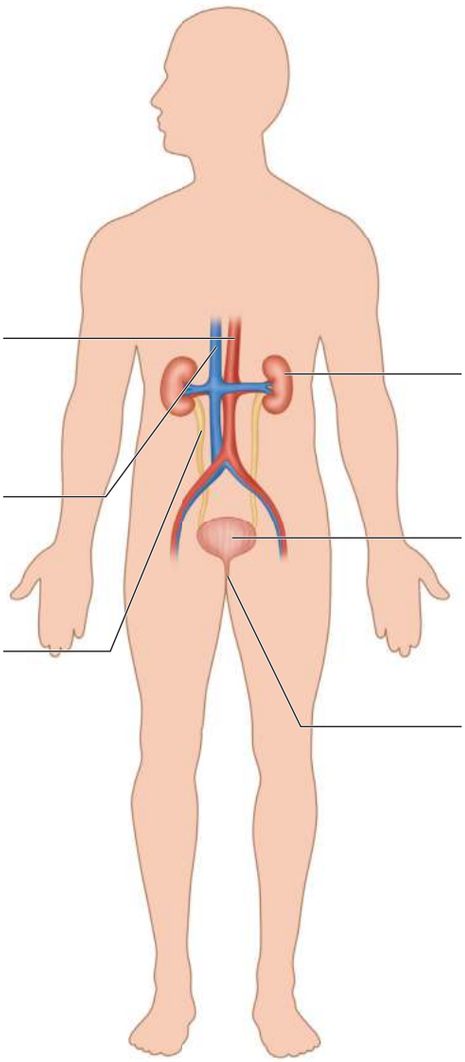
Why do we drink water? Our body contains about 70% water. Some parts have more water like the grey matter of the brain (about 85%) and some less, like fat cell (about 15%).

We normally consume 1.5 to 3.5 litres of water every day in the form of food and water.



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Excretory System



Points to Remember

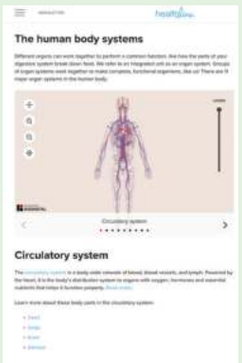
- The skeletal system gives shape to the body and protects the soft internal organs.
- There are three types of muscles – skeletal muscle (voluntary), smooth muscle (involuntary) and cardiac muscle.
- Circulatory system constitutes the heart, blood vessels and blood.
- Diaphragm – A large flat muscle forming the floor at the chest cavity.
- Digestion is the process of breaking complex food into simple and soluble substances.
- Brain is protected by the skull. It has three parts – cerebrum, cerebellum and medulla oblongata.
- The sense organs are Eyes, Ears, Nose, Tongue and Skin.

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ICT Corner

Human Organ systems

Through this activity you will be able to understand the organ system of the human body.



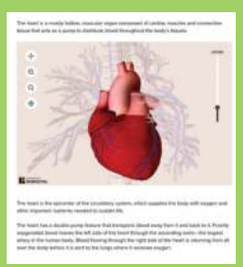
Step 1: Use the given URL in the browser. 'The human body systems page will open. Select any human organ system from the list given to explore.

Step 2: In the activity window the selected organ system will appear, you can zoom it by scrolling the mouse wheel or by clicking the + icon given.

Step 3: The multiple layers of the organ system can be increased or decreased by scroll over the ' Layers" button given..

Step 4: You can view a particular organ of a system by zooming over or by selecting the organ from the list given in the description below the activity window.

Step 1





Step 3



Step 2

The human body systems URL:

https://www.healthline.com/health/human-body-maps

EJ4MQ

*Pictures are indicative only

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Evaluation

NQL24

I. Choose the appropriate answer

1. Circulatory system transports these throughout the body

   a. Oxygen b. Nutrient

   c. Hormones d. All of these

2. Main organ of respiration in human body is

   a. Stomach b. Spleen
   c. Heart d. Lungs

3. Breakdown of food into smaller molecules in our body is known as

   a. Muscle contraction

   b. Respiration

   c. Digestion

   d. Excretion

II. Fill in the blanks

1. A group of organs together make up an _____ system
2. The part of the skeleton that protects the brain is _____
3. The process by which the body removes waste is _____
4. The _____ is the largest sense organ in our body
5. The endocrine glands produce chemical substances called _____

III. True or False. If False, give the correct statement

1. Blood is produced in the bone marrow.
2. All the waste products of the body are excreted through the circulatory system.
3. The other name of food pipe is alimentary canal.
4. Thin tube like structures which are the component of circulatory system are called blood vessels.
5. The brain, the spinal cord and nerves form the nervous system.

IV. Mach the following

1. Ear	-	Cardiac muscle
2. Skeletal System	-	Flat muscle
3. Diaphragm	-	Sound
4. Heart	-	Air sacs
5. Lungs	-	Protection of internal organs

V. Arrange in Correct sequence

1. Stomach → Large intestine → Oesophagus → Pharynx → Mouth → Small Intestine →Rectum → Anus
2. Urethra → Ureter → Urinary Bladder → Kidney

VI. Analogy

1. Arteries : Carry blood from the heart:: _____ :carry blood to the heart.
2. Lungs: Respiratory system:: _____: Circulatory system.
3. Enzymes: Digestive glands:: _____: Endocrine glands

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VII. Give very short answer

1. Describe about skeletal system.
2. Write the functions of epiglottis.
3. What are the three types of blood vessels?
4. Define the term "Trachea".
5. Write any two functions of digestive system.
6. Name the important parts of the eye.
7. Name the five important sense organs.

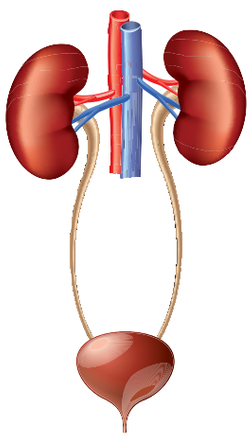
VIII. Give short answer

1. Write a short note on rib cage.
2. List out the functions of the human skeleton.
3. Differentiate between the voluntary muscles and involuntary muscles.

IX. Answer in detail

1 List out the functions of Endocrine system and Nervous system.

2. Label the diagram given below to show the four main parts of the urinary system and answer the following questions.



A. Which organ removes extra salts and water from the blood?

B. Where is the urine stored?

C. What is the tube through which urine is excreted out of the body?

D. What are the tubes that transfer urine from the kidneys to the urinary bladder called?

X. Questions based on Higher Order Thinking Skills

1. What will happen if the diaphragm shows no movement?
2. Why is the heart divided into two halves by a thick muscular wall?
3. Why do we sweat more in summer?
4. Why do we hiccup and cough sometimes when we swallow food?

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Unit 7 Parts of Computer



Learning Outcomes

- To know the Input unit, CPU and the Output unit.
- To understand the memory unit.
- To differentiate the input and output devices.
- To link the connections in Computer.

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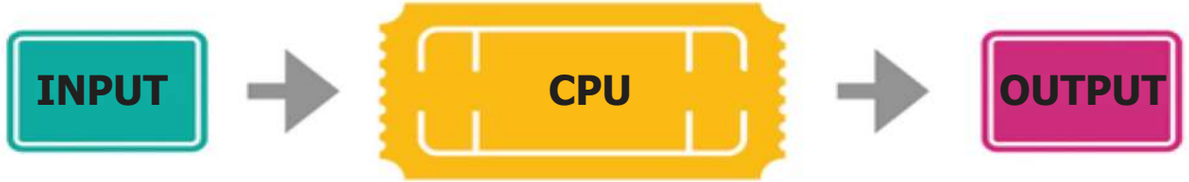
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Is it easy to connect our sprawling planet to a point? If it is easy, then how would it be possible? The answer to these questions in today's world is the Computer. In this Modern World computer eases the effort and speeds up the processes to a great extent. Now-a-days the usage of computer plays an important part in every walk of life. So, it is apt time to learn about computers. To start, it is necessary to note that there are three key units in the computer. Understanding of this three units will make us to operate a computer in ease. In this section, let us learn what are the three units? What are the functions of each of these units.

7.1.1 Parts of a Computer

- Input Unit
- Central Processing Unit (CPU)
- Output Unit

Input Unit



The input unit helps to send the data and commands for the processing. The devices that are used to input data are called input devices.

Keyboard, Mouse, Scanner, Barcode reader, Microphone-Mic., Web camera, Light Pen are some of the input devices.

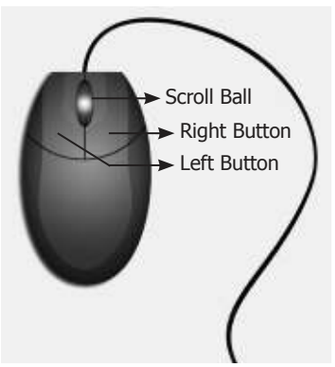
Keyboard

Keyboard and mouse are the important input units. Keyboard plays an important role in a computer as a input device. Numbers and alphabet plays a role of Data in computer. Keyboard helps to enter data. Keyboard has two types of keys, namely number keys and alphabet keys. The keys with numbers are called number keys and key with letters are called alphabet keys.



Mouse

Mouse is an essential part of the computer. Mouse has two buttons and a scroll ball in the middle. The mouse is used to move the pointer on a computer screen. Right button is used to select files and to open the folder. Left button is used to carryout corrections in the file. The page on the monitor can be moved up and down using the scroll ball.



Central Processing Unit (CPU)

CPU is the brain of the Computer. The

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data is processed in the CPU. The CPU has namely three parts.

1. Memory Unit
2. Arithmetic Logic Unit (ALU)
3. Control Unit

Control Unit

The control unit controls the functions of all parts of the computer.

Arithmetic Logic Unit

Arithmetic and Logic unit performs all arithmetic computations like addition, subtraction, multiplication and division.

Memory Unit

The memory unit in the computer saves all data and information temporarily. We can classify memory unit into two types namely primary and secondary memory. Memory can be expanded externally with the help of Compact Disk (CD), Pendrive, etc.

Output Unit

The output unit converts, command received by the computer in the form of binary signals into easily understandable characters. Monitor, Printer, Speaker, scanner are some of the output devices.

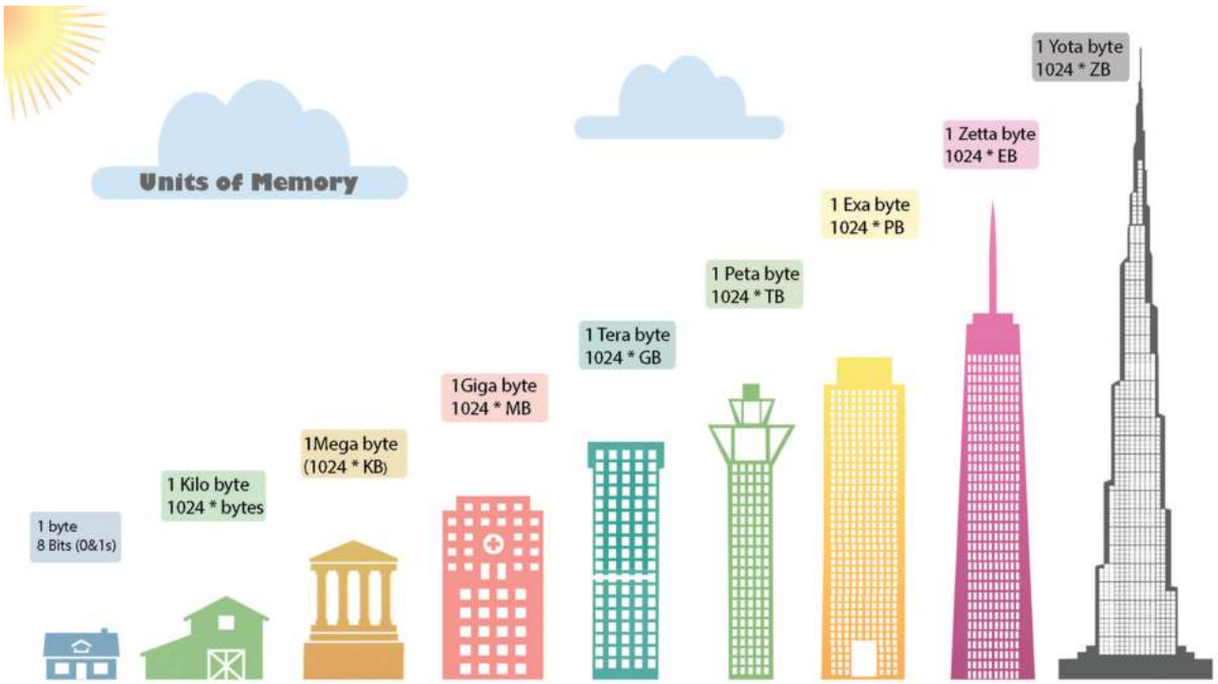
Of the various output devices, monitor is the important output device because it is link to the computer. Monitor screen looks like TV screen. The input data in the form of Alphabets, Numbers, Pictures or Cartoons and Videos it will be displayed on a monitor. There are two types of monitor namely,

1. Cathode Ray Tube Monitors (CRT)
2. Thin Film Transistor Monitors (TFT)

Now a days computer system has TFT monitor as they occupy less space and emit less heat than CRT monitors.

7.1.2 Memory Units

The data is measured in units which is



DO YOU KNOW?

A DVD is capable of storing 6 times more data than a CD.

called as Bit. A Bit has a single binary value either 0 or 1.

Classification of Computer

The computers can be classified as follows based on their design, shape, speed, efficiency, working of the memory unit and their applications.

- Mainframe Computer
- Mini Computer
- Micro or Personal Computer
- Super Computer



Mainframe computer



Mini computer



Micro personal computer



Super computer

Personal computer and its types

Personal computer comes under the microcomputer. Based on the memory and efficiency in PC they can be classified as



Desktop



Laptop



Tablet

1. Desktop
2. Laptop
3. Tablet

7.1.3 Connecting the Computer

You must have seen tube light and fan working by connection through electric wire. Likewise various parts of the computer are linked through connecting cables. We call computer as system as it is connected with one another. Do you know how these parts are connected? There are many cables used to connect these parts. These cables are called as connecting cables. These cables are found in different sizes. Each cable has its own specific use. Let us see the different types of cables and its uses.

Types of Cables

- Video Graphics Array (VGA)
- High Definition Multimedia Interface (HDMI)
- Universal Serial Bus (USB)
- Data cable
- Power Cord
- Mic cable
- Ethernet cable

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1. VGA cable

It is used to connect the computer monitor with the CPU.

2. USB cable /cord



Devices like Printer, Pendrive, Scanner, Mouse, Keyboard, web camera, and Mobile phone devices are connected with the computer using USB cord or cable.

3. HDMI cable



HDMI cable transmits high quality and high bandwidth streams of audio and video. It connects monitor, projector with the computer.

4. Data cable



Data cable transmits data and it is used to connect tablet, mobile phones to the CPU for data transfer.

5. Audio jack



The audio jack is used to connect the speaker to the computer.



6. Power cord

Power cord temporarily connects an appliance to the main electricity supply.



7. Mic cable

To connect the Mic to the CPU, Mic wire/ cord is used.



8. Ethernet

Ethernet cable helps to establish internet connectivity.

7.1.4 Wireless Connections

Bluetooth, Wi-Fi are used to connect to internet without using any connecting cables / devices.

1. Bluetooth



Mouse, Keyboard can be connected to the computer using the Bluetooth. Using the Bluetooth the data can be shared with nearby devices

2. Wi-Fi

Net connectivity can be obtained using the Wi-Fi without any connecting cables. Any data from anywhere can be shared using Wi-Fi.





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Evaluation

YJD3W

I. Choose the correct answer

1. Which one of the following is an output device?

   a. Mouse b. Keyboard

   c. Speaker d. Pendrive

2. Name the cable that connects CPU to the Monitor

   a. Ethernet b. Power Cord

   c. HDMI d. USB

3. Which one of the following is an input device?

   a. Speaker b. Keyboard

   c. Monitor d. Printer

4. Which one of the following is an example for wireless connections

   a. Wi-Fi b. Electric wires

   c. VGA d. USB

5. Pen drive is _____ device.

   a. Output b. Input

   c. Storage d. Connecting cable

II. Match the following

1.	VGA	-	Input device
2.	Bluetooth	-	Connecting cable
3.	Printer	-	LDMI
4.	Keyboard	-	Wireless connection
5.	HDMI	-	Output device

III. Give short answer

1. Name the parts of a computer.
2. Bring out any two differences between input and output devices.

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Activity

(Look at the magic of connecting cables to desktop computer with 4,3,2,1 formula, start from 4 proceed till 1. Now your computer is ready to use).

By connecting the various parts of a computer we can assemble a computer. For the construction activity, students have to use 4-3-2-1 formula.

A system consist of mouse, key board, monitor, CPU, power cables, and connecting cables Students has to connect the four parts of a computer in row 4, using the cables in row 3, through the power cables in row 2 to construct a system.

<table>
<tr><th colspan="5">Using the 4-3-2-1 formula we can connect the parts of the computer</th></tr>
<tr><td rowspan="2">4
Parts</td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Mouse</td><td>Keyboard</td><td>Monitor</td><td>CPU</td></tr>
<tr><td colspan="2" rowspan="2">3
Connection cables</td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>VGA</td><td>USB (connecting cable)for Keyboard</td><td>USB (connecting cable)for Mouse</td></tr>
<tr><td colspan="3">2
Power cords</td><td>  </td><td>  </td></tr>
<tr><td colspan="3" rowspan="3"></td><td>USB (connecting cable)for CPU</td><td>USB (connecting cable) for Monitor</td></tr>
<tr><td rowspan="2">1
Working system</td><td>  </td></tr>
<tr><td>A complete computer</td></tr>
</table>

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GLOSSARY

Atmosphere	-	வளிமண்டலம்
ArithmeticLogic Unit	-	கணிதத்தருக்கச் செயலகம்
Audio jack	-	ஒலி இணைப்பான்
Battery	-	மின் கல அடுக்கு
Basic Unit	-	அடிப்படை அலகு
BarcodeReader	-	பட்டைகுறியீடு படிப்பான்
Bluetooth	-	ஊடலை
Combustion	-	எரிதல்
Contraction	-	சுருங்குதல்
Cortical Expansion	-	பரும விரிவு
Cracking	-	விரிசல்
Cell	-	மின்கலன்
Chemicalenergy	-	வேதி ஆற்றல்
Conductors	-	மின் கடத்திகள்
Composition	-	இயைபு
Compressedair	-	அழுத்தப்பட்ட காற்று
Chloroplast	-	பசுங்கணிகம்
Chlorophyll	-	பச்சையம்
Compound microscope	-	கூட்டு நுண்ணோக்கி
Cellorganelles	-	செல் உறுப்புகள்
Circulatory system	-	இரத்த ஓட்ட மண்டலம்
Control Unit	-	கட்டுப்பாட்டகம்
Compact Disk	-	குறுவட்டு
Cord/cable	-	கம்பி
Digestive system	-	செரிமான மண்டலம்
Data cable	-	தரவுக்கம்பி
Electricalenergy	-	மின் ஆற்றல்
Electricalcircuit	-	மின் சுற்று
Eukaryoticcell	-	உண்மையான உட்கரு உடைய செல்
Excretory system	-	கழிவு நீக்க மண்டலம்
Endocrine system	-	நாளமில்லாசுரப்பி மண்டலம்.
Friction	-	உராய்வு
Fuel	-	எரிபொருள்
Flame	-	சுடர்
Freezing	-	உறைதல்
Flagella	-	கசைஇழை
Foodproduction	-	உணவு உற்பத்தி
Heat	-	வெப்பம்
Heat transfer	-	வெப்பம் கடத்தல்
Insulators	-	மின்கடத்தா பொருள்
Inflammable	-	எளிதில் எரியக்கூடிய
Input unit	-	உள்ளீட்டகம்
Kineticenergy	-	இயக்க ஆற்றல்
Linear Expansion	-	நீள் விரிவு
Leucoplast	-	வெண்கணிகம்
Light Pen	-	ஒளிப்பேனா
Laptop	-	மடிக்கணினி

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Molecules	-	மூலக்கூறுகள்
Mountaineer	-	மலையேறுபவர்
Muscularsystem	-	தசை மண்டலம்
Microphone	-	ஒலிவாங்கி
Memory Unit	-	நினைவகம்
Monitor	-	திரையகம்
Mainframe Computer	-	பெருமுகக்கணினி
MiniComputer	-	குறுமுகக்கணினி
Microcomputer	-	நுண்கணினி
Nerve cell	-	நரம்புச் செல்
Nucleus	-	உட்கரு
Nervoussystem	-	நரம்பு மண்டலம்
Output unit	-	வெளியீட்டகம்
Poorconductor	-	அரிதிற் கடத்தி
Photosynthesis	-	ஒளிச்சேர்க்கை
Pyrex glass	-	பைரக்ஸ் கண்ணாடி
Primary cell	-	முதன்மை மின் கலன்
Plasma membrane	-	பிளாஸ்மா சவ்வு
Prokaryoticcells	-	உட்கரு முதலில் தோன்றிய செல்
Parallelcircuit	-	இணை மின் சுற்று
Plotter	-	வரைவி
Pen drive	-	விரலி
Projector	-	ஒளிவீழ்த்தி
Rustingofiron	-	இரும்பு துருப்பிடித்தல்
Respiration	-	சுவாசம்
Respiratory system	-	சுவாச மண்டலம்
Secondarycell	-	துணை மின்கலன்
Series circuit	-	தொடர் மின் சுற்று
Solvent	-	கரைப்பான்
Solute	-	கரைபொருள்
Sublimation	-	பதங்கமாதல்
Skeletalsystem	-	எலும்பு மண்டலம்
Senseorgans	-	உணர்வு உறுப்புகள்
Speaker	-	ஒலிப்பெருக்கி
SuperComputer	-	மீக்கணினி
Scanner	-	வருடி
Temperature	-	வெப்பநிலை
Thermometer	-	வெப்பநிலைமானி
Thermal Equilibrium	-	வெப்பச் சமநிலை
Thermal Expansion	-	வெப்ப விரிவு
Vapourization	-	ஆவியாதல்
Vacuoles	-	குமிழ்கள்
Wind Mills	-	காற்றாலைகள்
Wi-Fi	-	அருகலை

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VI Std Science

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HISTORY

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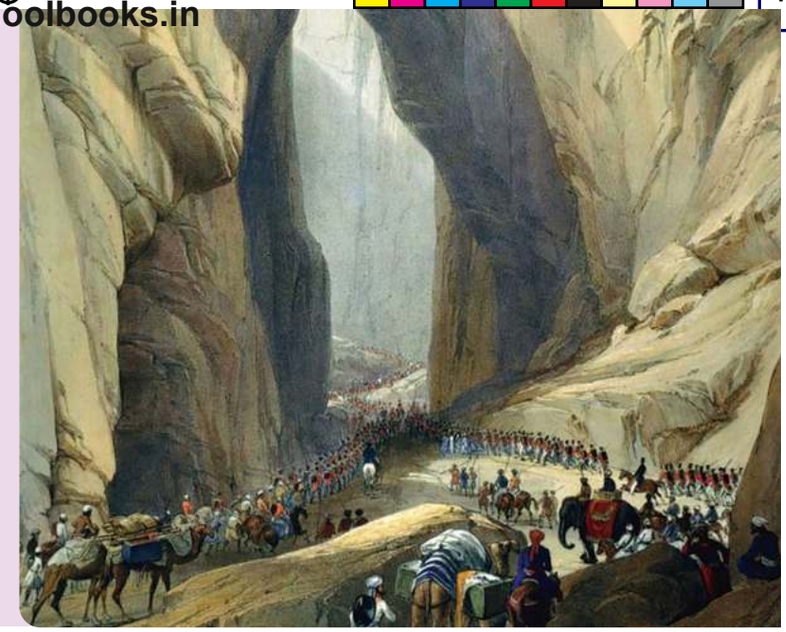
Assessment

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Unit 1

Vedic Culture in North India and Megalithic Culture in South India



Learning Objectives

2AIJ8

- To know the origin and migration of Aryans into India.
- To identify the sources of study relating to the Vedic Age.
- To understand the evolution of political, economic and the religious structures in Rig Vedic and Later Vedic Societies.
- To locate the regions inhabited by both early and later Vedic people.
- To make the differences between early and later Vedic periods.
- To understand the Megalithic/Iron Age culture in Tamil Nadu.

