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STANDARD SIX

TERM - III

VOLUME - 3

SCIENCE
SOCIAL SCIENCE

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Department Of School Education

Untouchability is Inhuman and a Crime

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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 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 Third term VI science book has six units.
- Two units planned for every month including computer science chapter has been introduced.
- Each unit comprises of simple activities and experiments that can be done by the teacher through demonstration if necessary student's can perform them.
- Colorful info-graphics and info-bits enhance the visual learning.
- Glossary has been introduced to learn 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 play store/ Apple App Store into your Smart phone.
- 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.

QR GUIDE

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E - book

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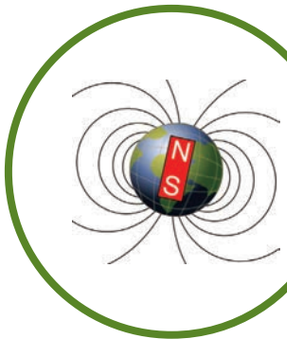

Unit 1 Magnetism

ECYPFM

Learning Objectives

- To know about the discovery of magnets
- To identify Magnetic and Non Magnetic Materials
- To distinguish between north and south poles
- To list out the properties of magnets
- To explain the principle of Maglev Train

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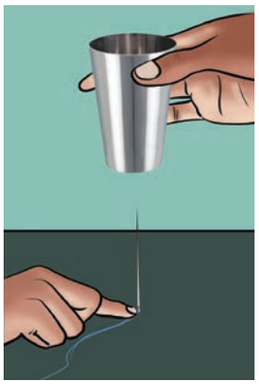
Introduction

You might have seen magnets. Have you ever enjoyed playing with them?



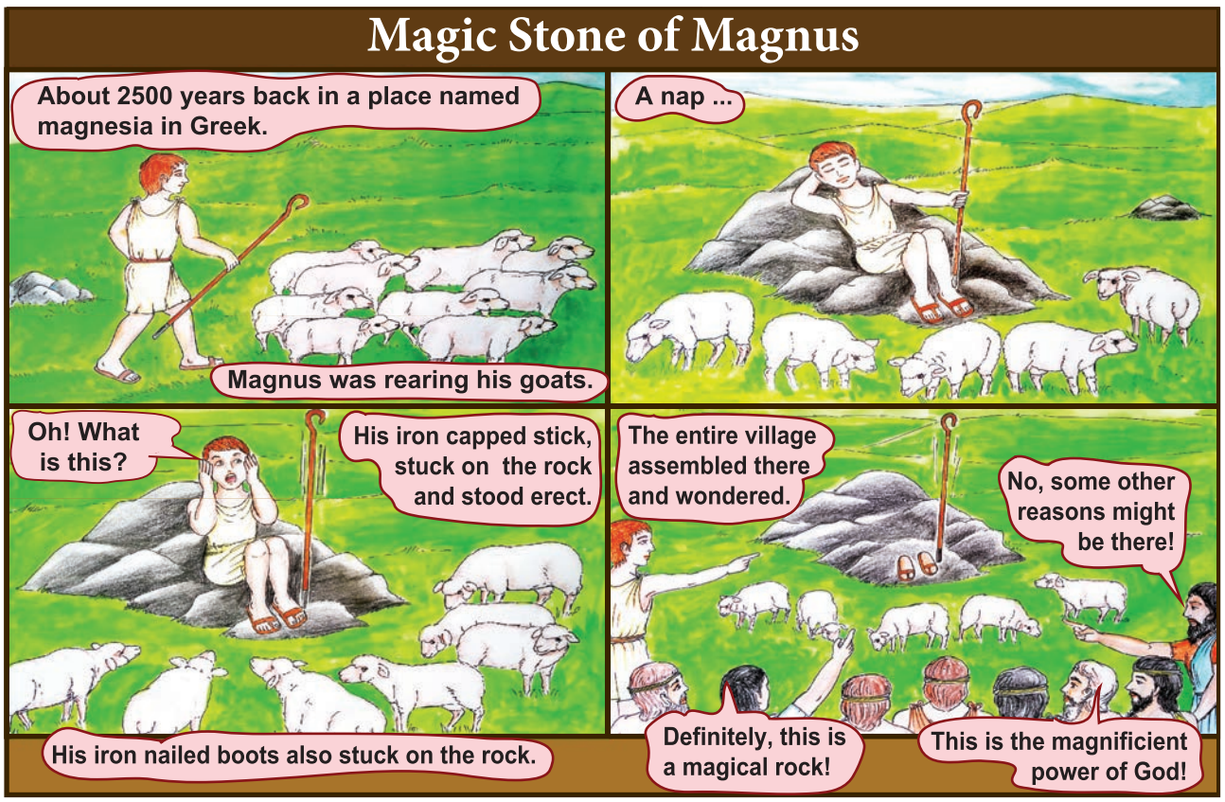
Take a steel glass. Take a needle through which thread is passed. Press the thread with a finger near the hole of the needle as shown in the figure and raise the glass upward slowly.