Vedic Age

The first phase of urbanisation in India came to an end with the decline of Indus Civilisation. A new era, called Vedic Age began with the arrival of Aryans.

Vedic Age – It is a period in the History of India between 1500 BC (BCE) – 600 BC (BCE). It gets its name from four 'Vedas'

Who were the Aryans?

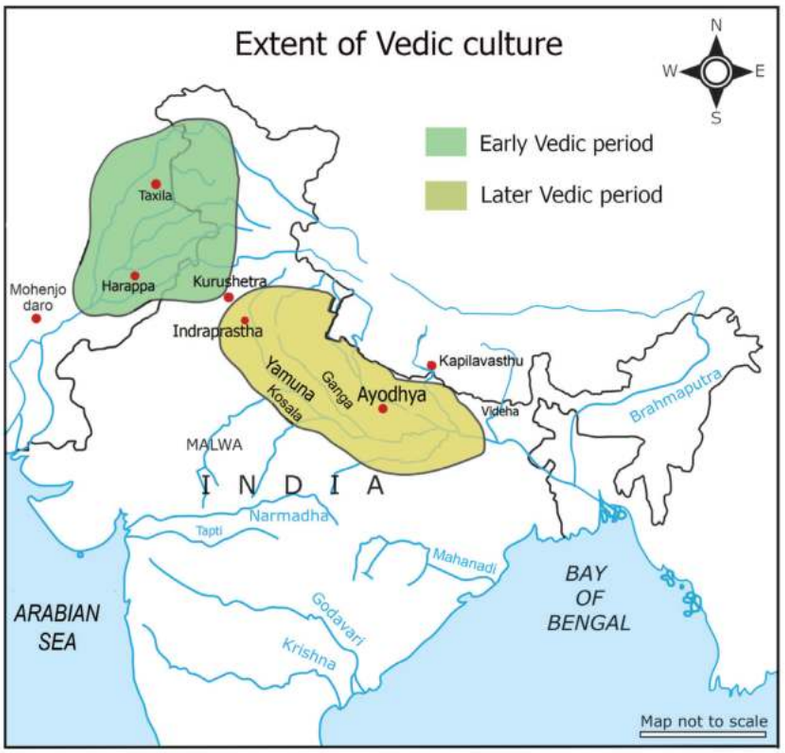
The Aryans were Indo–Aryan language speaking, semi nomadic pastoralists. They came from Central Asia in several waves of migration through Khyber Pass of Hindu Kush Mountains.

Though cattle rearing was their main occupation, they also practised slash and burn agriculture.

DO YOU KNOW?

Slash and burn agriculture - It is a farming method that involves clearing the land by cutting and burning all the trees and plants on it. Cultivation is done there for a short time and then abandoned. People then move to a new piece of land for cultivation.

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Time, Spread and Sources	
Geographical range	North India
Period	Iron Age
Time	1500 BC (BCE) – 600 BC (BCE)
Sources	Vedic Literature
Nature of Civilisation	Rural

Aryans and their Home in India

- Aryans of the Rig Vedic Period were semi-nomadic. They were basically pastoral people with cattle as their main source of wealth.
- In the Rig Vedic times, the Aryan homeland was the Punjab, which was at that time called Sapta Sindhu, the land of seven rivers.
- Around 1000 BC (BCE), Aryans in India moved eastward and settled in Indo-Gangetic Plain.
- Use of iron axes and ploughs became widespread.

DO YOU KNOW?

Four Vedas

1. Rig
2. Yajur
3. Sama
4. Atharva

Sources

Vedic literature

Vedic literature can be classified into two broad categories.

1. **Shrutis -** The Shrutis comprise the four Vedas, the Brahmanas, the Aranyakas and the Upanishads. They are considered sacred, eternal, and an unquestionable truth.

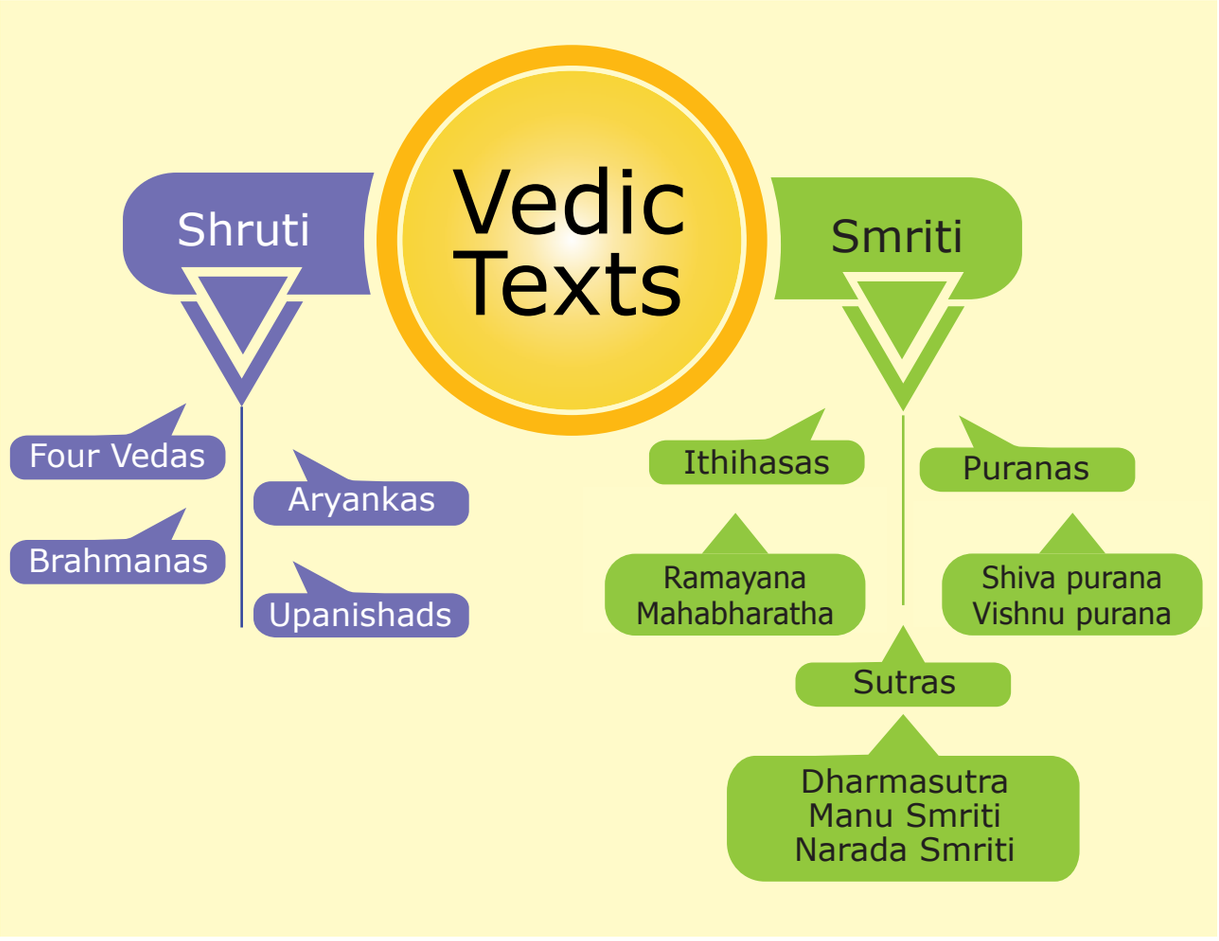
   'Shruti' means listening (or unwritten) ones that were transmitted orally through generations.

2. **Smritis -** A body of texts containing teachings on religion such as

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Ithihasas, Puranas, Tantras and Agamas. Smritis are not eternal. They are constantly revised.

'Smriti' means definite and written literature.



DO YOU KNOW?

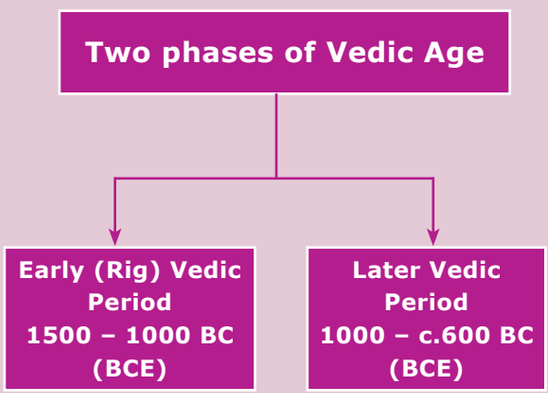
National Motto

"Satyameva Jayate" "(Truth alone triumphs)" is taken from Mundaka Upanishad.

Archaeological Sources

Material remains such as iron implements and pottery from the archaeological sites in Punjab, Uttar Pradesh and Rajasthan along the Indus and the Ganges.

Classification of Vedic Age



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Vedic Culture

Polity and Society

The Rig Vedic polity was kinship - based. Kula (clan) was the basic unit of the polity. It was under a head called Kulapati. Several families joined together to form a Grama (village). Grama was headed by Gramani. A group of villages was called Vis (clan) and was headed by Vishayapati. Rajan was the head of the Jana (tribe) and he was addressed as Janasyagopa (guardian of the people). There were several tribal kingdoms (Rashtras) during Rig Vedic period (Bharatas, Matsyas, Puras).

King

The main responsibility of the Rajan was to protect his tribe. His powers were limited by tribal assemblies namely Vidhata, Sabha, Samiti and Gana. Of these Vidhata, (the tribal assembly) was the oldest.

Sabha - a council of elders.
Samiti - assembly of people.

The king appointed a purohit (chief priest) to assist him. In economic, political and military matters, the king was assisted by the Senani (army chief). Gramani was the leader of the village.

When the Aryans moved east ward- into Ganges-Yamuna-Doab regions, the early settlements were replaced by territorial kingdoms. Hereditary kingship began to emerge. In the monarchical form of government, the power of the king increased and he performed various rituals and sacrifices to make his position strong.

Many Janas or Tribes were amalgamated to form Janapadas or Rashtras in later Vedic period. The importance of Samithi and Sabha diminished and the Vidhata completely disappeared. New states emerged. Bali was a voluntary contribution of the people to the King. In the later Vedic period bali was treated as tax and collected regularly. The Kuru and Panchala kingdoms flourished and large cities like Ayodhya, Indraprastha and Mathura also emerged during this period.

Bali - a tax consisting of 1/6 of the agricultural produce or cattle for a person.

Social Organization

The Vedic family was patriarchal. The fair complexioned Aryans distinguished themselves from dark complexioned non-Aryans whom they called Dasyus and Dasas. Within the early Vedic Society there were three divisions (Treyi) ; the general public were called Vis, the warrior class was called Kshatriyas and the Priestly class was named Brahmanas. At a later stage, when the Aryans had to accommodate non-Aryan skilled workers in their social arrangement, a rigid four-fold Varna system was developed, i.e., the priestly Brahmanas, the warrior Kshatriyas, the land owning Vysyas and the skilled workers sudras. Thus a graded social order emerged.

Although the Vedic Age is evidenced by good number of texts, it does not have adequate amount of material evidences.

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Status of women

In Rig Vedic society, women relatively enjoyed some freedom. The wife was respected as the mistress of the household. She could perform rituals along with her husband in their house. Child marriage and sati were unknown. There was no bar on the remarriage of widows. Nevertheless, the women were denied right to inherit property from their parents. They played no role in public affairs.

In the later Vedic period the role of women in society, as well as their status, even within the family, declined. Women could no longer perform rituals in the family. The rules of marriage became much more complex and rigid. Polygamy became common. Widow remarriage was not encouraged. Education was denied to women. Intercaste marriages were spurned.

Economic Life

Economy in the Vedic period was sustained by a combination of pastoralism and agriculture. Though occupation of Rig Vedic Aryans was cattle rearing, there were carpenters, chariot makers, potters, smiths, weavers, and leather workers. **Ochre Coloured Pottery (OCP)** was attributed to this period. Horses, cows, goats, sheep, oxen and dogs were domesticated.

When Aryans permanently settled in Sindh and the Punjab regions they began to practise agriculture. The staple crop was yava (barley). There is no mention of wheat or cotton in the Rig-Veda, though both were cultivated by the Indus people. Two crops a year were raised.



In the later Vedic period the Aryans tamed elephants, apart from cow, goat, sheep and horse. In addition to craftsmen of early Vedic period there were also jewellers, dyers and smelters. Pottery of this period was **Painted Grey Ware Culture**.

Use of iron plough and axe helped to put more areas of land under cultivation. Crops of wheat, rice and barley were cultivated. With the growth of agriculture, the idea of private possession of land came into existence. New crafts and arts developed leading to surplus production of commodities for sale.

Trade became extensive. Barter system was prevalent (exchange of goods). They used Nishka, Satmana (gold coins) and Krishnala (silver coins) for business transactions.

DO YOU KNOW?

Metals Known to Rig Vedic People

- Gold (Hiranya)
- Iron (Shyama)
- Copper/ Bronze (Ayas)

Religion

Rig Vedic Aryans worshipped mostly the earthly and celestial gods like Prithvi (Earth), Agni (fire), Vayu (wind), Varuna (rain), Indra (Thunder). There were also

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lesser female deities like Aditi (goddess of eternity) and Usha (appearance of dawn). Their religion was Yajna centered. The mode of prayer was recitation of Vedic hymns. People prayed for the welfare of Praja (children) Pasu (cattle) and Dhana (wealth). Cow was considered a sacred animal. There were no temples. Idol worship had not yet come into existence.

Lateron priesthood became a profession and a hereditary one. New gods were perhaps adopted from non-Aryans. Indra and Agni lost their importance. Prajapathi (the creator) Vishnu (the protector) and Rudra (the destroyer) became prominent. Sacrifices and rituals became more elaborate.

Education

Gurukula System of Education

- The gurukula system is an ancient learning method.
- The word Gurukula is a combination of the Sanskrit Word Guru (teacher or master) and Kula (family or home).
- The shishyas resided with their guru and served them and simultaneously learnt and gained knowledge.
- The students received education through oral tradition meaning rote learning, and were required to memorise everything.



- The subjects of the study included the four Vedas, Ithihasas, Puranas, grammar, logic, ethics, astrology, maths and military science.
- The students were also trained to lead a disciplined life.
- Only Dvijas could be Shishyas. No women could have formal education.

Age – based Ashramas

Towards the end of the later Vedic period, the concept of four stages in life (the four ashramas) developed.

- Brahmacharya (Student Life)
- Grihastha (Married Life)
- Vanaprastha (Going to the forest to meditate)
- Sanyasa (Leading a life of an ascetic so as to attain Swarga)

State the Differences between Indus and Vedic Civilisation

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CONTEMPORARY CULTURE IN SOUTH INDIA AND TAMIL NADU

The early Vedic culture in northern India coincided with Chalcolithic cultures that prevailed in other parts of the sub-continent. Since, people used copper (chalco) and stone (lithic), it was called Chalcolithic period.

Though Chalcolithic culture of India was contemporary to the mature phase of Harappan culture, they continued to exist even after the decline of the latter.

The later Vedic culture in north India and the Iron Age in south India belong to the same period.

Towards the end of Iron Age, people stepped into what is known as Megalithic Culture (600 BC (BCE) and AD (CE) 100).

Megalithic Period in ancient Tamilakam synchronised with the pre Sangam period. The Black and Red Ware Pottery became the characteristic of the Megalithic period.

MEGALITHIC / IRON AGE IN TAMILNADU

DO YOU KNOW?

The term 'Megalith' is derived from Greek. 'Mega', means great and 'lith' means stone. Using big stone slabs built upon the places of burial is known as Megalith.

Some of the Megalithic / Iron Age Archaeological Sites in Tamil Nadu

Adichanallur - Thoothukudi District

Among the artefacts unearthed were Urns, pottery of various kinds (Red Ware, Black Ware), iron implements, daggers, swords, spears and arrows, some stone beads and a few gold ornaments.

TQO6P



Bronze objects representing domestic animals and wild animals like tiger, antelope and elephant have been unearthed.

The people were skilful in making pottery and in working stone and wood.



Keezhadi – Sivagangai District

The Archaeological Survey of India (ASI) excavated an ancient town dating to Sangam Age in Keezhadi village at Thiruppuvanam taluk. Excavations have produced evidence for brick buildings, and well laid – out drainage system. Tamil – Brahmi inscription on pottery, beads of glass, carnelian and quartz, pearl, gold ornaments and iron objects, shell bangles, ivory dice have been unearthed. In 2017, ASI sent two samples of these for Radio carbon dating to Beta Analytic, Florida, USA. They dated samples as 200 BC (BCE). The Roman artefacts found at the site add to the evidence of ancient Indo -Roman trade relations.

DO YOU KNOW?

Periplus mentions the steel imported to Rome from Peninsular India was subjected to duty in the port of Alexandria.





Porunthal – Dindigul District

Finds – Grave goods, glass beads (in red, white, yellow, blue and green), iron swords, pottery with Tamil Brahmi scripts, pots filled with rice, semi-precious metals such as quartz, carnelian, bangles made of glass and shell.

The discovery of iron sickle, pike, and tip of ploughs provide evidences that they had the practice of rice cultivation in Tamil Nadu. A pot of rice from Porunthal site proves that rice was people's staple food.



Finds at Porunthal

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Paiyampalli – Vellore District

Archaeological Finds –Iron artefacts, along with Megalithic Black and Red Ware Pottery have been found.

Evidence for iron smelting has come to light at Paiyampalli. The date of this culture, based on radio carbon dating, is 1000 BC (BCE).

Kodumanal – Erode District

It is identified with the Kodumanam of Pathitrupathu. More than 300 pottery inscriptions in Tamil – Brahmi have been discovered there. Archaeologists have also discovered spindles, whorls (used for making thread from cotton) and pieces of cloth, along with tools, weapons, ornaments, beads, particularly carnelian.



A Menhir found at burial site is assigned to the Megalithic period.

Megalithic Monuments in Tamil Nadu

The people who lived during the last stages of the New Stone Age began to follow the Megalithic system of burial. According to this system, the dead body was placed in a big pot along with burial goods. The Megalithic monuments bear witness to a highly advanced state of civilisation with the knowledge of iron and community living.



Urns - large pottery jars were used for burying the dead.



Pandavan Thittu, Dharmapuri

Dolmens are Megalithic tombs made of two or more upright stones with a single stone lying across the burial site. Megalithic Dolmens have been found in Veeraraghavapuram village, Kanchipuram district, Kummalamaruthupatti, Dindigul district, and in Narasingampatti, Madurai district.

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Menhir–In Breton Language 'Men' means "stone" and 'hir', "long." They are monolithic pillars planted vertically into the ground in memory of the dead.



Menhir at Singaripalayam in Tirupur District and at Vembur in Theni District points to the existence of an ancient settlement along the banks of River Uppar. Menhirs are found at Narasingampatti in Madurai district, Kumarikalpalayam and Kodumanal in Erode district.



Pulimankombai 3rd Century BC (BCE)

Hero Stones – A Hero Stone is a memorial stone raised in remembrance of the honourable death of a hero in a battle or those who lost their lives while defending their village from animals or enemies. Hero stones are found at Maanur village near Palani, Dindigul district, Vellalankottai, Tuticorin district, and Pulimankombai, Dindigul district.

Summary

- The Aryans migrated to India around 1500 BC (BCE). The Vedic texts form an important source of this period.
- Rig Vedic polity was kinship-based.
- When the Aryans moved east ward, the early settlements were replaced by their territorial kingdoms.
- Use of iron plough and axe helped more areas of land under cultivation.
- New crafts and arts developed. It paved the way for urbanisation in the Gangetic plain.
- The later Vedic society in North India and the Iron Age society in South India belong to the same period.

GLOSSARY

Eternal	-	existing for ever (நிலையான)
Kinship	-	blood relationship (இரத்த உறவு)
Patriarchal	-	a system of society controlled by men (தந்தை வழிச் சமூகம்)
Deity	-	a god or goddess (தெய்வம்)
Contemporary	-	living or occurring at the same time (சமகாலத்தில்)
Metallurgy	-	the branch of science and technology concerned with the properties of metals and their production (உலோகவியல்)

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EXERCISES

I. Choose the Correct answer

1. Aryans first settled in _____ region.

   a. Punjab b. Middle Gangetic
   c. Kashmir d. North east

2. Aryans came from_____.

   a. China b. North Asia
   c. Central Asia d. Europe

3. Our National Motto "Sathyameva Jayate" is taken from _____.

   a) Brahmana b) Veda
   c) Aranyaka d) Upanishad

4. What was the ratio of land revenue collected during Vedic Age

   a. 1/3 b. 1/6
   c. 1/8 d. 1/9

II. Match the Statement with the Reason/Tick the appropriate answer:

1. **Assertion :** The vedic age is evidenced by good number of texts and adequate amount of material evidences.

   Reason: Shrutis comprise the Vedas, the Brahmanas, the Aranyakas and the Upanishads.

   a. Both A and R are true and R is the correct explanation of A.

   b. Both A and R are true but R is not the correct explanation of A.

   c. A is true but R is false.

   d. A is false but R is true.

2. **Statement I:** Periplus mentions the steel imported into Rome from peninsular India was subjected to duty in the port of Alexandria.

   Statement II: Evidences for iron smelting has come to light at Paiyampalli.

   a. Statement I is wrong. b. Statement II is wrong.
   c. Both the statements are correct. d. Both the statements are wrong.

3. Which of the statement is not correct in the Vedic society

   a. A widow could re-marry.

   b. Child marriage was in practice.

   c. Father's property was inherited by his son.

   d. Sati was unknown.

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4. Which is the correct ascending order of the Rig Vedic society?
   a. Grama < Kula < Vis < Rashtra < Jana
   b. Kula < Grama < Vis < Jana < Rashtra
   c. Rashtra < Jana < Grama < Kula < Vis
   d. Jana < Grama < Kula < Vis < Rashtra

III. Fill in the blanks

1. Vedic culture was _____ in nature.
2. _____ was a tax collected from the people in Vedic period.
3. _____ system is an ancient learning method.
4. Adhichanallur is in _____district.

IV. True or False

1. The Roman artefacts found at various sites provide the evidence of Indo – Roman trade relations.
2. A Hero Stone is a memorial stone raised in remembrance of the honourable death of a hero.
3. The army chief was called Gramani.
4. The Black and Red ware pottery became the characteristic of the Megalithic period.
5. Evidence for iron smelting has come to light at paiyampalli

V. Match the following

Site	Finds
a) Keezhadi	1) Ivory dice
b) Porunthal	2) tip of ploughs
c) Kodumanal	3) Spindles
d) Adichanallur	4) gold ornaments

a. 4 3 2 1
b. 3 4 1 2
c. 1 3 4 2
d. 1 2 3 4

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VI Answer in one or two sentence:

1. Name the four Vedas.
2. What were the animals domesticated by Vedic people?
3. What do you know about Megalith?
4. What are Dolmens?
5. What are Urns?
6. Name the coins used for business transactions in Vedic period?
7. Name some Megalithic monuments found in Tamil Nadu.

VII Answer the following

1. Write briefly about the archaeological site at Kodumanal
2. Write about the Vedic women in a pragraph.

VIII HOTS

Difference between Gurukula system of education and Modern system of education.

IX Pride and Joy – Let us find out the fact

Archaeological Sites	Archaeological Finds	Fact
Adichanallur	The Tamil Brahmi script	Existence of Pre-historic culture
Keeladi	Roman artefacts	
Paiyampalli	Iron implements	
Porunthal	Pot filled with rice	
Kodumanal	Spindle whorl	

X Student Activity

1. Sentence making by using these new words.

Shruti, Gramani, Rashtras, Iron Age, Semi nomadic, Barter

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2. Word Search

I	T	I	M	A	S	A	Z	W
U	D	Y	T	R	R	D	I	X
O	O	K	H	Y	B	E	R	S
S	L	P	F	A	A	V	O	A
P	M	S	I	V	D	N	N	T
A	E	R	C	A	A	R	A	M
D	N	S	I	R	U	R	G	A
D	S	X	M	T	N	B	E	N
Y	G	A	N	A	I	N	G	A

1. A pass
2. Text containing teachings on religion
3. A group of villages
4. A tribal assembly
5. Assembly of people
6. Fire
7. Gold coin
8. Period of Vedic Age
9. Megalithic tomb

XI Life Skills

Collect information from Newspapers about archaeological finds with the help of your teacher.

Site Visit

Visit to any one of the archaeological sites near your locality.

XII Answer Grid:

Mention two Ithikasas. Ans:	Vertical monolithic pillar planted in memory of dead is called _____ Ans:	Name the ancient town in Sivagangai district dating to Sangam age. Ans:
Name any two Iron Age sites in Tamilnadu. Ans:	What method of agriculture was practised by early Aryans? Ans:	Name two large cities emerged during Vedic period. Ans:

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Unit 2

Great Thinkers and New Faiths

Learning Objectives

- To learn the causes for the rise of new faiths in the sixth century BC (BCE).
- To have knowledge in the teachings of Mahavira and Buddha.
- To know the similarities and dissimilarities between Jainism and Buddhism.
- To understand the differences between Hinayana and Mahayana Buddhism.
- To know the influence of Jainism and Buddhism in Tamil Nadu.

Intellectual Awakening

The Sixth Century BC (BCE) is regarded as an important period in the history of ancient India. As a land mark period in the intellectual and spiritual development in India, historian Will Durant has rightly called it the "shower of stars".

Sources

Literary sources

- Angas – Jain texts
- Tripitakas and Jatakas - Buddhist texts

Causes for the Rise of Intellectual Awakening and the Birth of Buddhism and Jainism

There were several reasons for the rise of new intellectual awakening. Some of the exploitative practices that paved way for new faiths include:

- The complex rituals and sacrifices advocated in the later Vedic period
- Expensive sacrificial ceremonies
- Superstitious beliefs and practices that confused the common man.
- Upanishads taught as alternative to sacrificial rites were too philosophical, which a layperson could not understand.
- Slavery, caste system, gender discrimination also contributed to the new awakening.

Origin of Jainism

Jainism is one of the world's oldest living religions. Jainism grounds itself in 24 Tirthankaras. A 'Tirthankara', is the one who revealed religious truth at different times. The first Tirthankara was Rishabha and the last one was Mahavira. Jainism gained



Original name	-	Vardhamana
Place of Birth	-	Kundhagrama near Vaishali, Bihar
Parents	-	Siddharth, Trishala
Place of Death	-	Pavapuri, Bihar

prominence under the aegis of Mahavira, during the sixth century BC (BCE).

DO YOU KNOW?

The word **Jain** derives from the Sanskrit word Jina, which means conquering self and the external world.

Mahavira (The Great Hero)

Vardhamana, meaning 'prosperous', was a kshatriya prince. However, at the age of 30, he renounced his princely status to adopt an ascetic life. He undertook intense meditation.

After twelve and a half years of rigorous penance, Vardhamana attained omniscience or supreme knowledge, known as *Kevala*.

Omniscience – It is the ability to know everything or be infinitely wise.

Thereafter, he became Jina meaning 'one who conquered worldly pleasure and attachment'. His followers are called Jains. Mahavira reviewed the ancient Sramanic traditions and came up with new doctrines. Therefore he is believed to be the real founder of Jainism.

Unique Teachings of Jainism

- Jainism denies God as the creator of Universe.
- Basic philosophy of Jainism is Ahimsa or 'non –Violence'.
- Ultimate aim of Jainism is attaining moksha or ending the cycle of birth – death – rebirth.
- Jains reject the belief in Last judgement, where God, a supreme being, decides who goes to heaven or hell.
- Jainism advocates that the goodness or quality of one's life is determined by one's karma.

DO YOU KNOW?

What is Karma?

The belief that a person's actions in this life determine the quality of his or her later part of the current life and the next incarnation.

Tri–rathnas or Three Jewels

Mahavira exhorted the three – fold path for the attainment of moksha and for the liberation from Karma.

They are:

- Right Faith
- Right Knowledge
- Right action

Moksha - Liberation from the cycle of birth and death

Jain Code of Conduct

Mahavira asked his followers to live a virtuous life. In order to live a life filled with sound morals, he preached five major principles to follow.

They are:

- Ahimsa - not to injure any living beings
- Satya - to speak truth
- Asteya - not to steal
- Aparigraha - not to own property
- Brahmacharya - Celibacy

DO YOU KNOW?

Gautama Swami, a chief disciple of Mahavira, compiled the teachings of Mahavira, called *Agama sidhantha*.

Digambaras and Svetambaras

Jainism split into two sects.

Digambaras

- Digambaras are orthodox and conservative followers.
- Monks of the digambara sect, do not wear any clothing and live naked. They are forbidden to have any kind of possessions.
- Digambaras believe that women cannot achieve nirvana or liberation directly.



Svetambaras

- The Svetambaras are considered progressive.
- Monks of Svetambaras sect, wear white robes. They are permitted to have *Rajoharana* (broom with wollen threads), begging bowl and book.
- Svetambaras believe that women are equally capable of achieving liberation as men.

Reasons for the Spread of Jainism

The following are the main reasons for the wide acceptance of Jainism in India

- Use of people's language.
- Intelligible teachings.
- Support from rulers and traders.
- Perseverance of Jain monks.

Influence of Jainism (Samanam) in Tamil Nadu

- In ancient Tamil literature, Jainism is referred to as Samanam.
- There is a Samanar Hill or Samanar Malai in Keelakuyilkudi village, 15 km away from Madurai. The images of Tirthankaras created by Jain monks are found in the hill. It is a protected monument of Archaeological Survey of India.
- In Arittapatti, a small village 25 km from Madurai, on one side of Kalinjamalai hill there are Jain caves called Pandavar Padukkai. Pandavar Padukkai is the bed of Jain saints.
- There is a reference to Aravor Palli, place of living for Jain monks, in Manimegalai.


Thiruparthikundram


Sittannavasal


Chitharalmalai temple

- According to Silapathikaram, when Kovalan and Kannagi were on their way to Madurai, Gownthiyadigal a female jain monk blessed the couple and accompanied them.
- Puhar, Uraiyur, Madurai, Vanchi (Karuvur), Kanchi all had Jain monasteries.
- **Jina Kanchi** – Thiruparthikundram, a village in Kanchipuram, has two ancient Jain temples. This village was once called Jina Kanchi.

Buddhism

Gautama Buddha

Gautama Buddha was the founder of Buddhism. His real name was Siddhartha. Like Mahavira, he was also a Kshatriya prince belonging to the ruling Sakya clan. When Siddhartha was only seven days old his mother died. So he was raised by his step mother Gautami.



Original name	-	Siddhartha
Place of Birth	-	Lumbini Garden, Nepal
Parents	-	Suddhodana, Maya devi
Place of Death	-	Kushi Nagar, UP

Four Great Sights

At the age of 29, Siddhartha saw four sorrowful sights. They were:

- An uncared old man in rags with his bent back.
- An sick man suffering from an incurable disease.
- A man's corpse being carried to the burial ground by weeping relatives.
- An ascetic



Enlightenment

Buddha, the Awakened or Enlightened One, realised that the human life was full of misery and unhappiness. So at the age of 29 he left his palace and became a hermit. He sacrificed six years of his life towards penance. Nonetheless deciding that self-mortification was not a path to salvation, Buddha sat under a Pipal tree and undertook a deep meditation near Gaya.



On the 49th day he finally attained enlightenment. From that moment onwards, he was called Buddha or the Enlightened One. He was also known as Sakya Muni or Sage of Sakya clan.

Buddha delivered his first sermon at Deer Park in Sarnath, near Benaras. This was called "Dharma Chakra Pravartana" or the Turning of the Wheel of Law.

Buddha's Four Noble Truths

- Life is full of sorrow and misery.
- Desire is the cause of misery.
- Sorrows and sufferings can be removed by giving up one's desire.
- The desire can be overcome by following the right path (Noble eight-fold path)

Eight Fold Path

- Right view
- Right Thought
- Right Speech
- Right Action
- Right Livelihood
- Right Effort
- Right Knowledge
- Right Meditation

The teachings of Lord Buddha were simple and taught in a language which people used for communication. Since the teachings addressed the everyday concern of the people, they could relate to them. He was opposed to rituals and sacrifices.

Teachings of Buddha

- Buddha's teachings are referred to as dhamma.
- Buddhism accepted the Theory of Karma – meaning that the quality of man's life depends on his deed.
- Buddha neither accepted nor denied the existence of God, but believed in the laws of universe.
- Buddha asserted that attaining nirvana is the ultimate aim of life.

- Buddha advocated ahimsa or non-violence.
- Buddha had rejected the caste system.

The Wheel of life – represents the Buddhist view of the world.

Buddhist Sangha

Buddha laid foundation for a missionary organization called Sangha, meaning 'association' for the propagation of his faith. The members were called bhikshus (monks). They led a life of austerity.

DO YOU KNOW?

Chaitya – A Buddhist shrine or a meditation hall.

Viharas – Monastries/living quarters for monks.

Stupas – Built over the remains of Buddha's body, they are monuments of great artistic value.

Buddhist Sects

Hinayana	Mahayana
Did not worship idols or images of Buddha.	Worshiped images of Buddha.
Practiced austerity.	Observed elaborate rituals
Believed that Salvation of the individual as its goal.	Believed that salvation of all beings as its objective
Used Prakrit language.	Used Sanskrit language
Hinayana is also known as Theravada. Spread to Sri Lanka, Myanmar (Burma) and South East Asian Countries.	Spread to Central Asia, Tibet, China and Japan where middle path was accepted.

Causes for the Spread of Buddhism

- Simplicity of the teachings of Buddha in local language appealed to people.
- Buddhism rejected elaborate religious customs whereas the practice of orthodox Vedic religion insisted on expensive rituals and sacrifices.
- Buddha's emphasis was on observance of Dhamma**.**
- Buddhist Sanghas played an important role in spreading the messages of Buddha.
- Royal patronage under Ashoka, Kanishka and Harsha also helped the causes of Buddhism.
- Viharas or the Buddhist monasteries became great centres of education. One such centre was Nalanda, where Hiuen Tsang, the Chinese pilgrim, studied for many years.

DO YOU KNOW?

Frescoes (paintings)

Frescoes on the ceilings and walls of the Ajanta caves in Aurangabad, Maharashtra – depict the Jataka Tales.



Middle path – It refers to neither indulging in extreme attachment to worldly pleasure nor committing severe penance.

Jainism and Buddhism- Similarities and Dissimilarities

Similarities	Dissimilarities	
	JAINISM	BUDDHISM
■ Both Mahavira and Buddha hailed from royal families. Yet they renounced royal privileges and chose to adopt an ascetic life. ■ Denied the authority of Vedas. ■ Taught in the language of the common people. ■ Admitted disciples from all the castes and from both the genders ■ Opposed blood sacrifices. ■ Believed in the doctrine of Karma. ■ Emphasized on right conduct and right knowledge instead of performing religious ceremonials and rituals as the means to achieve salvation.	■ It followed extreme path. ■ It remained in India only. ■ It does not believe in the existence of god, but believes soul in every living being.	■ It followed middle path. ■ It spread across many parts of the world. ■ It emphasises on ANATMA (no eternal soul) and ANITYA (impernance).

Buddhist Councils

First	–	Rajagriha
Second	–	Vaishali
Third	–	Pataliputra
Fourth	–	Kashmir

Influence of Buddhism in Tamilnadu

- Buddhism spread to Tamil Nadu much later than Jainism.
- Manimekalai, one of the epics of the post-Sangam age is a Buddhist literature.
- There is an elaborate description about Kanchipuram in classical epic Manimegalai.
- Kanchipuram was a famous Buddhist Centre, from where Dinnaga, the famous Buddhist logician, and Dharmapala, a great scholar of Nalanda University hailed.
- Hieun Tsang who visited Kanchipuram in the seventh century A.D(CE). noticed the presence of 100 feet stupa built by Ashoka there.



Buddha statue at Nagapattinam



Buddha statue found at pallur near Kanchipuram

Jataka Story

The Jatakas are popular stories about the previous birth and life of Buddha, as human and as an animal. They teach morals.



The Woodpecker and the Lion (A Jataka Story)



Once upon a time, there lived a woodpecker and a lion. One day, the lion hunted a big bison and sat down to eat it. It so happened that while having his meal, a big bone got stuck in the lion's throat. He was not able to remove it and was in great pain.



A kind hearted woodpecker offered to help the lion. The woodpecker, however, told the lion that he would only take out the bone if the lion promised not to eat him while removing the bone. The lion gladly agreed and opened his mouth in front of the woodpecker. The woodpecker hopped inside the lion's mouth, and easily pulled out the bone. The lion kept his promise and let the woodpecker fly away.



Soon the lion recovered completely and killed another bison. The woodpecker also thought of joining the lion and asked for a small share of meat. To her utter disappointment the lion blatantly refused to share his meal with her. The Lion said, "How dare you ask me for more favours? I have already done so much for you!"



The woodpecker did not understand what the lion was talking about. The lion then clarified, "You should be thankful to me that I did not devour you when you were taking out the bone from my throat. Now do not expect anything else from me and go away." The woodpecker said to himself, "It was indeed a mistake to help such an ungrateful creature!" Nevertheless, it is not worth being angry or holding grudge against someone as unworthy as him.



Elsewhere in the world 6th Century BC (BCE)

Confucius (Kung Fu Tse)



Confucianism in China

Zoroaster



Zoroastrianism in Persia

Summary

- The Sixth century BC (BCE) was an important period of the intellectual and spiritual development in India.
- Jainism was a doctrine developed by 24 Tirthankaras.
- Mahavira exhorted the three-fold path – Right faith, Right knowledge, Right action.
- Gautama Buddha was the founder of Buddhism.
- Buddha's teachings are referred to as dhamma.
- Buddhism crossed the frontiers of Indian sub-continent but Jainism was confined to India.
- Basic philosophy of Jainism and Buddhism is ahimsa or non-violence

GLOSSARY

Superstitious beliefs	-	belief in things that are not real or possible (மூடநம்பிக்கைகள்)
Preceptor	-	a teacher or instructor (ஆசான்)
Doctrine	-	set of principles or beliefs (கோட்பாடு)
Virtuous	-	having high moral standards (நல்லொழுக்கம்)
Sacred book	-	holy book (புனித நூல்)
Frescoes	-	a painting done in water colour on wet plaster (ஈரமான சுவற்றில் வண்ணக் கலவை கொண்டு வரையப்பட்ட ஓவியங்கள்)
Corpse	-	a dead body (சடலம்)
Nirvana	-	A state of freedom from suffering and rebirth (துன்பம் மற்றும் பிறப்பிலிருந்து விடுதலை / நிர்வாண நிலை)

EXERCISES

I Choose the correct answer:

1. What is the name of the Buddhist scripture?
   a) Angas b) Tripitakas c) Tirukkural d) Naladiyar
2. Who was the first Tirthankara of Jainism?
   a) Rishabha b) Parsava c) Vardhamana d) Buddha
3. How many Tirthankaras were there in Jainism?
   a) 23 b) 24 c) 25 d) 26
4. Where was the third Buddhist Council convened?
   a. Rajagriha b. Vaishali c. Pataliputra d. Kashmir
5. Where did Buddha deliver his first sermon?
   a) Lumbini b) Saranath c) Taxila d) Bodh Gaya

II Match the Statement with the Reason. Tick the appropriate answer:

1. **Statement:** A common man could not understand upanishads.

   Reason: Upanishads were highly philosophical.

   a. Statement and its Reason are correct.
   b. Statement is wrong.
   c. Statement is true, but the Reason for that is wrong.
   d. Both Statement and Reason are wrong.

2. **Statement:** The Jatakas are popular tales.

   Reason: Frescoes on the ceilings and walls of Ajanta caves depict the Jataka Tales.

   a. Statement and its Reason are correct.
   b. Statement is wrong.
   c. Statement is true, but the Reason for that is wrong.
   d. Both statement and Reason are wrong.

3. Find out the correct answer:
   Buddha Viharas are used for
   1. Education
   2. stay of Buddhist monks
   3. Pilgrims' stay
   4. Prayer hall

   a. 2 is correct
   b. 1 and 3 are correct
   c. 1, 2, 4 are correct
   d. 1 and 4 are correct

4. Consider the following statements regarding the causes of the origin of Jainism and Buddhism.

I. Sacrificial ceremonies were expensive.

II. Supertitious beliefs and practices confused the common man.

Which of the above statement (s) is/are correct?

a. Only I

b. Only II

c. Both I & II

d. Neither I nor II

5. Which of the following about Jainism is correct?

a. Jainism denies God as the creator of universe.

b. Jainism accepts God as the creator of universe.

c. The basic philosophy of Jainism is idol worship.

d. Jains accept the belief in Last Judgement.

6. Circle the odd one:

Parsava, Mahavira, Buddha, Rishaba

7. Find out the wrong pair:

a. Ahimsa - not to injure

b. Satya - to speak truth

c. Asteya - not to steal

d. Brahmacharya - married status

8. All the following statements are true of Siddhartha Gautama except:

a. He is the founder of Hinduism.

b. He was born in Nepal.

c. He attained Nirvana.

d. He was known as Sakyamuni.

III Fill in the blanks:

1. The doctrine of Mahavira is called _____.

2. _____ is a state of freedom from suffering and rebirth.

3. _____ was the founder of Buddhism.

4. Thiruparthikundram, a village in Kanchipuram was once called_____..

5. _____ were built over the remains of Buddha's body.