What happens?

Observe the same activity performed by your teacher and note it.

Does the needle stand vertically up without touching the glass? Why this happens?

1.1 Discovery of Magnets



People wondered about this incident, Each and everyone expressed their views. What might be the reason for the stick, to get stuck on the rock?

Yes, you are right. That is a magnetic rock. People found it attracting not only for the stick of Magnus, but also for all the materials made of iron. The more rocks of these kinds were found worldwide. These magnetic rocks were named **'Magnets'** and the ore is called as

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'Magnetite' after the name of the boy Magnus. The name is also supposed to come after the name of the place (Magnesia) in which it was found.

Magnetite was the ore with attracting property found in that region. Magnetites are **natural magnets**. They are called magnetic stones.

Magnetite

Natural magnets do not have a definite shape. Since, they are used for finding direction, they are also called **'leading stones'** or **'lode stones'.**

1.2 Magnet of different shapes

After learning the method of changing the piece of iron into magnet (magnetization) we have been making and using several kinds of magnets. Such man-made magnets are called **artificial magnets**.

Bar-magnet, Horseshoe magnet, Ring magnet and Needle magnet are generally used artificial magnets.

Bar-magnet

Horseshoe magnet

Ring magnet

Needle magnet

Oval-shape, Disc shapes Cylindrical and magnets are also available.

Oval-shape

Disc shape

Cylindrical shape

Activity 1: Take a magnet. Take the magnet Closer to the objects surrounding you.

What happens? Observe and note.

The objects attracted by the magnet : _____

The objects, not attracted by the magnet : _____

Which substances are used to make the objects attracted by the magnet?

_____

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1.3 Magnetic and Non Magnetic Materials

Substances which are attracted by magnet are called **magnetic substances**. Iron, cobalt, nickel are magnetic substances.

Substances which are not attracted by magnet are called **non-magnetic substances.** Paper, plastic are called non-magnetic substances.

1.4 Magnetic Poles

Place some iron filings on a paper. Place a bar magnet horizontally in the filings and turn it over a few times. Now lift the magnet. What do you see? Which part of the magnet has more iron filings sticking to it?

Which part of the magnet has almost no filings sticking to it?

The parts of the magnet those attract the largest amount of iron filings are called as its poles. **The attractive force of the magnet is very large near the two ends. These two ends are called its poles.**

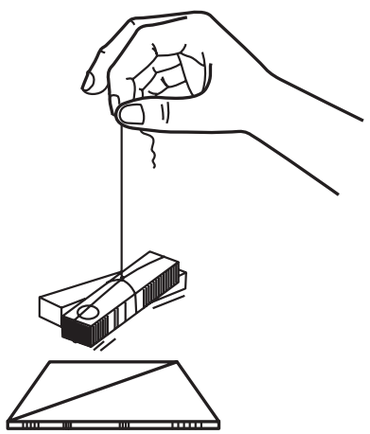
If you have a horseshoe magnet, or any other type of magnet at home, find the position of its poles by this experiment.

In experiments with magnets you will need to use iron filings again and again. You can do this by placing a magnet in a pile of sand and turning it around in the sand. The small pieces of iron present in the sand will stick to the magnet. If you cannot find sand you can look for iron pieces in clayey soil as well.

If you don't have iron filings, you can collect small pieces of iron and they will serve the purpose as well.

1.5 Finding directions with a magnet

Tie a piece of thread to the centre of a bar magnet and suspend it. Note, in which direction the magnet stops. Draw a line on a sheet of cardboard or the table along the direction in which the bar magnet stops



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(i.e) a line parallel to the bar magnet). Turn the magnet gently and let it come to stop again. Repeat it three or four times.

Does the bar magnet stop in the same direction each time? _____

In which direction does the magnet stop every time? _____

This is roughly the north-south direction. The end of the magnet that points to the north is called the **North Pole.** The end that points to the south is called the **South Pole.**

A freely suspended magnet always comes to rest in north-south direction.

The directive property of magnets has been used for centuries to find directions. Around 800 years ago, the Chinese discovered that a suspended lode stone stops in the north-south direction. Chinese used these lode stones to find directions.

The navigators of that country used to keep a piece of lode stone suspended in their boats and during a storm or mist, they used the lode stone to locate directions.