IV True or False:

1. Buddha believed in Karma.

2. Buddha had faith in caste system.

3. Gautama Swami compiled the teachings of Mahavira.

4. Viharas are temples.

5. Emperor Ashoka followed Buddhism.

V Match the following:

1. Angas - Vardhamana
2. Mahavira - monks
3. Buddha - Buddhist shrine
4. Chaitya - Sakya muni
5. Bhikshus - Jain text

VI Answer in one or two sentences:

1. What are the Tri-ratnas (three jewels) of Jainism?
2. What are the two sects of Buddhism?
3. What does Jina mean?
4. Write any two common features of Buddhism and Jainism.
5. Write a note on Buddhist Sangha.
6. Name the Chinese traveler who visited Kancheepuram in seventh century AD(CE).
7. Name the female jain monk mentioned in Silapathikaram.

VII Answer the following:

1. Name the eight-fold path of Buddhism?
2. What are the five important rules of conduct in Jainism?
3. Narrate four noble truths of Buddha?
4. Write any three differences between Hinayana and Mahayana sects of Buddhism?
5. Jainism and Buddhism flourished in Sangam period. Give any two evidences for each.

VIII HOTS:

1. Karma – a person's action. Name any 10 good actions (deeds).

IX Student Activity

1. Read any one story from Jatakas and write a similar story on your own.
2. Make a tabular column in the following headings.

Religion	Name of the founder with picture	Name of their parents	Key Principle (any one)	Sects	Symbol

3. Place the following words in the appropriate column.

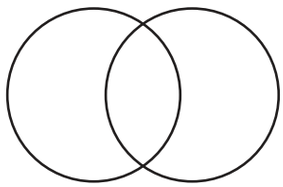
Words: Jina, Mahayana, Tirthankaras, Stupas Nirvana, Digambara, Tripitakas, Agama

Jainism	**Buddhism**

4. Task cards activity:

Make informative cards for the following religions. Hinduism, Christianity, Islam, Buddhism, Jainism

5. Make a Venn diagram to indicate similarities and dis-similarities of Jainism and Buddhism.



6. Solve the puzzle

1	9					■	■	10
2						■	■	
3 8			11				■	
		■	4				■	
		■	5					
			6	■	■	■	■	
		■					7	

Left to right

1. One of the Tri Rathna: Right
2. Buddha's teachings are referred as
3. A great centre of education
4. The place where Buddha attained enlightment
5. Not to injure any living being

Right to left

6. Mother of Siddhartha
7. The Quality of man's life depends on his deed

Top to bottom

8. Lumbini is in
9. Buddhist prayer hall
10. A state of freedom from birth
11. Jain scripture compiled by Gautama Swami.

X. Life Skills

Create a story board for Jainism/Buddhism in a chart

Model.

Early life 	Four Noble Truths	Eight - Fold Path 
Teachings of Buddha 	Buddhist Sangha	Buddhist Sects

XII Answer Grid

The Jain monks who wear white clothes are called Ans: _____	What is the meaning of Buddha? Ans:	Who is the 24th Tirthankara of Jainism? Ans:
Who delivered Dharmachakra Pravartana? Ans:	How many noble truths are there in Buddhism? Ans:	Which religion's teachings include four noble truth and eight-fold path? Ans:
Name the earliest Buddhist literature which deals with the stories of various births of Buddha? Ans:	Name any four places where Jain monasteries were located in Tamil Nadu. Ans:	Name one of the twin Indian's Epics Ans:

ICT CORNER

Virtual Tour of Sittanavasal

Through this activity you will be able to see Virtual Tour about Cave Paintings in Tamil Nadu



Step-1: Open the Browser and type the URL or scan QR code which is given below.
Step-2: You can see Virtual Tour website. Click to allow **"Adobe Flash Player"** on the screen.
Step-3: Open **"slide view"** in menu bar and acces s control button
Step-4: Click **"Red Arrow Button"** you can see cave paintings



Step-1



Step-2



Step-3



Step-4

URL:

http://view360.in/virtualtour/sithannavasal/

*Pictures are indicatives only.

www.tnschoolbooks.in

Unit 3

From Chiefdoms to Empires



Learning Objectives

- To know the factors responsible for the rise of Janapadas and Mahajanapadas.
- To understand the evolution of Indian polity from Chiefdoms to Kingdoms.
- To recall the greatness of Mauryan Empire.
- To learn the main features of the administration and the nature of the society & economy during that time.
- To gain the knowledge on Ashoka's policy of Dhamma.
- To examine the causes for the decline of Mauryan Empire.

Importance of Sixth Century BC (BCE)

During the sixth Century BC (BCE) many territorial states emerged. This Led to the transformation of socio – economic and political life of the people in the Gangetic plains. A new intellectual awakening began to develop in northern India. Mahavira and Gautama Buddha represented this new awakening.

Role of iron in a changing society

Iron played a significant role in this transformation of society. The fertile soil of the Gangetic Valley and the use of iron ploughshares improved agricultural productivity. In addition, iron facilitated craft production. Agrarian surplus and increase in craft products resulted in the emergence of trading and exchange centres. This in turn paved the way for the rise of towns and cities. Thus, knowledge in the use of iron gave Magadha an advantage over other Mahajanapadas. Thus the Magadha could establish an empire of its own.

Gana - sanghas and Kingdoms

There were two kinds of government in north India during the sixth century BC (BCE)

- Gana - sanghas – non monarchical states.
- Kingdoms - monarchies

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The term '**gana**' means 'people of equal status'. 'Sangha' means 'assembly'. The gana - sanghas covered a small geographical area ruled by an elite group. The gana sanghas practiced egalitarian traditions.

A '**kingdom**' means a territory ruled by a king or queen. In a kingdom (monarchy), a family, which rules for a long period becomes a dynasty. Usually these kingdoms adhered to orthodox Vedic traditions.

Janapadas and Mahajanapadas

Janapadas were the earliest gathering places of men. Later, Janapadas became republics or smaller kingdoms**.** The wide-spread use of iron in Gangetic plain created conditions for the formation of larger territorial units transforming the janapadas into Mahajanapadas.

Sixteen Mahajanapadas ("Great Countries")

Sixteen Mahajanapadas dotted the Indo-Gangetic plain in the sixth century BC (BCE). It was a transition from a semi – nomadic kinship - based society to an agrarian society with networks of trade and exchange. Hence an organized and a strong system of governance required a centralised state apparatus.

DO YOU KNOW?

16 Mahajanapadas

Kuru, Panchala, Anga, Magadha, Vajji, Malla, Kasi, Kosala, Avanti, Chedi, Vatsa, Machcha, Surasena, Assaka, Gandhara and Kamboja.

There were four major Mahajanapadas

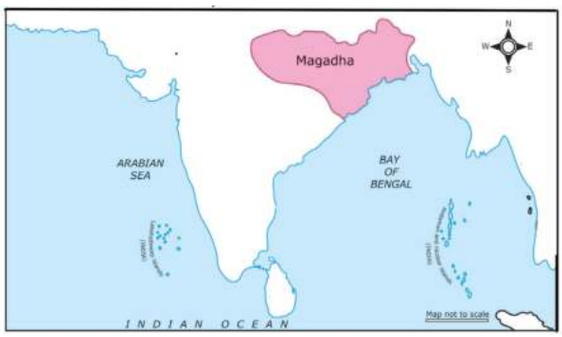
They were:

- Magadha in Bihar
- Avanti in Ujjain
- Kosala in Eastern Uttar Pradesh and
- Vatsa in Kausambi, Allahabad.

Among the four Mahajanapadas, Magadha emerged as an empire.

The Causes for the Rise of Magadha

- Magadha was located on the lower part of the Gangetic plain. The plain was fertile which ensured the rich agricultural yield. This provided regular and substantial income to the state.
- The thick forests supplied timber for construction of buildings and elephants for army.
- Abundance of natural resources especially iron enabled them to equip themselves with weapons made of iron.
- Growing trade and commerce facilitated movement of people as well as settlement of people in centres of arts and crafts.
- The outcome was urbanization and emergence of Magadha as an empire.



Magadha Empire

Dynasties of Ancient Magadha

Four dynasties ruled over Magadha Empire.

- The Haryanka dynasty
- The Shishunaga dynasty
- The Nanda dynasty
- The Maurya dynasty

Haryanka Dynasty

Magadha's gradual rise to political supremacy began with Bimbisara of Haryanka dynasty.

Bimbisara extended the territory of Magadhan Empire by conquests and by matrimonial alliances with Lichchhavis, Madra and Kosala. His son Ajatasatru, a contemporary of Buddha, convened the first Buddhist Council at Rajagriha. Udayin, the successor of Ajatasatru, laid the foundation of the new capital at Pataliputra.

Shishunaga Dynasty

Haryanka dynasty was succeeded by the Shishunaga dynasty. Kalasoka, a king of Shishunaga dynasty, shifted the capital from Rajagriha to Pataliputra. He convened the second Buddhist Council at Vaishali.

Nanda Dynasty

Nandas were the first empire builders of India. The first Nanda ruler was Mahapadma. Mahapadma Nanda was succeeded by his eight sons. They were, known as Navanandas (nine Nandas). Dhana Nanda, the last Nanda ruler, was overthrown by Chandragupta Maurya.

DO YOU KNOW?

Nalanda - UNESCO World Heritage Site.

Nalanda was a large Buddhist monastery in ancient kingdom of Magadha. It became the most renowned seat of learning during the reign of Guptas. The word Nalanda is a Sanskrit combination of three words Na + alam + daa meaning "no stopping of the gift of knowledge".

Mauryan Empire

Sources

Archaeo-logical sources	Punch Marked Coins.
Inscriptions	Edicts of Ashoka, Junagath Inscription
Secular Literature	Kautilya's Arthasastra Visakadatta's Mudrarakshasa Mamulanar's poem in Agananuru
Religious Literature	Jain, Buddhist texts and Puranas
Foreign Notices	Dipavamsa, Mahavamsa and Indica

DO YOU KNOW?

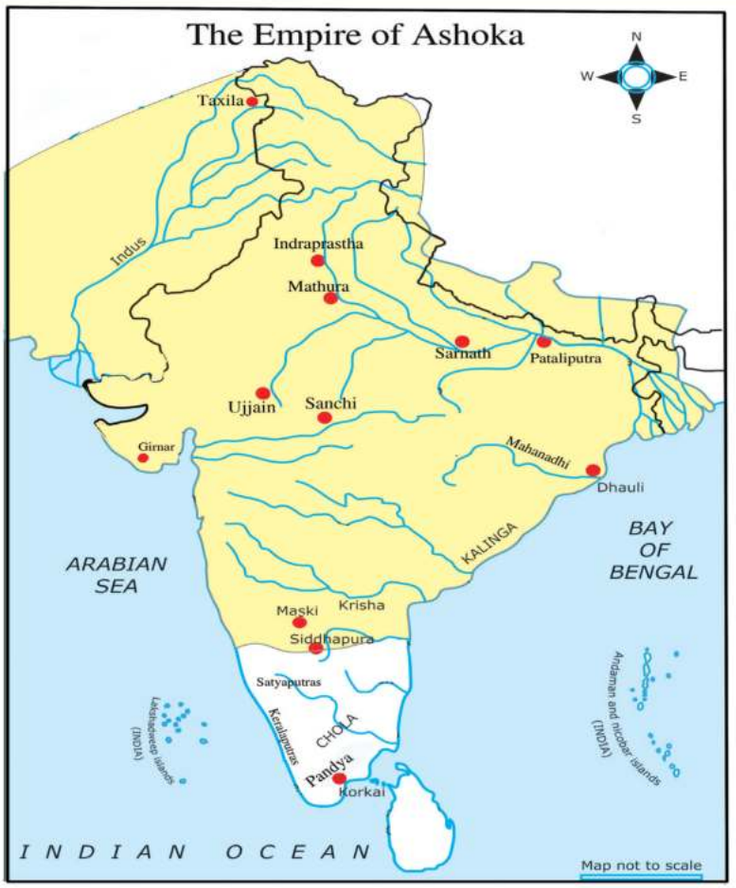
Megasthenese

He was the ambassador of the Greek ruler, Seleucus, in the court of Chandra Gupta. He stayed in India for 14 years. His book *Indica* is one of the main sources for the study of Mauryan Empire.

Mauryan Empire – India's First Empire

Capital	Pataliputra (present day Patna, Bihar)
Government	Monarchy
Historical era	c. 322 BC (BCE) – 187 BC (BCE)
Important Kings	Chandragupta, Bindusara, Ashoka

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DO YOU KNOW?

Grandeur of Pataliputra

The great capital city in the Mauryan Empire, which had 64 gates to the city with 570 watch towers.

Chandragupta Maurya

The Mauryan Empire was the first largest empire in India. Chandragupta Maurya established the empire in Magadha.

Bhadrabahu, a Jain monk, took Chandragupta Maurya to the southern India.

Chandragupta performed *Sallekhana* (Jaina rituals in which a person fasts unto his death) in Sravanbelgola (Karnataka).

Bindusara

Real name of Bindusara was Simhasena. He was the son of Chandragupta Maurya. Greeks called Bindusara as Amitragatha, meaning 'slayer of enemies'. During Bindusara's reign Mauryan Empire spread over large parts of India. He appointed his son Ashoka as a governor of Ujjain. After his death, Ashoka ascended the throne of Magadha.

Ashoka

Ashoka was the most famous of the Mauryan kings. He was known as 'Devanam Piya' meaning 'beloved of the Gods'.

Ashoka fought the Kalinga war in 261 BC (BCE). He won the war and captured Kalinga.

The horror of war was described by the king himself in the **Rock Edict XIII.**

"Ashoka shines and shines brightly like a bright star, even unto this day"

- H. G. Wells , Historian

DO YOU KNOW?

Lion Capital of Ashoka

The Emblem of the Indian Republic has been adopted from the Lion Capital of one of Ashokas pillars located at Sarnath. The wheel from the circular base, the Ashoka Chakra is a part of the National Flag.



Chandasoka (Ashoka, the wicked) to Dhammasoka (Ashoka the righteous)

After the battle of Kalinga, Ashoka became a Buddhist. He undertook tours (Dharmayatras) to different parts of the country instructing people on policy of Dhamma. The meaning of Dhamma is explained in Ashoka's – Pillar Edict II

It contained the noblest ideas of humanism, forming the essence of all religions.

He laid stress on

- Compassion
- Charity
- Purity
- Saintliness
- Self-control
- Truthfulness
- Obedience and respect for parents, preceptors and elders.

Ashoka sent his son Mahinda and Sanghamitta to Srilanka to propagate Buddhism. He also sent missionaries to West Asia, Egypt, and Eastern Europe to spread the message of Dhamma. The *Dhamma-mahamattas* were a new cadre of officials created by Ashoka. Their job was to spread dhamma all over the empire. Ashoka held the third Buddhist Council at his capital Pataliputra.

Edicts of Ashoka

C0A4I

The 33 Edicts on the pillars as well as boulders and cave walls made by the Emperor Ashoka, describe in detail Ashoka's belief in peace, righteousness, justice and his concern for the welfare of his people.

DO YOU KNOW?

An Edict is an official order or proclamation issued by a person in authority or a king.

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DO YOU KNOW?

The script of the inscriptions

At Sanchi – Brahmi

At Kandahar – Greek and Aramaic

At North Western part – Kharoshthi

The Rock Edicts II and XIII of Ashoka refer to the names of the three dynasties namely Pandyas, Cholas, the Keralaputras and the Sathyaputras.

Mauryan Administration

Centralized administration

King

- The king was the supreme and sovereign authority of the Mauryan Empire.
- Council of ministers known as *mantriparishad* assisted the King. Assembly of ministers included a Purohit, a Senapathi, a Maha mantri and the Yuvaraja.
- King had an excellent spy system.

Revenue system

- The land was the most important source of revenue for the state. Ashokan inscription at Lumbini mentions *bali and bagha* as taxes collected from people. The land tax (bhaga) collected was 1/6 of the total produce.
- Revenue from taxes on forests, mines, salt and irrigation provided additional revenue to the government.
- Much of the State revenue was spent on paying the army, the officials of the royal government, on charities and on different public works such as irrigation project, road construction etc.

Judicial System

- The king was the head of the Judiciary. He was the highest court of appeal.
- King appointed many judges subordinate to him. The punishments were harsh.

Military Administration

The king was the supreme commander of the army.

A board of 30 members divided into six committees with five members on each, monitored

- Navy
- Armoury (transport and supply)
- Infantry
- Cavalry
- The war chariots
- The war elephants

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Municipal Administration (Cities and Towns)

- Board of 30 members divided into six committees. Each had 5 members to manage the administration of the city.
- Town administration was under Nagarika. He was assisted by Sthanika and Gopa.

DO YOU KNOW?

The Junagarh / Girnar Inscription of Rudradaman records that the construction of a water reservoir known as Sudarshana Lake was begun during the time of Chandragupta Maurya and completed during Ashoka's reign.

Currency

Money was not only used for trade; even the government paid its officers in cash.

The punch marked silver coins (panas) which carry the symbols of the peacock, and the hill and crescent copper coins called *Mashakas* formed the imperial currency.

Trade and Urbanization

Trade flourished particularly with Greece (Hellenic) Malaya, Ceylon and Burma. The Arthasastra refers to the regions producing specialized textiles – Kasi (Benares), Vanga(Bengal), Kamarupa (Assam) and Madurai in Tamilnadu.

Main Exports	Main Imports
Spices	Horses
Pearls	Gold
Diamonds	Glassware
Cotton textiles	Linen
Ivory Works	
Conch Shells	



Mauryan coins

Mauryan Art and Architecture

Mauryan art can be divided into two

TXSMU

Indigenous Art – Statues of Yakshas and Yakshis

Royal Art – Palaces and Public buildings
– Monolithic Pillars
– Rock cut Architecture
– Stupas

DO YOU KNOW?

Yakshas were deities connected with water, fertility, trees, the forest and wilderness. **Yakshis** were their female counterpart.



Statues of Yaksha and Yakshi

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Stupas



Sanchi near Bhopal, MP

A Stupa is a semi – spherical dome like structure constructed on brick or stone. The Buddha's relics were placed in the centre of the dome.

Monolithic Pillar – Sarnath

The crowning element in this pillar is Dharma chakra.



Monolithic Pillar – Sarnath

Beginning of Rock cut Architecture

Rock – Cut Caves of Barabar and Nagarjuna Hills



Lomas Rishi cave, Barabar

There are several caves to the north of Bodh Gaya. Three caves in Barabar hills have dedicative inscription of Ashoka. And three in Nagarjuna hills have inscriptions of Dasharatha Maurya (grand son of Ashoka).

Reasons for the Decline of the Mauryan Empire

- Ashoka's successors were very weak.
- Continuous revolts in different parts of the empire.
- Invasion by the Bactrian Greeks weakened the empire.
- Last Maurya ruler Brihadratha was killed by his commander Pushyamitra Sungha who established Sungha dynasty.

Ancient name	Its Modern name
Rajagriha	Rajgir
Pataliputra	Patna
Kalinga	Odisha

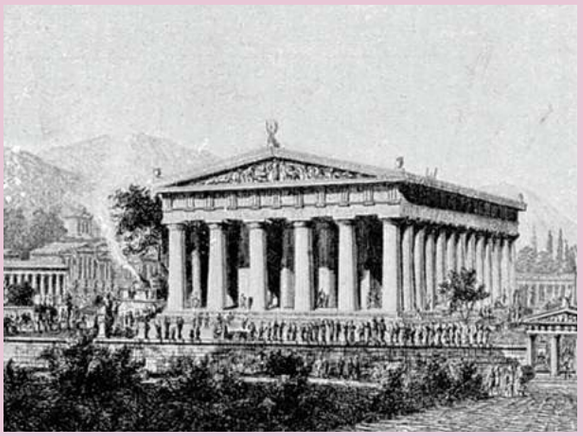
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Elsewhere in the world



The Great Wall of China

It is an ancient series of fortification. During third century BC (BCE) emperor Qin-Shi Huang linked these walls on Northern border to protect his empire.



Temple of Zeus at Olympia

An ancient temple in Olympia, Greece, dedicated to the god Zeus, constructed during fifth century BC (BCE), It is one of the seven wonders of the ancient world.

Summary

- Sixth century BC (BCE) forms an important landmark as it witnessed the emergence of sixteen Mahajanapadas.
- Among the sixteen Mahajanapadas, Magadha emerged as an empire.
- Magadha was ruled by four dynasties- The Haryanka, the Shishunaga, the Nanda and the Maurya dynasty.
- Chandragupta Maurya established the Mauryan empire.
- Ashoka was the most famous of the Mauryan kings.
- Ashoka's pillar and Rock Edicts enlighten us on his ideas of Dhamma.

GLOSSARY

Egalitarian – a person who advocates the principle of equality for all. (சமத்துவம்)

Monastery – a building in which monks live and worship. (மடாலயம்)

Treatise – a written work dealing systematically with a subject. (ஆய்வுக்கட்டுரை)

Horror – a feeling of fear and anxiety (பேரச்சமும் நடுக்கமும்)

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EXERCISES

ZG1OP

I Choose the correct answer:

1. The Kingdom which was most powerful among the four Mahajanapadas
   a) Anga b) Magadha c) Kosala d) Vajji
2. Among the following who was the contemporary of Gautama Buddha?
   a) Ajatasatru b) Bindusara c) Padmanabha Nanda d) Brihadratha
3. Which of the following are the sources of Mauryan period?
   a) Artha Sastra b) Indica c) Mudrarakshasa d) All
4. Chandra Gupta Maurya abdicated the thrown and went to Sravanbelgola along with Jaina Saint _____.
   a) Badrabahu b) Stulabahu c) Parswanatha d) Rushabhanatha
5. _____ was the ambassador of Seleucus Nicator.
   a) Ptolemy b) Kautilya c) Xerxes d) Megasthenese
6. Who was the last emperor of Mauryan Dynasty?
   a) Chandragupta Maurya b) Ashoka
   c) Brihadratha d) Bindusara

II Match the statement with the reason/Tick the appropriate answer:

1. Statement (A) Ashoka is considered as one of India's greatest rulers.
   Reason (R) He ruled according to the principle of Dhamma.
   a. Both A and R are true and R is the correct explanation of A.
   b. Both A and R are true but R is not the correct explanation of A.
   c. A is true but R is false.
   d. A is false but R is true.
2. Which of the statements given below is/are correct?
   Statement 1 Chandragupta Maurya was the first ruler who unified entire India under one political unit.
   Statement 2 The Arthashastra provides information about the Mauryan administration
   a. only 1 b. only 2 c. both 1 and 2 d neither 1 nor 2
3. Consider the following statements and find out which of the following statement(s) is/are correct.
   1) Chandragupta Maurya was the first king of Magadha.
   2) Rajagriha was the capital of Magadha.
   a. only 1 b. only 2 c. both 1 and 2 d. neither 1 nor 2

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4. Arrange the following dynasties in chronological order.
   a. Nanda – Sishunaga – Haryanka – Maurya
   b. Nanda – Sishunaga –Maurya – Haryanka
   c. Haryanka - Sishunaga – Nanda - Maurya
   d. Sishunaga – Maurya – Nanda – Haryanka

5. Which of the following factors contributed to the rise of Magadhan Empire?
   1) Strategic location
   2) Thick forest supplied timber and elephant
   3) Control over sea
   4) Availability of rich deposits of iron ores
      a. 1, 2 and 3 only
      b. 3 and 4 only
      c. 1, 2 and 4 only
      d. All of these

III Fill in the blanks:

1. _____ was the earliest capital of Magadha.
2. Mudrarakshasa was written by _____.
3. _____ was the son of Bindusara.
4. The founder of the Maurya Empire was _____.
5. _____ were appointed to spread Dhamma all over the empire.

IV State True or False:

1. The title Devanam Piya was given to Chandragupta Maurya.
2. Ashoka gave up war after his defeat in Kalinga.
3. Ashoka's Dhamma was based on the principle of Buddhism.
4. The lions on the currency notes is taken from the Rampurwa bull capital.
5. Buddha's relics were placed in the centre of the Stupas.

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V Match the following:

a. Gana	1. Arthasastra
b. Megasthenese	2. religious tours
c. Chanakya	3. people
d. Dharmayatras	4. Indica

a.	3	4	1	2
b.	2	4	3	1
c.	3	1	2	4
d.	2	1	4	3

VI Answer in one or two sentences:

1. Mention any two literary sources of Mauryan period.
2. What is a stupa?
3. Name the dynasties of Magadha.
4. What were the sources of revenue during Mauryan period?
5. Who assisted Nagarika in the administration of towns?
6. What do you know from the Rock Edicts II and XIII of Ashoka?
7. Which classical Tamil poetic works have the reference of Mauryans?

VII Answer the following:

1. What did Ashoka do to spread Buddhism? (Write any three points)
2. Write any three causes for the rise of Magadha.

VIII HOTS

1. Kalinga war became a turning point in Ashoka's life. How?
2. Write any five welfare measures you would do if you were a king like Ashoka?

IX Picture study

This is the picture of an Ashokan edicts.

a. What are edicts?
b. How are Ashokan edicts useful?
c. Where were these edicts inscribed?
d. Name the script used in Sanchi Inscription.
e. How many Rock Edicts are there?



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X Who am I

1. I belonged to Haryanka dynasty. I extended territory by matrimonial alliances. My son is Ajatasatru – who am I?
2. I played a significant role in the transformation of society. I am used in making ploughshare - Who am I?
3. I was known as Devanampiya. I embraced the path of peace - Who am I?
4. I established the first largest empire in India. I performed Sallekhana. Who am I?
5. I am found in the Lion capital of Ashoka. I am at the centre of our national flag. Who am I?

XI Decipher the code – The Mauryan Empire.

A	B	C	D	E	F	G	H	I	J	K	L	M
1	2	3	4	5	6	7	8	9	10	11	12	13
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
14	15	16	17	18	19	20	21	22	23	24	25	26

1. The first dynasty that ruled over Magadha was _____ (8, 1, 18, 25, 1, 14, 11, 1).
2. _____ empire was the first largest empire (13, 1, 21,18, 25, 1).
3. _____ laid the foundation of the new capital at Pataliputra (21, 4, 1, 25, 9, 14).
4. _____ was one of the main exports (19, 16, 9, 3, 5, 19).
5. _____ became later the most renowned seat of learning (14, 1, 12, 1, 14, 4, 1).
6. Revenue from agricultural produce was called _____ (2, 8, 1, 7, 1).
7. The horror of war was described in _____ (18, 15, 3, 11, 5, 4, 9, 3, 20)
8. Greeks called Bindusara as _____ (1, 13, 9, 20, 18, 1, 7, 1, 20, 8, 1)
9. The crowning element in Saranath Pillar is _____ (4, 8,1, 18, 13, 1, 3, 8, 1, 11, 18, 1)
10. Council of ministers were known as _____ (13, 1, 14, 4, 18, 9, 16, 1, 18, 9, 19, 8, 1, 4)

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XII Activity

1. Field trip to Museum
2. Movie show – about Ashoka and Chandragupta.

XIII Map Work

1. Mark the extent of Ashokan Empire.
2. Mark the following places on the river map of India

a. Taxila b. Pataliputra c. Ujjain d. Sanchi e. Indraprastha

XIV Life Skill

1. Make a model of Ashoka Chakra.
2. Make a model of Sanchi Stupa.
3. Draw and colour our National Flag.

XV Answer Grid

Name the two kinds of government in North India during 6th century B.C (BCE) **Ans:**	Who conducted second Buddhist council at Vaishali? **Ans:**	What is the modern name for Kalinga? **Ans:**
Town was administrated by_____ **Ans:**	Where was the third Buddhist council convened by Ashoka? **Ans:**	Name any two major Mahajanapadas. **Ans:**
Which inscription records the construction of Sudarshana lake? **Ans:**	Who was the last Nanda ruler? **Ans:**	Name the silver coin which were in use during Maurian period? **Ans:**

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ICT CORNER

Histroy from Chiefdoms to Empires



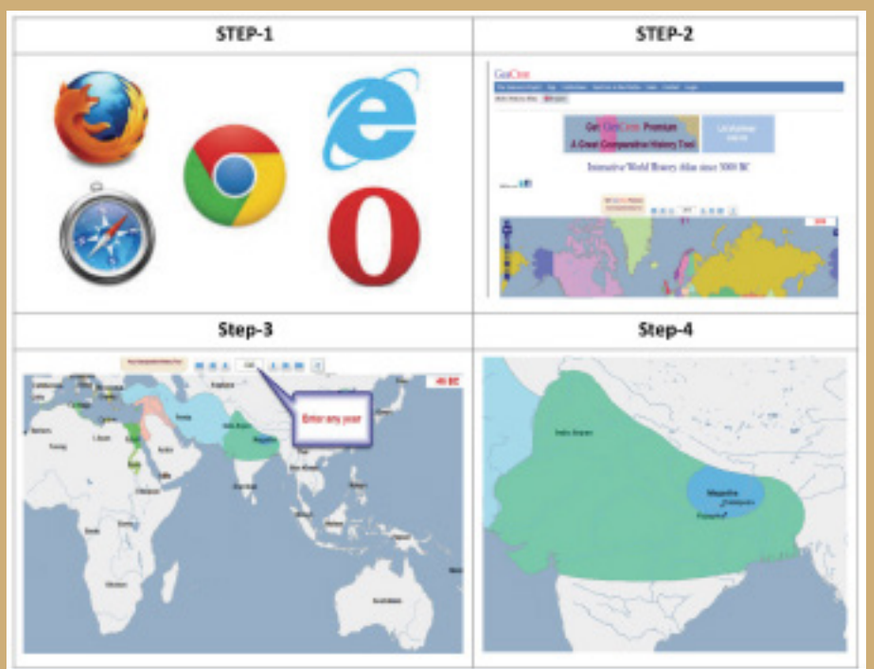
This activity for Maps based on Vector database is a INTERACTIVITY ATLAS which helps to know about Comparative History, Political, Military, Art, Science, Literature, Religion and Philosophy in the world.

Step – 1: Open the Browser and type the URL given (or) Scan the QR Code.

Step - 2 : World History Atlas page will appear.

Step-3 : You will enter any kingdom period or political period (ex. Magadha Empire).

Step-4 : You will get vector database map.



URL

http://geacron.com/home-en/

AJQC4

*Pictures are indicatives only.

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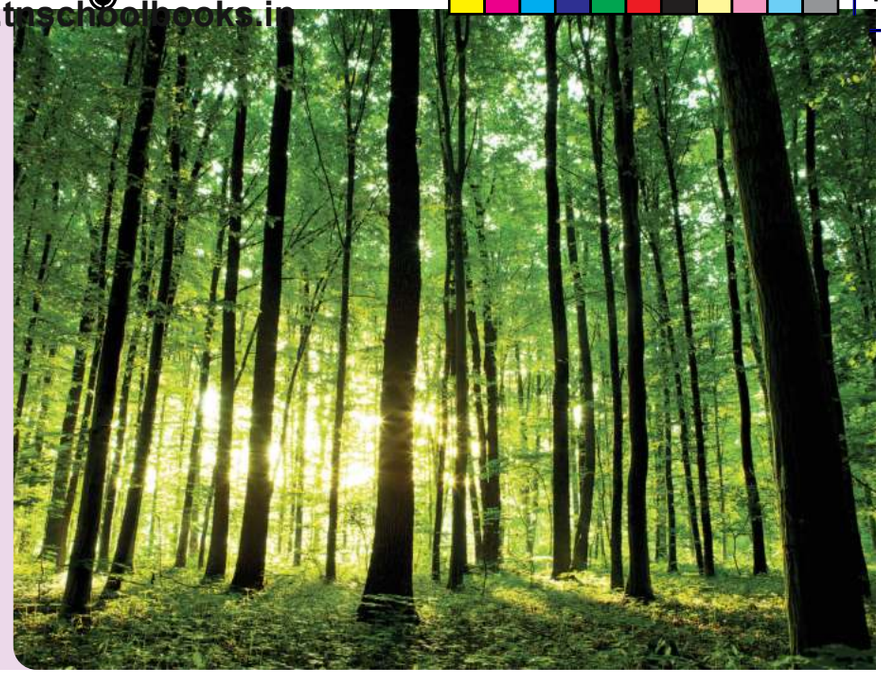
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GEOGRAPHY

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Unit 1

RESOURCES



Learning Objectives

- To introduce the meaning of resources
- To familiarize with the different types of resources
- To understand the need for conservation of resources
- To understand the meaning of economic activities.

RG158

Pathway

This lesson focuses on the meaning, classification of resources and conservation of resources for sustainable living. It also provides an insight to the various economic activities and in particular it deals with the inter relation between the nature and human activities.

கேடறியாக் கெட்ட இடத்தும் வளங்குன்றா
நாடென்ப நாட்டின் தலை– குறள் 736

எந்த வகையிலும் கெடுதலை அறியாமல், ஒருவேளை கெடுதல் ஏற்படினும் அதனை சீர்செய்யுமளவிற்கு வளங்குன்றா நிலையில் உள்ள நாடுதான் நாடுகளிலேயே தலை சிறந்ததாகும்.

Kuzhali was lying in her bed to see if her father would enter her room. She wanted her report card to be signed. There was no symptom of coming of her father. She jumped out of her bed and ran to her mother in the kitchen.

Kuzhali: Amma where is Appa?

Amma: Today he has 'overtime' and he has left early.

Kuzhali: "Overtime" what is that?

Amma: Working more hours than the actual working hours is called overtime. Your father's boss wants him to manufacture a few more solar panels because they have some urgent orders.

Kuzhali: He should have told me last night. My progress report has to be signed.

Amma: Enough of that. Now go have your bath. I'll sign your report this time.

Kuzhali: Amma, thank you ma. One more question. What does he make the solar panels from?

Amma: Let me explain for you to understand. Silicon, extracted from sand, a natural resource, is used in making PV cells. It convert solar energy into electrical energy.

Kuzhali: Natural resource, what do you mean by it?

Amma: All things useful to man is resource. And if it is directly from nature we call it natural resource.

Kuzhali: Then what kind of work does father do?

Amma: He is a manufacturer of things by using natural resources.

Kuzhali: Can we called the manufactured goods as man made resources?

Amma: Yes, they are called as man made resources.

Kuzhali: Ok amma. It's getting late. Let me get ready.

Activity: 1

Circle the words which are not associated for gardening. Soil, Seeds, A piece of Land, Computers, Saplings, Flower Pots, Manure, Textbooks.

Resource is anything that fulfills human needs. When anything is of some use it becomes valuable. All resources have **value**. The value can be either **commercial** or **non-commercial**. **Commercial resources** have great economic value. (e.g.) Petroleum. The **Non-commercial resources** are very abundant in availability (e.g.) Air.

HOTS:

Do all the items in your shopping list have commercial value?



Anything becomes a resource only when its use is discovered. The needs of human beings are ever changing. According to the ever changing needs, resources keep changing. **Time** and **Technology** are two important factors that determine whether a substance is a resource or not. for example: Sun's energy to generate electricity was made possible after the invention of solar panels (technology); and the receding of coal and petrol was in need of an inexhaustible resource (time).



HOTS:

Is the tilt of the solar panels same everywhere on Earth?

Resources can be **natural**, **man-made** and **human resources**.

TYPES OF RESOURCES

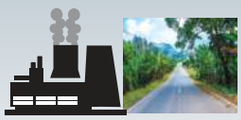
Natural Resources

PRIMARY
eg. Hunting, Forest



Man Made Resources

SECONDARY
eg. Sugar factory, Road



Human Resources

TERTIARY
eg. School, Scientist



Based on Origin

BIOTIC
eg. Trees



ABIOTIC
eg. Water



Based on Development

ACTUAL
eg. Lignite



POTENTIAL
eg. Wind Energy



Based on Renewability

RENEWABLE
eg. Solar



NON-RENEWABLE
eg. Coal



Based on Distribution

UNIVERSAL
eg. Water



LOCALIZED
eg. Kangaroo



Based on Ownership

INDIVIDUAL
eg. House



COMMUNITY
eg. Pond



NATIONAL
eg. Rivers



INTERNATIONAL
eg. Ambergris



1.NATURAL RESOURCES:

All resources that have been directly provided by nature are called **Natural resources**. The air, water, soil, minerals, natural vegetation and wild life around us are all natural resources. The use of any natural resource depends on the place it is available, the form in which it is available and the technology necessary to avail it.



Sun

CLASSIFICATION OF NATURAL RESOURCES

Natural resources can be classified into different groups depending on **origin, development, renewability, distribution, ownership etc**.

A.ON THE BASIS OF ORIGIN:

On the basis of **origin,** resources can be classified into biotic and abiotic resources.

i. All living resources are biotic resources, plants, animals and other micro organisms are **biotic resources**.



ii. **Abiotic resources** are non-living things. Land, water, air and minerals are abiotic resources.

The biotic resources were mere substances till they were recognized by humans. According to the human needs the substances were collected by the ancient men and preserved for use. In the beginning ,man had only three basic needs- food, clothing and shelter. He collected things through **primary activities** such as hunting, food gathering, fishing and forestry. Later when food became scarce, they had to cultivate and that became agriculture and the cattle were also reared on their farms to fulfill their basic needs.



The abiotic resources were also sought after by the early men. They went in search of better landforms where they had enough water resources for agriculture and their cattle. They were in need of tools right from hunting to agriculture. Primarily the tools were only made of stones. Later man dug the earth for better abiotic resources and found copper first and iron later. He also mined precious metals simultaneously for making ornaments. Later mining became one of the leading primary activities and still holds an important place among the economic activities.

B.ON THE BASIS OF DEVELOPMENT:

Based on the **level of development**, resources can be divided into actual and potential resources.

i. **Actual resources** are resources that are being used and the quantity available is known. (e.g.) Coal at Neyveli.

ii. **Potential resources** are resources that are not being used in the present and its quantity and location are not known. The technology to extract such resources is also yet to be developed. (e.g.) Marine yeast found in the Bay of Bengal and Arabian Sea.



Marine yeast have greater potential than the terrestrial yeast. They can be used in baking, brewing, wine, bio-ethanol and pharmaceutical protein production.

C. ON THE BASIS OF RENEWABILITY:

On the basis of **renewability** resources can be classified as renewable resources and non-renewable resources.

i. Resources once consumed can be renewed with the passage of time are called **renewable resources**. (e.g.) Air, Water, Sunlight. Misuse of such resources can also limit its available quantity. So, they have to be used wisely.

ii. The resources which cannot be immediately renewed once they are depleted are called **non-renewable** resources. They become exhausted after use and the time they take to replace does not match the life cycle. (e.g.) Coal, petroleum, natural gas and other minerals.

HOTS:

Find out what other resources can renew themselves?



Neyveli lignite corporation

The resources which cannot renew themselves are either scarce or totally absent. So man is in search of new resources and is conducting several researches. He confirms that a substance is a resource only after research. He tries to harness it and also searches the regions where it may be found in. They are potential resources. Wind energy is one such example. The places where the wind energy can be utilized are still unknown.



Wind energy

HOTS:

How did coal originate?

D.ON THE BASIS OF DISTRIBUTION:

On the basis of distribution, resources can be classified into **localized resources** and **universal resources.**

i. When resources are present in specific regions they are called **localized resources**. (e.g.) Minerals.

ii. Some resources are present everywhere Such resources are called **universal resources**. (e.g.) Sunlight and air.

Activity: 2

Which region / continent does each of these animals belong to?







E.ON THE BASIS OF OWNERSHIP:

Based on **ownership** resources can be classified into Individual resources, Community-owned resources, National resources and International resources.

i. **Individual resources** are resources privately owned by individuals. (e.g.) Farmland.

ii. **Community-owned resources** are resources which can be utilised by all the members of the community. (e.g.) Public parks.



Farmland

iii. **National resources** are resources within the political boundaries and oceanic area of a country. (e.g.) Tropical forest regions of India.



DO YOU KNOW?

Tropical rain forests are called the 'World's largest Pharmacy' as 25% of the natural vegetation are medicinal plants. (e.g.) Cinchona.

iv. **International resources** are all oceanic resources found in the open ocean. Resources found in this region can be utilized only after an international agreement. (e.g.) Ambergris.

DO YOU KNOW?

Ambergris is an extract from the sperm whale. A pound (0.454kg) of sweet – smelling ambergris is worth US $63,000 and used in perfume industries.



Ambergris

2. MAN-MADE RESOURCES:

Natural resources are modified or processed by technology into **man-made resources.** (e.g.) sugarcane processed to get sugar. All structures built by man can also be called man-made resources. (e.g.) Bridges, Houses, Roads.

Activity: 3

What natural resources are necessary to lay a road?

This transforming of raw materials into finished goods is called **Secondary Activities**. Man's skills and ideas are the basic requirements for these activities.

3.HUMAN RESOURCE:

Human resources are groups of individuals who use nature to create more resources. Though human beings are basically natural resources, we classify



Man-Made resources

human beings separately. Education health, knowledge and skill have made them a valuable resource. (e.g.) Doctors, Teachers, Scientists. Tertiary activities are basically concerned with the distribution of primary and secondary products through a system of transport and trade (e.g) Banking, Trade and Communications. The quantity and quality of institutions and organizations involved in making the professionals decide the human resource of a country.

R8D57

Activity:

Identify the personalities and professionals








Gandhian thought on Resources:



There is enough for everybody's need and not for anybody's greed. Mahatma Gandhi blamed "human beings" for depletion of resources because of

(i) over exploitation of resources
(ii) Unlimited needs of human beings. So, conservation is very important.

Resource planning / Management

Resource planning is a technique or skill of proper utilization of resources. Resource planning is necessary because

(i) Resources are limited, their planning is quite necessary so that we can use them properly and at the same time we can save them for our future generation.
(ii) Resources are not only limited but also they are unevenly distributed over the different parts of the World.
(iii) It is essential for the production of resource to protect them from over exploitation.

CONSERVATION OF RESOURCES:

Careful use of resources is called **conservation of resources.** Resources are being used at a very fast rate due to the rapid increase in population. So, natural resources are depleting fast; wisely using resources can control the depleting ratios.

Development is necessary without affecting the needs of the future generations. If the present needs of resources are met and the conserving of resources for the future are balanced, we call it **sustainable development**. Sustainable development can take place when

(i) The reasons of depletion are identified.
(ii) Wastage and excess consumption is prevented.
(iii) Reusable resources are recycled.
(iv) Pollution is prevented.
(v) Environment is protected.
(vi) Natural vegetation and wild life are preserved.
(vii) Alternative resources are used.

The easiest way to conserve resources is to follow the '3R's: **Reduce**, **Reuse** and **Recycle**.



RECAP

- Anything that fulfills human needs can be called a resource.
- Resources provided directly by nature are natural resources.
- All living things are biotic resources.
- All non-living things are abiotic resources.
- Collection of resources directly from nature is called primary activities.
- Actual resources are being used at present.
- Potential resources are not utilized at present.

- After consumption, resources can be renewed with the period of time is called renewable resources.
- The resources which cannot be immediately renewed once they are depleted are called non-renewable resources.
- Resources that found everywhere are Universal resources.
- Resources found in specific regions are called localized resources.
- Natural resources when processed to meet man's needs are called man-made resources.
- People are also referred to as resources.
- Tertiary activities are those which render services to production and distribution of goods.
- Careful use of resources is conservation of resources.
- When the present population's needs are fullfilled; the future generation's needs will be met without damaging the environment ,sustainable development take place.

GLOSSARY

1. Manufacture – production.
2. Solar panel – A plate that can absorb solar energy.
3. PV cells – Photo voltic cells
4. Localized – Limited to specific areas.
5. Universal – found everywhere.
6. Open ocean – areas of ocean that does not belong to any country.
7. Depleting – reducing.
8. Conservation – saving for future use.
9. Sustainable – able to be maintained.
10. Tertiary – third level.

9PLDO

Exercises

A) Match the following.

A	B
Natural resource	Minerals
International resource	Sustainable development
Reduce, Reuse, Recycle	Air
Non-renewable	Manufacturing
Universal resource	Ambergris
Secondary activities	Forest

B) Fill in the blanks.

1. Sugarcane is processed to make _____.
2. Conservation of resources is _____ use of resources.
3. Resources which are confined to certain regions are called _____.
4. _____ resources are being used in the present.
5. _____ resources are the most valuable resources.
6. Collection of resources directly from nature is called _____.

C) Write short notes on the following.

1. Renewable resources.
2. Human resources.
3. Individual resources.
4. Tertiary activities

D) Give brief answers for the following.

1. What are resources?
2. What are actual resources?
3. Define abiotic resources.
4. What is sustainable development?

E) Give short answers for the following questions.

1. Differentiate universal and localized resources.
2. Though human beings are natural resources, why are they classified separately?
3. Compare national and international resources.
4. What is the difference between man-made resources and human resources?
5. Write the Gandhian thought on conservation of resources.

F) Give detailed answers for the following questions. (100-120 words)

1. How are natural resources classified? Explain any three with examples.
2. How can resources be conserved?
3. What is resource planning and why is it necessary?
4. Explain the primary, secondary and tertiary activities.

G) Statements and inferences.

1. **Statement:** Solar energy is the best substitute for thermal energy in tropical regions.

   Inference 1: Coal and petroleum resources are receding.

   Inference 2: Solar energy will never deplete.

   Now choose the right answer.

   a) Only conclusion 1 follows.
   b) Only conclusion 2 follows.
   c) Neither 1 nor 2 follows.
   d) Both 1 and 2 follow.

2. **Statement:** If you don't conserve resources, human race may become extinct.

   Inference 1: You need not conserve resources.

   Inference 2: You need to conserve resources.

   Now choose the right answer.

   a) Only conclusion 1 follows.
   b) Only conclusion 2 follows.
   c) Neither 1 nor 2 follows.
   d) Both 1 and 2 follow.

3. **Statement:** Man switched over to agriculture.

   Inference 1: Food gatherers experienced scarcity of food.

   Inference 2: Food gathered was not nutritious.

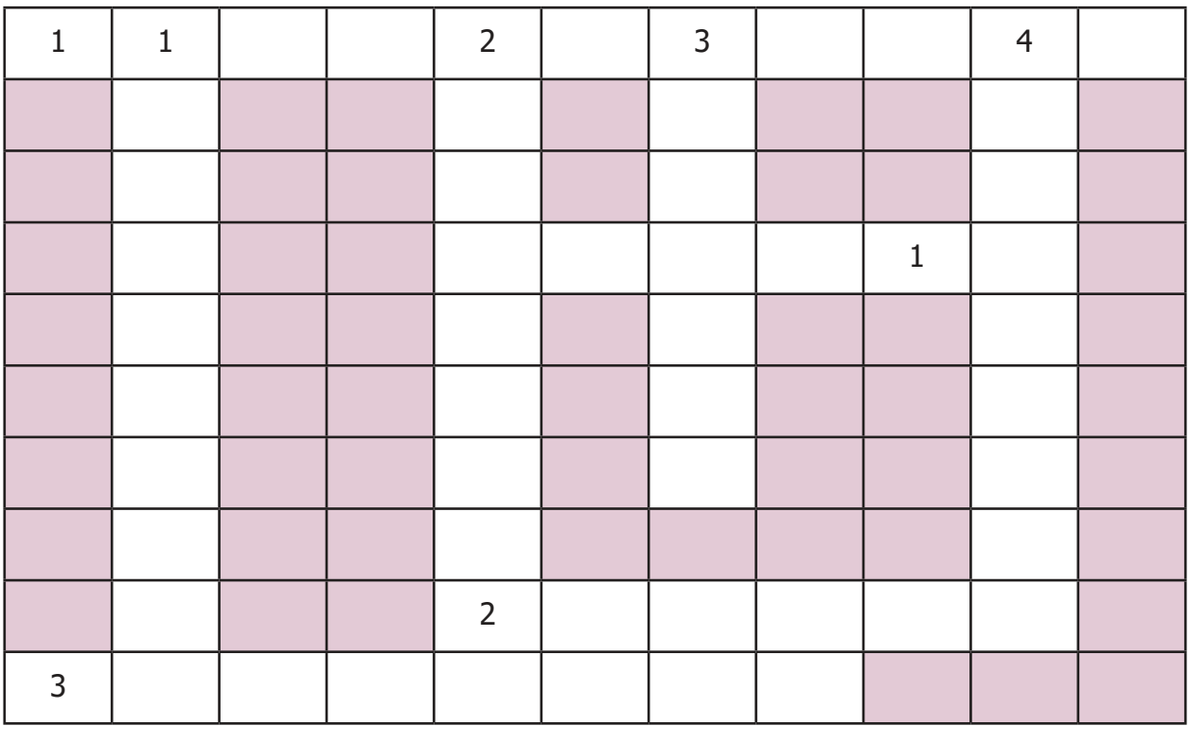
   Now choose the right answer.

   a) Only conclusion 1 follows.
   b) Only conclusion 2 follows.
   c) Neither 1 nor 2 follows.
   d) Both 1 and 2 follow.

H) Given are three suggestions to conserve resources: Write the 3Rs in suitable places.

1. Giving your childhood cycle to your neighbour _____.
2. Using a flush that consumes less water _____.
3. Melting used plastic to lay roads _____.

I) Cross word puzzle.



Across left to right	Down
1. A development that balances time.	1. A resource found everywhere.
2. Energy from the sun.	2. An international resource.
3. All resources that belongs to country.	3. A resource provided by nature.
Across right to left	4. A resource restricted to specific areas.
1. One of the 3Rs	

J) Mark the following in the outline map of India.

1. Neyveli
2. Bay of Bengal
3. Arabian Sea
4. Forest region of Tamil Nadu
5. Indian Ocean
6. Iron mining in Kanjamalai (Salem)

K) Identify the different economic activities and fill the table given below.

Sl. No.	Picture	Primary/ secondary/ tertiary	What activity is this?	Region in which it is found
1				
2				
3				
4				

L) Teacher's Activities:

1. Observe "**Save Energy Day**" once in a month at school / class level.
2. Try making wall hangings with waste materials to decorate your school corridors.
3. Find out if there are any industries nearby your school. A field trip may be arranged.
4. Collect pictures based on

a.Fishing	b.Hunting
c.Food-gathering	d.Forestry
e.Mining	f.Agriculture
g.Cattle-rearing	h.Lumbering

REFERENCE

Human and economic geography- Goh Cheng Leong

Internet Resource

https;//www.acciona.com/sustainable development

ICT CORNER

Resources and Economic Activities.

This activity will make the students to know about the renewable resources



Step 1: Open the Browser type the URL link given below (or) Scan the QR Code.

Step 2: A home Page **Ingenium** opens, select by clicking **events, activities and games.** Under that select energy games.

Step 3: Now go down and select the power up game by clicking **play**. Allow to run adobe flash player to play the game.

Step 4: You can play various levels to understand the energy generated from wind and sun. They can also explore the quizzes on different types of energy resources.



Step-1



Step-2



Step-3



Step-4

URL:

https://energy.techno-science.ca/en/index.php

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Unit 1

NATIONAL SYMBOLS



Learning Objectives

- To know about the natural national symbols of India.
- To understand the importance to protect nature.
- To know the other national symbols and appreciate them.
- To know the about different national festivals and celebrate them with joy.

W56JG

Path way

This lesson deals with the natural national symbols and the other national symbols. It also explains about the different national festivals.

Velan and Ponni went on a forest trip to Pulivanam. The thought that they were going to visit the forest, made them ecstatic and they were filled with excitement and adventurous spirit. Veena, a wildlife reasearcher was with them. That forest had a legendary river running across. The forest also had 2,000 metre high mountain.

As per the plan, they had reached the forest area by a vehicle. "We are waiting for you" said the forest officer Manimaran, smilingly to the enthusiastic young researchers. Veena introduced Velan and Ponni to the officer. The personal vehicles had to be stopped there as they were restricted to go further. After that they had to travel only by vehicles run on battaries that are pollution free. These vehicles also called as 'Jeep' were covered with glass. A jeep was waiting for them. The forest officer Manimaran, Veena and the team boarded the vehicle.

"I think you are eagerly waiting to watch the tiger, but it is possible only when you are lucky enough. Though it is the tiger's habitat, there are many birds, insects, reptiles, aquatic life and

amphibians which make the eco-system. So please don't wait only for the tigers but enjoy watching other animals too. And remember you shouldn't speak loudly" said Manimaran.

In a few minutes they had a chance to see a beautiful pond with lotus. The vehicle was moving slowly. The lotuses were smiling back at them. "Lotuses are of different types. Those which are pink are called pink lotuses. The lotus has a very special structure" said Veena.

Just behind a big tree near the pond, a peacock was fanning out its feathers gracefully. Without making noise, Velan and Ponni were admiring it. "Uncle Manimaran, usually peacocks do this during rainy days. Will it rain now?" said Ponni.

"Maybe. It dances only during rainy days. But once a chieftain Began, wondered whether the peacock was shivering in cold and covered the peacock with his shawl. This chieftain belonged to the classical Sangam age of Tamils and also revered as one of the seven most generous personalities of ancient Tamil land.



DO YOU KNOW?

There is a Peacock Sanctuary at Viralimalai in the district of Pudukottai (Tamilnadu)

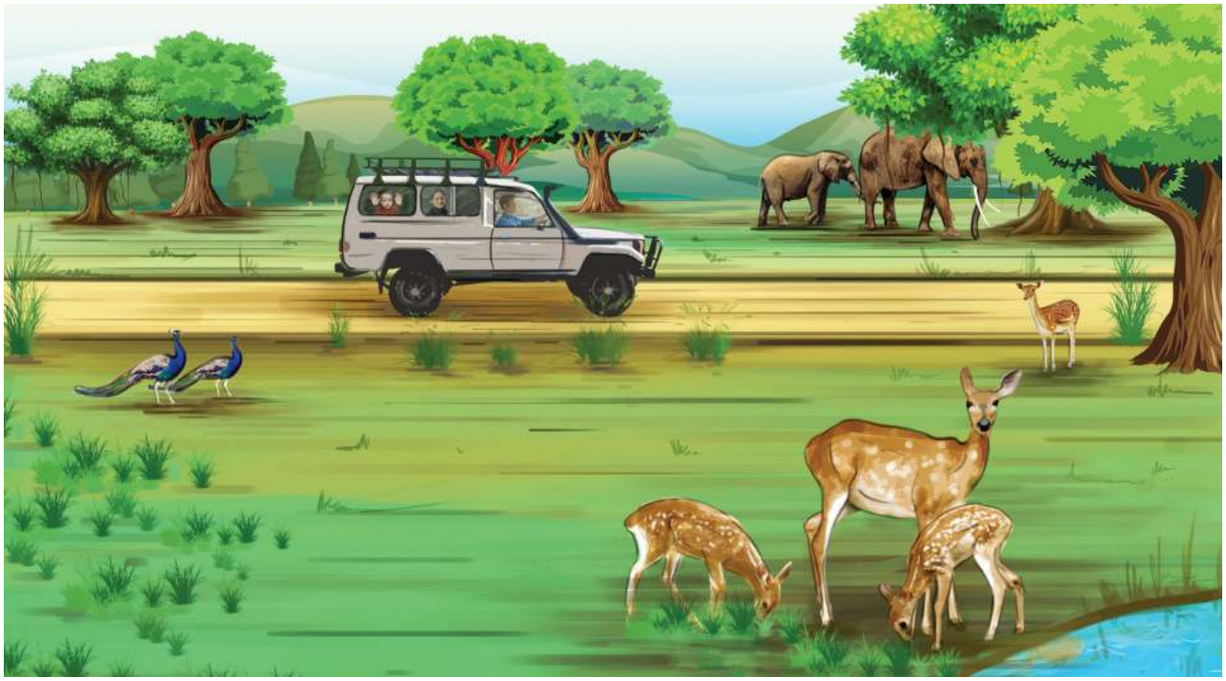
"You know very well that the peacock is our national bird. For a long time the Peacock has a significant place in our culture, art and heritage. It's beauty, stately appearance and its even distribution all over India makes it our national bird" said Manimaran.

The vehicle moved forward silently. They admired the beauty on either side even without blinking.

"We have come very close to the bank of the river. Now we have to go along the river. I am going to show you a different animal. You have to remain silent; only then you can see it. Please take your binoculars" said Manimaran.

Veena had instructed the team to bring their binoculars on the visit. Velan and Ponni had borrowed the binoculars from their neighbours. They focused their binoculars towards the gap between the bushes. That gave them a view of the river. Veena said, "Look, there is something black like a Gharial crocodile moving". They could not see the animal clearly due to the glare caused by the morning sun. Manimaran said, "Turn away from the Sun's rays and watch carefully. It is not a Gharial".

Veena said, "No it does not look like a fish. It looks like an aquatic mammal – a river dolphin".



Velan and Ponni exclaimed, "What? Is it a dolphin? Marine acrobatic animal? How can it live in a river?

Manimaran said, "There are river dolphins in our country. The dolphins that live in the rivers have a long snout similar to the Gharial crocodiles. Just like bats, they use the ultrasound waves to catch their prey. They are essentially blind.

Velan said, "That was an interesting detail".

"Do you know the name of the river beside which we are now on?".

"The rich harvests of the fertile plains of Ganges was mentioned in one of Bharathiyar's famous songs. Am I on the same banks of Ganges? My father asked me to collect some information about this place before visiting it," said Ponni.

"No doubt about it."

"Do you know that this river is 2,525 km long and is the longest river in India?" said Velan stunning everyone around.

"Though Brahmaputra is 2900 km long, it does not flow across India. So, What Velan said is right" said Veena.

Manimaran said, "We have seen a lot of things. Now let us relax. Come, let us have these pieces of mangoes."

"These mangoes are very tasty, what kind of mangoes are these?" asked Veena eagerly.

"This kind of mango is known as 'Imam pasand' a variety of mango that was cultivated during the Mughal reign for the royal family. This is occasionally found in the forest. Even this was picked from the mango grove at the fringes of this forest" said Manimaran. Eveyone got into the vehicle and were ready to go.

"Now we are going to see another wonder" said Manimaran and drove the vehicle around a big banyan tree with countless roots around. He travelled

around it for a few minutes and came back to the starting point. "Such a big banyan tree?" exclaimed Ponni and Velan.

"This is a very big banyan tree and is the oldest in this forest. It is the habitat of thousands of birds. It is as famous as the banyan tree in the Indian Botanical Garden in Howrah (Calcutta)," said Manimaran.

"There is another big banyan in Adyar (Chennai). It is as big as that. I saw that when I visited the Theosophical Society and wondered at it." said Ponni.

"Let us now go slowly because there is a herd of elephants climbing the mountains right behind the banyan tree" said Manimaran.

Velan replied at once, "Oh! Aren't the wild elephants ferocious? Are we in danger?".

Manimaran said "First and foremost we are not supposed to trouble the wild animals because the forest is their home. We can admire them without disturbing them."

Manimaran continued "We should know how to safeguard ourselves from the encounters of the wild animals. That is the reason why we try to explore the forests with the guides who belong to the forest tribal community".

"Even though the animals are quite huge, they will not harm you unless you hurt them".

"Let us also climb the hills along with the elephants. There is another surprise waiting for you on the top of the hills" said Manimaran.

After climbing the hill they came across a plain. He parked the vehicle and asked the team to see something using their binoculars. "Look there,"

There was a cone-shaped nest built with dried leaves. Manimaran asked, "Can you guess which animal's nest is that?

I know that birds build nests on the ground, but this seems a bit strange," said Veena.

It is a snake's nest, the nest of king cobra".

"What? Snakes build nests?" said Velan.

"This is the only reptile that builds a nest of its own and reproduces. Thus snake's average length is 18 feet and is the longest of the poisonous snakes" said Manimaran.

"We have explored the forest and climbed the hills but we have not seen a tiger till now" said Ponni.

"Don't worry Ponni. We have come across many wonders. The Tiger is a very shy animal. While descending down the hills we may see one on the rocky area on the slope" said Manimaran.

They had seen many unusual things that day. But they were very disappointed because they had not seen ever a tiger."

"I have visited several forests but they are not identical. I got some new information from Mr.Manimaran and the tribals. I have visited forestes many times regarding my research. But I was not able to see the tiger. Don't worry, we will see a tiger some time later comforted Veena.

NATURAL NATIONAL SYMBOLS



Banyan tree-1950

It is a symbol of pride and has many medicinal values.



Lotus-1950

Though it grows in muddy water it blooms with beauty.



Peacock-1963

It is native to Asia and the only bird which has a tail.



Tiger-1973

It is the largest cat species. India has 70% of tigers population in the world.



River Ganges-2008

It is a perennial river and many royal capitals flourished on the banks of this river.



Elephant-2010

It is native to mainland Asia and plays a critical role in maintaining the regions forests.



River Dolphin-2010

It is the reliable indicator of the health of the entire river eco-system. It is in the endangered list.



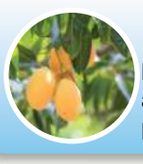
Lactobacillus-2012

They are friendly bacteria.They are a major part of the lactic and bacteria group.



King cobra- Ophiophagus hannah

It is the world's longest venomous snake and lives in the rain forests and plains of India.



Mango - 1950

It is a rich source of vitamins A,C and D and mainly cultivated in the plains.

The years the symbols were adopted by the Government of India are given.

They descended down the hill and came to the same place where they had watched the river dolphins. They parked the vehicle and rested for a while. Ponni came out of the vehicle and watched through the binoculars. She noticed something strange. She couldn't control herself she whispered "Uncle, look there." All of them quickly turned to look with their binoculars. They saw a tigress with her three cubs drinking water from the river. Veena captured the beautiful scene with her camera. Nobody dared to see anything other than the tigress, till it left the river bank and vanished away.

"This is the real king of the forest" said Manimaran.

Tamil Nadu's Natural Symbols

Animal	Nilgiri Tahr	
Bird	Emerald dove	
Flower	Gloriosa Superba	
Tree	Palmyrah tree	

"It is absolutely true" said Veena.

They all got back to the vehicle and were returning. Veena asked the team a question. "Do you know, there is something common between all the wonders you have seen today?"

"What is common?" asked Velan.

"Please, tell us quickly. We are very eager to know" said Ponni.

"All that we saw today are our natural national symbols" said Veena

"You are right, Veena. This didn't strike me." said Manimaran.

Other Symbols of our Country

National flag:

The tricolour flag is our National flag. The three colours are of the same width and are arranged horizontally. The saffron at the top represents valour and sacrifice. The green at the bottom represents fertility and prosperity. The white band in between represents honesty peace and purity. The Ashoka chakra or the wheel in navy blue represents truth and peace.



Out National Flag's length and width proportion is 3:2 respectively and the Ashoka's chakra has 24 spokes in it.

National Emblem

The four lions on top of the Ashoka

HOTS:

Who has been given the right to manufacture the National flag?

DO YOU KNOW?

Kodi Kaatha Kumaran



Tirupur Kumaran was born in Chennimalai of Erode district. As a youth, he actively participated in the freedom struggle for India. In 1932, when Gandhiji was arrested, protests were held against the arrest all over the country. When protests were held for Gandhiji's release, Tirupur Kumaran took active part in it. He lost his life when the police attacked violently. He held on to the tricolor flag even when he died. He was honoured with the title, 'Kodi Kaatha Kumaran'. The Government of India has released a postal stamp on his centenary year to remember Tirupur Kumaran's sacrifice and dedication to the nation.

DO YOU KNOW?

- The National flag was designed by Pingali Venkayya from Andhra Pradesh.
- The first Indian Flag was woven at Gudiyatham in Vellore district of Tamilnadu.
- This flag was hoisted by Pandit Jawaharlal Nehru on 15th August 1947 at Red Fort (Delhi)
- This flag is now an exhibit at the St.George's Fort Museum, Chennai.

Pillar at Sarnath was chosen to be our National emblem. The national emblem was accepted on 26th January 1950, 'Satyameva Jayate" has been inscribed at its bottom. It means 'Truth alone triumphs'. The National emblem consists of two parts- the upper and the lower parts.



The upper part has four lions facing the North, South, East and West. This is on a circular pedestal. One can only see three lions at a time.

The lower part has an elephant (energy), a horse (speed), a bull (hardwork) and a lion (majestic). The 'Wheel of righteousness' is placed between them. This emblem is found at the top of the government communication, Indian currency and passport.

DO YOU KNOW?

The four lions, chosen from the Sarnath pillar of Ashoka as our emblem, is now placed in the Sarnath Museum.

National Anthem

'Jana Gana Mana' is our National anthem. It symbolises the sovereignty and intergrity of our nation. This anthem was written by Rabindranath Tagore in Bengali. This was transcripted in Hindi and was accepted by the Constituent Assembly on 24th January 1950.

The rules to be observed while singing the Anthem

- This anthem has to be sung at a duration of 52 seconds.
- Everyone should stand erect while singing the national anthem.
- One should understand the meaning while singing.

DO YOU KNOW?

On 27th December 1911 this National anthem was sung for the first time during the Congress committee meet held at Kolkata.

National song

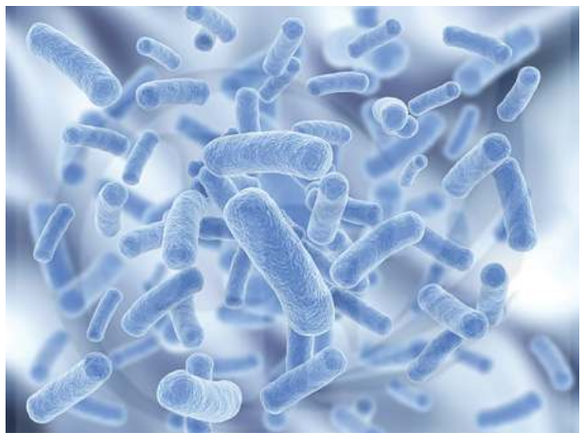
The song Vande Mataram, composed by Bankim Chandra Chatterjee, was a source of inspiration to the people of India in their struggle for freedom. It has an equal status with Jana Gana Mana. On January 24, 1950, the then President, Dr. Rajendra Prasad came up with a statement in the Constituent Assembly, "the song Vande Mataram, which has played a historic part in the struggle for Indian freedom, shall be honoured equally with Jana Gana Mana and shall have equal status with it."

The song was a part of Bankim Chandra's most famous novel 'Anand Math'.

National pledge

"India is my country. All Indians are my brothers and sisters" is our national pledge. The pledge was written by Pydimarri Venkata Subba Rao in Telugu.

National Micro organism



The curd which we consume every day is curdled from milk by a micro organism called lacto bacillus delbrueckii. This was accepted as our national micro organism in the year 2012. This micro organism makes the milk undergo a chemical reaction and changes the protein content of the milk. Curd is known for its digestive quality and cooling capacity.

Currency of India- (INR) ₹

The Indian currency is the Indian Rupees. The currency released by SherShah Sur in the sixteenth century was 'Rupiya'. This 'rupiya' has been transformed, into 'Rupees'. The symbol of rupees is ₹. This was designed by D. Udhayakumar from Tamil Nadu in the year 2010.

National Calender

During the reign of Emperor Kanishka he began following a new calendar in the year 78 CE/AD. The year begins from the spring equinox which falls on March 22nd. During a leap year, it begins on March 21st. Our country follows this calendar. The famous astronomer Meghnad Saha headed the

Calendar Reformation Committee on 22nd March 1957. It was then accepted by the committee as our national calendar.

The National symbols help in uniting the diversified sections of India and to instill patriotism.

National Holidays

Independence Day



Every year, August 15 is celebrated as the Independence Day to commemorate India's freedom from British rule. This auspicious day is also marked as a birth of the world's biggest democracy, India.

On the day India gained independence, Mahakavi Bharathiyar's poem "Aaduvome Pallu Paduvome" and it was sung over the AIR (All India Radio) by T.K. Pattammal, a famous singer of Carnatic Music. The celebration of Independence Day continues every year. The Prime Minister unfurls the National Flag on the Independence Day at the Red Fort, New Delhi.

Republic Day



On 26th January 1950, India was declared as a Republic state. Every year this day is commemorated as the 'Republic Day'. The constitution commenced on 26th January 1950. From August 1947 to 26th January 1950, the Queen of Britain was the honorary head of India. The day India was declared as a Republic state, the President became the first citizen of India. On Republic Day, the President of India unfurls the National flag on Kartavya path (the path of duty), New Delhi.



On January 29, the third day of the Republic day, the celebrations are brought to an end with the **"Beating Reteat"** ceremony. This is performed by the bands of Indian Army, Navy and Airforce. The President of India is the chief guest of this day. Rashtrapati Bhavan will be illuminated at 6pm as a part of the celebration.



Gandhi Jayanthi



The birthday of Mahatma Gandhi, the Father of our Nation, was declared

one of the National festivals. It falls on 2nd October. In 2007, the United Nations declared October 2nd as the 'International Day of Non-violence'.

GLOSSARY

Independence - Freedom from control of another country or organization.

Republic - A country in which the Head of State is an elected person.

Heritage - The art, buildings, traditions and beliefs that a society considers important to its history and culture.

Aquatic - Growing or living in or near water.

Astrophysicist - An expert in astrophysics

RECAP

- Tiger, Elephant, River dolphin of Ganges, Peacock, King Cobra, Banyan tree, mango, The Ganges and lotus are the natural national symbols.
- The constitutional Assembly accepted the tricolour flag as the national flag on 22nd July 1947.
- The National Flag, the National emblem, the National Anthem and the National song etc., are the other national symbols.
- Independence Day, Republic day, Gandhi Jayanthi are our important National festivals.

Exercises

B8FEN

I. Choose the correct answer

1. The National Song Vande Mataram was composed by_____
   a) Pingali Venkayya
   b) Rabindra Nath Tagore
   c) Bankim Chandra Chatterjee
   d) Gandhiji
2. Which is the National Anthem of India?
   a) Jana Gana Mana
   b) Vande Mataram
   c) Amar Sonar Bangla
   d) Neerarum kaduluduththa
3. Who wrote the most famous novel Anand Math?
   a) Akbar
   b) Rabindra Nath Tagore
   c) Bankim Chandra Chatterjee
   d) Jawaharlal Nehru
4. _____ birthday is celebrated as the International Day of non violence?
   a) Mahatma Gandhi
   b) Subash Chandra Bose
   c) Sardar Vallabhai Patel
   d) Jawaharlal Nehru
5. The colour of the Asoka chakra found in our National flag is _____
   a) sky blue b) navy blue
   c) blue d) green
6. The first flag ever flown after the Independence is stored in _____
   a) Chennai fort Museum
   b) Delhi Museum
   c) Saranath Museum
   d) Kolkata Museum

7. The National Anthem was written by _____
   a) Devandranath Tagore
   b) Bharathiyar
   c) Rabindranath Tagore
   d) Balagangadhar Tilak
8. The time taken to play the National Anthem is _____
   a) 50 seconds b) 52 minutes
   c) 52 seconds d) 20 seconds
9. "Vande Mataram" was first sung by _____ at the 1896 session of the National Congress
   a) Bankim Chandra Chatterjee
   b) Rabindranath Tagore
   c) Mahathma Gandhi
   d) Sarojini Naidu
10. _____ hoists the flag on Independence day in Delhi
    a) The Prime Minister
    b) The President
    c) Vice President
    d) Any Political leader

II. Fill in the blanks.

1. The National emblem was adopted from the Ashoka pillar of _____
2. The National fruit of India is _____
3. The National Bird of India is _____
4. Our National tree is the _____
5. The Flag which was flown in 1947 Independence day was weaved in _____
6. The Indian National Flag was designed by _____
7. _____ started the Saka Era
8. The longest river in India is _____
9. The Indian Rupee symbol was designed by _____
10. The Chakra of the National Flag has _____ spokes

III. Choose the correct answer

1. The Lion Capital is now in the _____ museum (Kolkata/Sarnath)
2. The National Anthem was adopted in _____ (1950/1947)
3. _____ is declared as our National Micro organism (Lacto bacillus / Rhizobium)

IV. Fill in the blanks

1. Saffron – Courage ; White - _____
2. Horse – Energy; Bull - _____
3. 1947 – Independence day; 1950 - _____

V. Choose the Correct Option

1. Rabindranath Tagore - a.National Song
2. Bankim Chandra Chatterjee- b. National Flag
3. Pingali Venkayya - c. Astro Physicist
4. Meghnad Saha - d. National Anthem

	1	2	3	4
a)	a	d	b	c
b)	d	a	c	b
c)	d	a	b	c

VI. Match and choose the wrong pair:

1. National Reptile – Tiger
2. National Aquatic Animal – Lacto bacillus
3. National Heritage Animal – King Cobra
4. National Micro organism – Dolphin

VII. Choose the wrong sentence:

1. a) The ratio of our National Flag's length and breadth is 3:2
   b) The Chakra has 24 spokes
   c) The Chakra is Sky Blue in colour
2. a) The National Flag was designed by Pingali Venkayya
   b) The First ever flown Flag after the Independence is stored in Kolkata Museum
   c) The First National Flag was weaved in Gudiyattam

VIII. Choose the correct sentence:

1. a) August 15 is celebrated as the Independence day
   b) November 26 is celebrated as the Republic day
   c) October 12 is celebrated as Gandhi Jayanti

IX. Answer the following.

1. What do the colours in our National Flag represent?
2. What are the parts of our National emblem?
3. What are the salient features of the National anthem?
4. Draw and define the Indian Rupee symbol
5. Where do we use our National emblem?
6. Who wrote the National pledge?
7. What are the animals found in the bottom of the emblem?
8. What are the natural national symbols?
9. Where is the peacock sanctuary located in Tamil Nadu?

X. Activities

1. Draw the natural National symbols as a scenery / Frame a story
2. Prepare a logo for your class/school of your own
3. What should we do to protect the endangered plants and animals – Discuss
4. Celebrate the national events in your school and prepare a news item for a local newspaper.

XI. Life skill activity:

Why are certain organisms adopted as natural National symbols? Analyse.

ICT CORNER

Symbols of India and Indian States

Let us learn about
The Constitution of India



Step 1: Go to play store and install "National symbols" App.

Step 2: Open the app. Click any national symbol like National Flag , National Bird etc. to know more about the symbol.

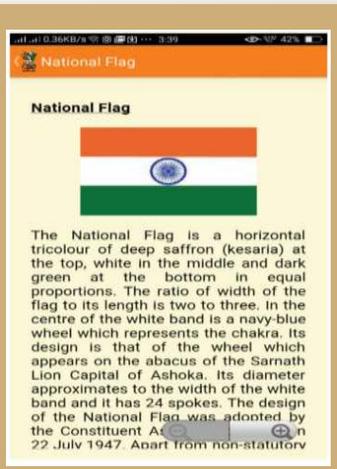
Step 3: Click the Back button and scroll below to see "States ". Select states and click Tamil Nadu for instance.

Step 4: Now you can see the symbols about Tamil Nadu.

Step 1:

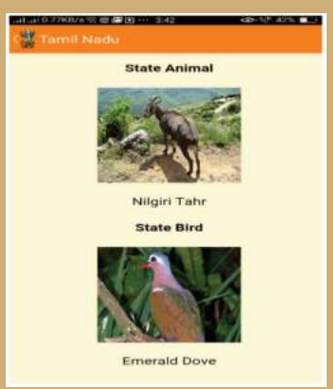


Step 2



Step 3:





Step 4

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https://play.google.com/store/apps/details?id=com.cdac.symbol

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Unit 2

THE CONSTITUTION OF INDIA



Learning Objectives

- To know about the Constitution of India
- To recognise the formation of our Constitution
- To know the salient features of our Constitution
- To know the fundamental rights and duties of the citizen of India

RFUZT

Pathway

The Lesson speaks about the formation of the constitution of India. It gives guidelines to govern the country, while ensuring the fundamental rights and duties of the citizens and how it protects them.

Yazhinian and Sudaroli are brothers. Yazh is student of standard six and Sudar is in standard four. Yazh was preparing for his class test. Sudar after completing his home assignments was watching an animated series on television. Sudar was watching it but the noise level disturbed Yazh. Sudar was totally engrossed in the series and laughed and clapped loudly. Yazh could not concentrate on his lessons.

So he asked Sudar to reduce the volume. But Sudar was not ready to adhere to his elder brother's advice. Inspite of Yazh's continuous request Sudar did not reduce the volume.

Yazh complained to his father that Sudar did not decrease the volume of the television in spite of requesting him several times. Yazh made it clear that he had a class test the following day.

"Isn't your brother preparing for his class test? Weren't you wrong in troubling him?" continued his father.



"I was watching the TV. Yazh kept disturbing and stopped me from watching it" said Sudar.

"Studying for the test and watching television are not the same" said his father.

But Sudar was not ready to accept the fact. Sudar was consistent that he had all rights to watch a film as much as Yazh had the right to study.

His father admitted that both had equal rights. But one must not hinder another's freedom. Sudar didn't realise the fact that he was very stubborn.

"Look Sudar. You have all rights to watch the film" said his father.

"Yes dad".

"Similarly, Yazh also has the right to listen to his favourite song on TV Coundn't he?"

"How can that happen? When I watch the television he cannot do that".

"When you can watch a film by increasing its volume, Yazh can also hear music loudly." said father.

"How will I watch the movie?".

"How will Yazh study?" .

"Oh! I didn't think of it. Okay dad, I will not watch the movie while Yazh studies".

"No my child. You can watch the movie without causing trouble to anyone".

"Don't be angry Yazh. You study and I promise I will not disturb you".

Yazh smiled and patted Sudar's back and left the place.

Sudar's mother was watching everything silently. She said," Even to run a small family don't we need to follow so many rules and regulations? How much more of that will we need to administer a country?" she exclaimed.

"It is an ocean Deepa. In order to administer people who follow different religions, speak different languages and belong to different castes and culture and treat everyone equally, we need to have a good code of laws and guidelines which we call as 'The Constitution of India'.

The next day Sudar and Yazh went to school. It was the Republic Day also.

The celebration was a jubilant. The students and teachers were standing in line around the flag post. Immediately after the hoisting of the flag, a discussion was held with the chief guest for the day, Mr. Arumugam, an expert in social sciences.

"Wish you a happy Republic Day!" wished Mr. Arumugam.

"Wish you the same Sir".

"Do you know why do we celebrate the Republic Day?"

"Our Constitution was framed and came into existence from 26th January 1950. That is why every year we observe this day as the Republic Day." said the history teacher Malarmathi.



"Yes, it is true. There are other reasons why this constitution came into existence on 26th January 1950. When the Congress met at Lahore in 1929, the members of the Congress unofficially declared the same day as the Day of Poorna Swaraj or the Day of complete self governance. The next year, 26th January 1930 was celebrated as the Independence Day. That day has been observed as our Republic Day".

"What do you mean by the "Constitution of India" asked Nathar.

"Before that, let me ask a few questions. You answer me. Then I will explain in detail about the constitution of India".

"All right sir".

(The students were prepared to answer the questions)

"Are you following any rules and regulation at home?"

"Yes sir"

"Are you following any rules at school?"

"Yes sir"

"Do the two are the same or different?"

"Mostly, they are different"

"Is it necessary to follow certain rules in public places?"

"Yes, Sir"

"Why is it necessary?"

"We should not disturb anybody in public" said Tamilselvi.

"It's true. Also no one should disturb us"said Selva

"Yes, I do accept it. But what if someone compels you to follow some rules? How would you feel?"

"It would be difficult to do so."

"How do you feel when you are asked to make your own rules?"

"We would be proud and pleased to obey our own rules".

(Everyone agreed and nodded their heads)



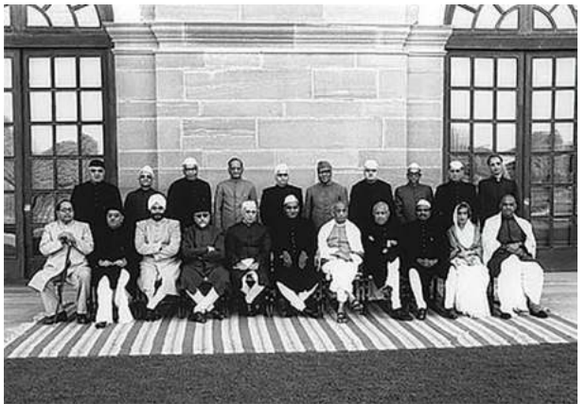
"The Constitution is an authentic document containing the basic ideas, principles and laws of a country. It also defines the rights and duties of citizens. The laws governing a country originate from the consitutition. Every country is ruled on the basis of its constitution"

"What are the things that make the constitution of India?" asked Deepika.

"The constitution of India is the ultimate law. We have to abide by it. It explains the fundamental concepts of structure, methods,

powers and the duties of Government bodies. It also lists the fundamental rights and duties of the citizens. Directive Principles are also mentioned in the constitution. So it is holistic in nature".

"When did they begin to frame the constitution?" asked Christopher.



"In 1946, nearly 389 members of the constituent Assembly who belonged to different places of the country came together to frame the Constitution of India. The Chairman of the committee was Mr. Rajendra Prasad".

"Who were the other significant members in the Constituent Assembly?"

"Jawaharlal Nehru, Sardar Vallabai Patel, Moulana Azad, S. Radhakrishnan, Viajalakshmi Pandit and Sarojini Naidu were the members in the Constituent Assembly".



"How many women members were there in the Constituent Assembly?

"15 women members were in the Constituent Assembly".



'The Father of the Constitution of India' is Dr.B.R. Ambedkar.

"The Drafting committee was formed with eight members and its Chairman was B.R. Ambedkar; B.N.Rao was appointed as an advisor. The committee met for the first time on 9th December 1946. On the same day, the drafting of constitution of India started".

"How did they form the Indian constitution?"

"The constitutions of nearly 60 countries including the UK, USA,former USSR, France , Switzerland etc., were thoroughly examined and their best features have been adopted by our constitution".

"Did they draft it in a short span of time?"

"No, nearly 2000 amendments were made before the draft was finalised"

"When did they complete this work?"

"It took a period of 2 years, 11 months, and 18 days. It was completed on 26th November 1949".

"The constitution was accepted by the Constituent Assembly. So, 26th November is celebrated as the Day of the Constitution. isn't it ?" said Karthikeyan.

"Yes" said Mr. Arumugam



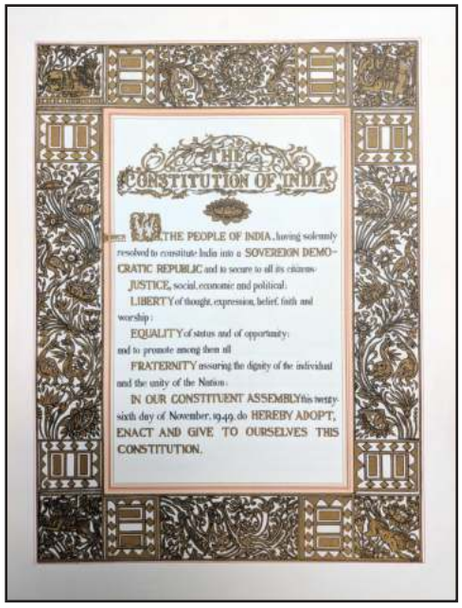
"How much was spent to frame the constitution of India?" asked Nathar.

"They spent almost 64 lakhs".

"What are the objectives of the Constitution?".

"The Preamble of our constitution stresses on the justice, liberty, equality and fraternity".

"What is a Preamble?"



"The preface of the constitution is the Preamble. According to it, India is a Sovereign, socialist, Secular democratic republic".

What does it mean by 'Sovereign'?

"The constitution has granted the people the right to rule. The members of the parliament and the legislative assembly are elected by the people. The right to decide is only in the hands of the representatives. Sovereignty refers to the ultimate power of the country."

What is the meaning of "Secular"?

"Law allows all the citizens of a country, the right to follow different faith and religious beliefs. All citizens enjoy the freedom of worship. The country does not have a religion of its own. All the religions in our country hold the same status".

"The Government of India rules through the Parliament, doesn't it?"

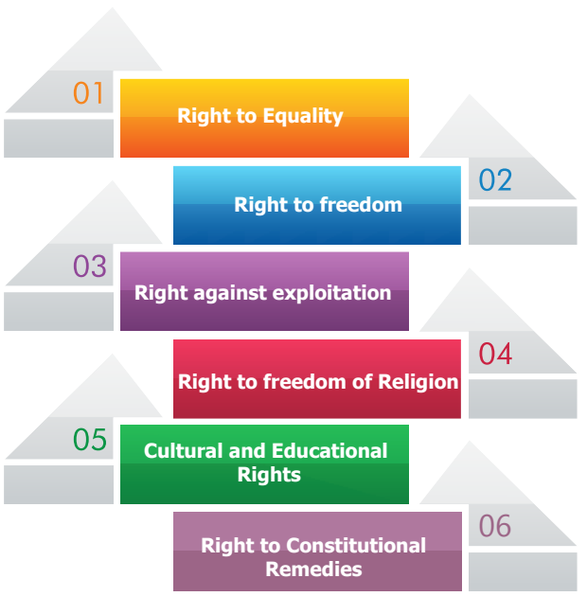
"Yes, the Constitution of India provides a Parliamentary form of Government, both at the centre and the state. In a Parliamentary System, the Executive is collectively responsible to the Legislature. The party which has the majority forms the government."

"What are fundamental rights?"

"Fundamental rights are the basic human rights of all citizens".

"What are they?"

Fundamental rights



"They are Right to Equality. Right to freedom, Right against exploitation, Right to freedom of Religion, Cultural and Educational Rights and Right to Constitutional Remedies."

"You mentioned about Directive Principles. What do you mean by that?"

"There are certain guidelines to be followed while the governments frame law. Though these are not mandatory, they should be taken into account".

"What is Universal Adult Franchise?"

"Every Indian citizen has the right to vote when they attain 18 years of age, irrespective of any caste, religion, gender or economic status".

"Like fundamental rights, every citizen will have duties too, won't they?"

"Yes, There are duties respecting the National flag and National Anthem, respect and protect the Constitution, follow our great leaders who fought for our freedom, to protect our country, readiness to serve our country if necessary, treating everyone as brothers irrespective of their castes, religions, languages, races etc., to conserve our ancient heritage, and conserve natural elements like forests, rivers and lakes and fauna, to develop science, humanity and feelings of reformation to avoid non-violence and protect government property, parents or guardians providing educational opportunities to children between 6-14 years etc., have been added as our duties" Mr. Arumugam concluded his discussion.

DO YOU KNOW?

The original copies of the Constitution of India (Hindi, English) are preserved in special Helium filled cases in the Library of the Parliament of India.

FACTS

- Dr. B.R. Ambedkar, N. Gopalasamy, K.M. Munshi, Syed Mohammad sadullah, N. Madhava Rao, T.T. Krishnamachari, Alladi Krishnaswamy were the legal experts of the Drafting Committee.
- The Chairman of the Drafting Committee Dr. B.R. Ambedkar was considered the Chief architect.
- When the Constitution was drafted, there were 395 articles in 22 parts and 8 schedules. At present our Indian Constitution contains 448 articles in 25 parts and 12 schedules.
- 105 amendments were made till 30.10.2021.

HOTS

Prepare a list of your immediate duties?

A-Z GLOSSARY

1.Democracy - a type of government in which representatives are elected by the people of that country.

2. Drafting Committee - a Committee set up to prepare the draft of the Constitution

3.Preamble - an introduction to a book or a written document.

4. Republic - a country with an elected head of state

5.Secular - a state which does not discriminate anyone on religious grounds

6.Socialist - equal distribution of a country's wealth and equal opportunities in all fields.

7.Sovereign - an independent country not subject to any external power or influence.

RECAP

- 26th January is observed as our Republic Day.
- The Constitution is an authentic document containing the basic ideas, principles and laws of our country
- The father of the Constitution of India is Dr. B. R Ambedkar.
- The Preamble of our Constitution stresses on justice, liberty, equality and fraternity.
- According to the Preamble, India is a sovereign, socialist, secular, democratic republic
- All citizens enjoy the freedom of worship
- The Executive is collectively responsible for the legislature
- Fundamental rights are the basic human rights of all citizens.
- Directive principles are certain guidelines which are not mandatory
- Universal Adult Franchise is every Indian citizen's right to vote when they attain 18 years of age.
- Every citizen has certain duties too.

EXERCISES

WNFZK

I. Choose the correct answer:

1. The Constitution Day is celebrated on

   a) January 26 b) August 15

   c) November 26 d) December 9

2. The Constituent Assembly accepted the Constitution of India in the year

   a) 1946 b) 1950

   c) 1947 d) 1949

3. There are _____ amendments made in the Constitution of India till 2016

   a) 101 b) 100 c) 78 d)46

4. Which of the following is not a fundamental right?

   a) Right to freedom

   b) Right to equality

   c) Right to vote

   d) Right to education

5. An Indian citizen has the right to vote at

   a) 14 years b) 18 years

   c) 16 years d) 21 years

II. Fill in the blanks:

1. _____ was selected as the chairman of the Constituent Assembly
2. The farther of the Constitution of India is _____
3. _____ protects our fundamental rights
4. The Constitution of India came into existence on _____

III. Match the following:

1.Independence day	-	a. November 26
2.Republic Day	-	b. April 1
3. Constitutional Day of India	-	c. August 15
4.Right to Education	-	d. January 26

	1	2	3	4
a.)	c	a	d	b
b.)	c	d	a	b
c.)	d	b	a	c

IV. Answer the questions given under the caption

Constituent Assembly

1. In which year was the Constituent Assembly formed?
2. How many members were in the Drafting Committee?
3. How many women were part of the Constituent Assembly?
4. When was the Constitution of India completed?

V. Answer the following questions:

1. Why was January 26 adopted as the Republic Day?
2. What is the Constitution of India?
3. List out the special features of the Constitution of India
4. What are the fundamental rights?
5. List out the fundamental duties that you would like to fulfil
6. What is Preamble?
7. What do you understand by Liberty, Equality and Fraternity?
8. Define: Sovereign

VI. Projects and Activities:

1. Let the students work individually or in a group to prepare rules for their class. From them discuss and a form a list of rules and regulations for their class.
2. List your duties at
   a) school b) home and c) society
3. Discuss on these topics:
   a) Equality b) Child labour
   c) Right to Education
4. Kailash Satyarti (India) and Malala Yusufsai (Pakistan) have been awarded the Nobel Prize for Peace (2014) Find out the reason why.

Life Skill:

Which of the fundamental rights do you like the most? Why?

Fundamental rights and duties are guaranteed by the constitution. Look at the picture and share your opinions.



ICT CORNER

The Constitution of India

Let us learn about
The Constitution of India



Step 1: Type the URL or scan the QR code to open The Constitution of India page . Th ough this page we are going to learn about the constitution of India.

Step 2: Click the GO button in that page. Here we get some questions. Click any question to learn the related concepts.

Step 3: To know more , click the next button in the lower right corner. Now we get more information.

Step 4: To go to the next concept , click button in the upper right corner .



Step-1



Step-2



Step-3



Step-4

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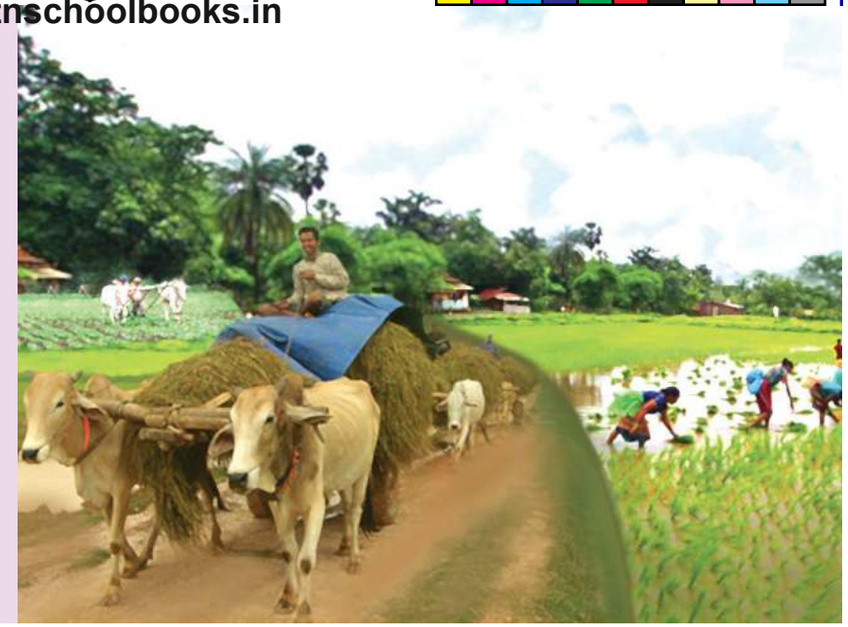
ECONOMICS

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Unit 1

Economics -An Introduction



The laughter of children echoed throughout the children's park of that apartment. Some slided down joyfully down the slide and some went up and down in the see – saw, shouting cheerfully. Others were swinging so high and fast, in the swings as if they were about to reach the sky. Some children were waiting near the swings to play next.

Kavin did not join with any of these children. He sat alone in a corner, staring somewhere. His uncle Mohan noticed Kavin and came near him.

"Kavin, are you going to play with your friends?" asked his uncle as he sat next to Kavin.

"Uncle, everyone teases me, calling me a villager," said Kavin, with tears rolling down his eyes. "Even our Vimalan laughs along with them. I came here for the holidays with so much of excitement. Now, I regret my presence here. I want to go back to our village, uncle," sobbed Kavin.

"Is it so? Where is Vimalan?" asked his uncle and started to search for his son in the crowd.



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'Vimalan'... called him in loud voice. On hearing his father's voice, Vimalan enquired, "Did you call me, dad?" and came near him.

"Did everyone tease Kavin?" asked Mohan.

Vimalan didn't utter a word. He stood quietly.

"Even though I live in this big city, I also hail from the same village. My roots are still there" said his father worriedly. Then he added, "Go and bring your friends. I have to tell something to you." Saying this, he sat near Kavin.

When Vimalan brought his friends, his father made them all sit down together. Mohan asked the children, "Let me come to the point directly. Do you know from where do we get all the food?"

"The rice and pulses we eat? We buy them from shops", said Anandhan

"Tell me, where do the shopkeepers get these things from?"

"I guess they would buy them from another shop".

"I think they would buy them from those who grow crops, uncle", said Inba.

"Correct! We call those people who raise crops as farmers. Farming is the main occupation in villages".

The children looked at each other in surprise.

"The farmers grow various crops like pulses, grains, vegetables etc., and send them to the shops in cities. We buy and consume them".

"Uncle, I have a doubt", said Kavin.

"Tel me, Kavin"

"In villages, I have seen people selling all kinds of things in a place. Why do they call it 'Sandhai', instead of shops?"

"Yes, Kavin,

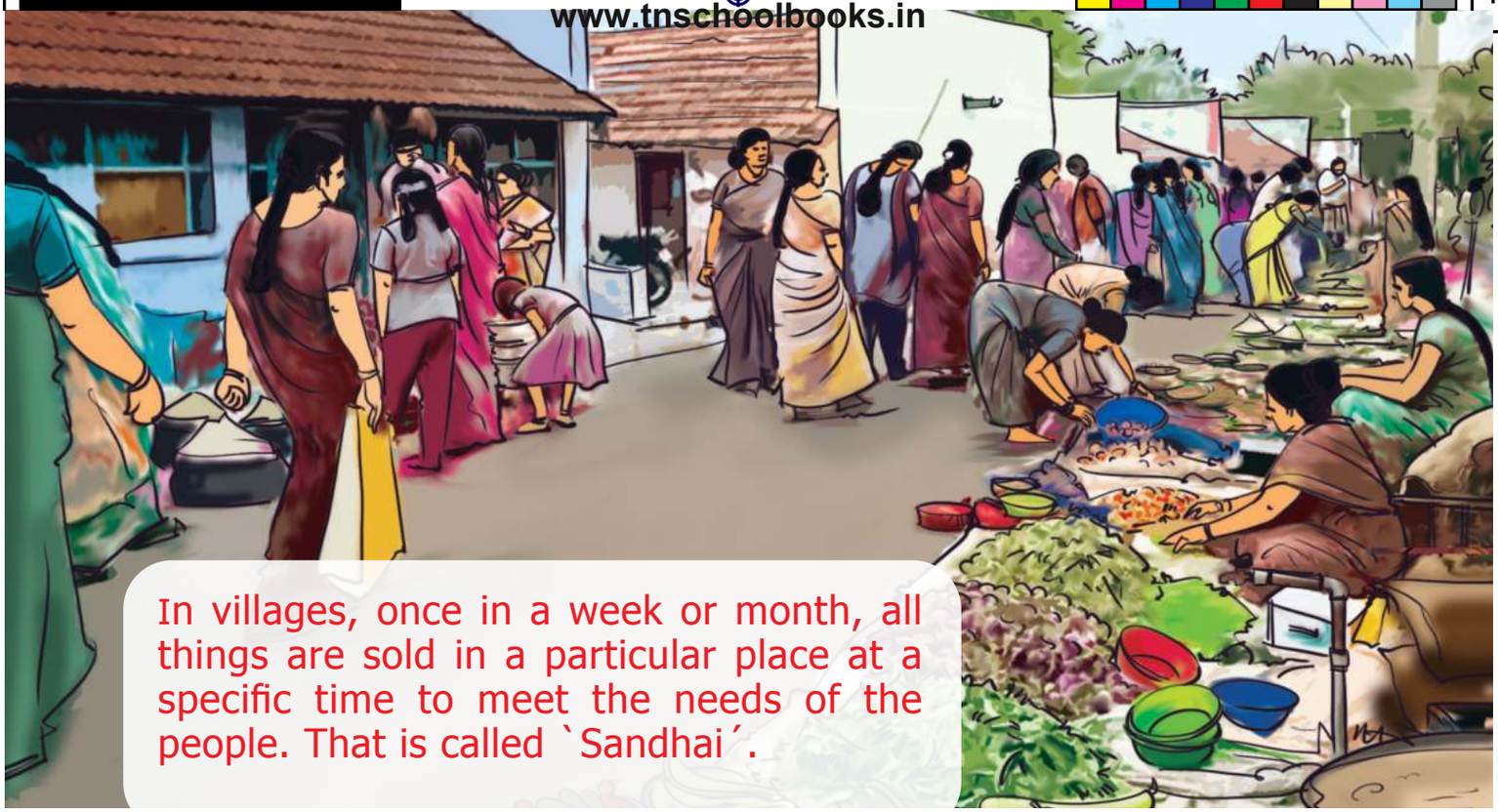
HOTS:

Imagine if money disappears one day?



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In villages, once in a week or month, all things are sold in a particular place at a specific time to meet the needs of the people. That is called `Sandhai´.

"Do you all know from where do they bring these things to Sandhai?"

"We don't know, uncle", said the children.

"I told you already that the things which are produced in villages are brought to sandhai".

"Fine, Kavin. Do you know what activities are carried out in a sandhai?"

"Buying and selling", said Kavin.

"Very good Kavin. Apart from going to the sandhai with your mother, you have also noticed what's happening around you."

Consumer Goods:
The finished goods which are bought from the market to fulfill the daily needs of the consumers is called consumer goods. Example: rice, clothes, bicycles, etc.

Hearing this, Kavin smiled.

All the children said in unison,"Without knowing the importance of villages, we teasted kavin. Forgive us, uncle, we won't hurt anyone herafter. We wish to know more about this".



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Activity 1

- Plan for a model Sandhai.
- Ask the students to bring vegetables and fruits to the classroom. [One student – one vegetable/fruit].
- Ask them to display like Sandhai and stick the prices of the vegetables .
- Other class students can buy the vegetables.
- Through this activity, the students can get an experience of the value of goods, buying, selling and a knowledge of profit, loss, demand and supply.
- Probably the Sandhai should be profitable. The students learn to fix the selling price through which they can earn profit.

"Sure, I will tell you", said Mohan,

"Small traders and other people buy things from sandhai," explained Mohan.

"Do you know in olden days we had a system of exchanging goods for other goods, called barter system. For example, exchange a bag of rice for enough clothes".

"A person who has rice in surplus and a person who has cloth in surplus, will exchange on the basis of their needs. But, here the problem is that the person who has clothes should have the willingness to buy rice. Only then, the exchange through barter system will take place".

"When they exchange commodities, they may lead to certain problems, when comparing the differences in the value of commodity. To solve this problem, people invented a tool called money".

"Really. Is it so" exclaimed the children.

"You know that early man, who hunted and gathered food, later learnt to cultivate crops. When they found rivers which provided them water, settled down



Issues faced in Barter system

The amount from the income which is left for future needs after consumption is called savings.

அளவறிந்து வாழாதான் வாழ்க்கை யுளபோல
வில்லாகித் தோன்றாக் கெடும். –குறள் 479

விளக்கம்: தன் செல்வத்தின் அளவு அறிந்து அதற்கு ஏற்ப வாழாதவனுடைய வாழ்க்கை பல வளங்களும் இருப்பது போல தோன்றி உண்மையில் இல்லாதவனாய்ப் பின்பு அப்பொய்த் தோற்றமும் இல்லாமல் அழியும்.

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Activity 2

Sing / Play the song **ஒன்றிலிருந்து இருபது வரைக்கும் கொண்டாட்டம்.... கொண்டாட்டம்....** Interpret the lyric of the song / what is the logic behind the song.

SHQ57

Activity 3

Fill up the given table.

SI.No	Countries	Currency	Symbol
1.	Germany		
2.	Brazil		
3.	India		
4.	Argentina		
5.	China		

permanently near the rivers. These permanent settlements were called **villages**. Agriculture remains to be the root of our economy even today. Man has no limits for his demand and desire. Based on this, man started to learn new occupations. Those who are involved in farming and grazing are called farmers or cultivators".

"Is agriculture the primary occupation?"

"Yes, there are certain other primary activities like farming.

"Agriculture and industries are helpful in the economic development of our country. Our country's economy is based on three economic activities".

PRIMARY ACTIVITIES

They are concerned with the production of raw materials for food stuff and industrial use. Primary activities include

- Agriculture
- Cattle rearing
- Fishing
- Mining
- Collection of fruits, nuts, honey, rubber, resin, medicinal herbs and lumbering.





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"Is agriculture confined only to villages? What other works do the villagers do?"

"What will a village look like uncle?" interrupted Inba.

"Agriculture is the primary occupation. There won't be any kind of facilities like our cities. At the same time, they get their basic needs fulfilled easily. There are small shops. Vegetables are grown in abundance, just like rice and pulses. Though the sugar that is added in our milk, coffee and tea is produced in sugar mills, the raw material sugarcane is cultivated in villages. From chilies to mustard, all those provisions used for food are grown in villages."

"Wow! My mother told me that these things are very expensive. Therefore, the villagers must be so wealthy!" said Adithya.

"No, not like that. They are just producers. Their products are bought and sold by some mediators. So, the farmers get very little money".

"What a pity! But the villages are the real shadows of cities", exclaimed Anandhan.

"Even Gandhiji has said that the **villages are the backbone of our country**".



"Yes, what a wonderful saying!" said Kavin excitedly.

At that time, the mobile phone rang. Mohan attended the phone. Vimalan's mother Ponni had called.

"What are you chatting about with the children for so long? The food is ready. Bring them home", saying so, she cut the call.

"Children, come, let's go home. Food is ready" Mohan got up and the children followed him with joy.

Inba asked, "Uncle, you said how villages are important. Aren't cities important?"

"No Inba. Both cities and villages are important on their own".

"If it is so, tell us about the importance of cities", asked Inba again.

"That is good. I will tell you. More than 50 percentage of the world's populations live in cities. In our state Tamil Nadu, 47 percentage of the people are in cities,.

"Wow!" they exclaimed.

"Not only that. Tamil Nadu is well developed in secondary and tertiary activities as well. These are city centered activities."

"We feel very proud to hear this uncle. Tell us about those activities".

Uncle Mohan said, "Well, apart from this, employment opportunities are more in cities than villages. People involved in small scale industries and unorganized sector are mostly found in cities."

"We don't understand."

"In villages, there are only a few saloons and laundry shops. But, in cities the number of such small scale workers are more. This results in additional income in cities."

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SECONDARY ACTIVITIES

The raw materials obtained from the primary activities are converted into finished products through machinery on a large scale. These activities are called secondary activities.

Industries are classified on the basis of the availability of raw materials, capital and ownership.

On the basis of raw materials, industries are classified as

- Agro based industries – Cotton textiles, Sugar mills and Food processing.
- Forest based industries – Paper mills, Furniture making, Building Materials.
- Mineral based industries – Cement, Iron, Aluminium Industries.
- Marine based industries – Sea food processing






Activity 4

Put ✓ mark in appropriate box

S.No.	Occupation	Primary activity	Secondary activity	Tertiary activity
1.	Farmer			
2.	Teacher			
3.	Tailor			
4.	Engineer			
5.	Bank Manager			

"Really?"

"Yes, well paved roads, ports, airports and railway stations support trade. Many branches of banks help in the circulation of money and boost the country's economy. All these are termed as tertiary activities."

Vimalan exclaimed, "Even being in the city, I never knew about all these."

Inba said, "We really got to know more information, uncle"

"Good, will you compare cities and villages in the future?"

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TERTIARY ACTIVITIES

"I already told you that industries produce goods and distribute them to the people. For this purpose, some services are required. These services are called **tertiary activities or service sectors**. The service sector serves the people to fulfill their daily needs like:

- Transport – roadways, railways, waterways, airways
- Communication – Post, Telephone, Information Technology etc
- Trade – Procurement of goods, selling
- Banking – Money transactions, banking services






"Never, we won't say such a thing. If anyone talks like that, we will explain whatever we have learnt from you" replied the children.

" Come lets go and have our lunch". Said Mohan.

Children said that they will come after playing for some more time.

Holding Kavin's hand, they all ran towards the park.

Mohan, an economics teacher, felt proud of their unity and satisfied of clarifying something good to the children.

LEANING OUTCOMES

- Children understand the meaning of Sandhai.
- Get clear idea about the barter system.
- Gain knowledge of the various kinds of occupation.

GLOSSARY

Consumer	–	the one who uses the products
Commodity	–	products
Occupation	–	work / Job
Settlement	–	living place of human being

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EXERCISES

I. Fill in the blanks:

1. The producers of food grains are _____
2. Collection of honey is a _____ occupation
3. The conversion of raw materials into finished goods is called _____
4. According to Gandhiji the villages are _____ of the nation.
5. The percentage of population in the cities of Tamil Nadu is _____

II Match the following:

1.	Cattle rearing	–	Secondary occupation
2.	Food processing	–	Services
3.	Iron & Steel Industry	–	Primary occupation
4.	Telephone	–	Agro based industry
5.	Cotton Industry	–	Tertiary occupation

III Match and find the odd pair:

1. Small scale Industry – Transaction of Money
2. Forest based Industries – Information Technology
3. Services – Paper Industries
4. Banking – Cattle rearing

IV Choose the correct answer:

1. Agriculture is a (Primary / Secondary) occupation
2. Economic activities are divided on the basis of (ownership / use)
3. Sugar Industries are (Primary / Secondary) activity
4. Agro based industry (Cotton / Furniture)
5. Dairy farming is a (Public sector / co-operative sector)

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V Answer the following questions:

1. Sandhai – Define
2. What is called barter system?
3. What is trade?
4. What is Savings?
5. What was the necessity for the invention of money?
6. What was the reason for the development of settlements near water bodies?
7. What are called secondary occupation?
8. Name the city centred industries.

VI Answer the following in detail:

1. List out the important primary occupations of your district
2. Mention the manufacturing industries found in your district
3. How are the industries classified on the basis of raw materials?
4. Write down the occupations in the service sector
5. What do you know about the features of cities?

VII Fill in the tabular column given below:

S.No.	Occupations in Villages	Occupations in cities	Occupations in Villages and cities
1.			
2.			
3.			
4.			
5.			

Activity

- Write the lyrics of Bharathiyar's "சிந்துநதியின் மிசை நிலவினிலே". Analyze the lyrics and write down the commodities which were exchanged in yester years with the help of the teacher.

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VIII Stick pictures.

Primary Activities	Secondary Activities	Tertiary Activities

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GLOSSARY

Eternal	நிலையான
Kinship	இரத்த உறவு
Contemporary	சமகாலத்திய
Metallurgy	உலோகவியல்
Preceptor	ஆசான்
Doctrine	கோட்பாடு
Virtuous	நல்லொழுக்கம்
Corpse	சடலம்
Monastery	மடாலயம்
Treatise	ஆய்வுக்கட்டுரை
Manufacture	உற்பத்தி
Deplete	பயன்பாட்டில் குறைதல்
Sustainable	நிலைநிறுத்துதல்
Tertiary	மூன்றாம் நிலை
Resource	வளம்
Biotic	உயிருள்ள
Abiotic	உயிரற்ற
Independence	சுதந்திரம்
Republic	குடியரசு
Heritage	பாரம்பரியம்
Aquatic	நீர்வாழ்வன
Astrophysicist	வான்இயற்பியலாளர்
Democracy	மக்களாட்சி
Drafting Committee	வரைவுக்குழு
Preamble	முகப்புரை
Secular	மதச்சார்பின்மை
Socialist	சமத்துவம்
Sovereign	இறையாண்மை
Consumer	நுகர்வோர்
Commodity	விற்பனைப் பொருட்கள்
Occupation	தொழில்கள்
Settlement	குடியிருப்பு

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