1.6 Magnetic compass

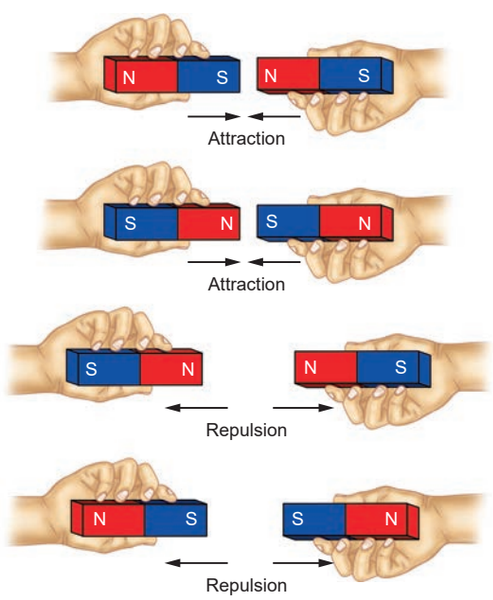
A compass is an instrument which is used to find directions. It is mostly used in ships and airplanes. As a rule, mountaineers also carry a compass with them so that they do not lose their way in unknown places.

The compass has a magnetic needle that can rotate easily. The marked end of the needle is the North Pole of the magnet. **Can you use magnetic compass to find west direction?** Ask your teacher to help you in using magnetic compass.

1.7 Properties of Magnets

Attraction or Repulsion

Take two similar magnets, place them in four different ways as shown in Figure.



What do you observe? When do the magnets attract each other?

_____

_____

When do the magnets repel each other?

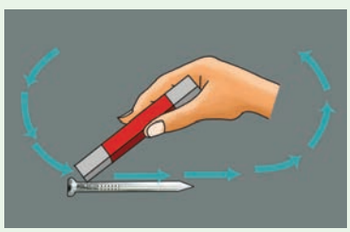
_____

_____

Unlike poles (S-N, N-S) attract each other. Like Poles (N-N, S-S) repel each other.

Activity 2: **LET US MAKE MAGNETS**

Take a nail / a piece of Iron and place it on a table. Now take a bar magnet and place one of its poles near one edge of the nail / piece of Iron and rub from one end to another end without changing the direction of the pole of the magnet. Repeat the process for 30 to 40 times.

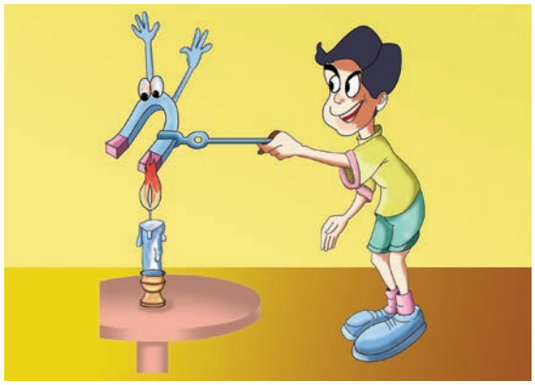


Bring a pin or some iron filings near the nail / piece of Iron to check whether it has become a magnet. Does the nail/ piece of iron attract the pin / iron filings? If not, continue the same process for some more time.

1.8 Do magnets lose their properties ? When?

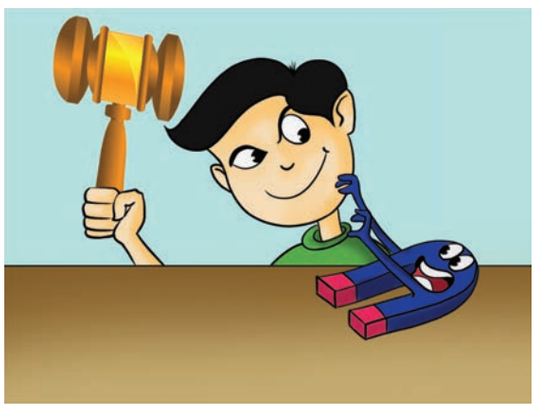
ED8KHA

Magnets lose their properties if they are heated or dropped from a height or hit with a hammer.



When heated

When dropped



When hammered

Magnets lose their properties when they are placed near Cellphone, Computer, DVDs. These objects will also get affected by magnetic field.

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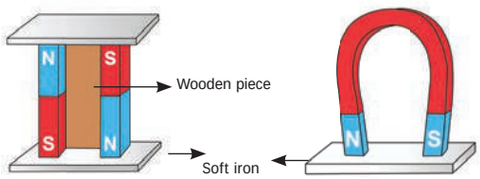
Activity 3: **Make your own magnetic compass**

Insert the magnetized needle, that you made in the activity 2, in to two styrofoam balls (Thermocol balls) and place the needle in bowl of water. Test whether the floating needle is always turned in rest on north - south direction.

Note: If you don't have styrofoam balls you can use dry leaf or a cork piece.

1.9 Storage of Magnets

Improper storage can also cause magnets to lose their properties. To keep them safe, bar magnets should be kept in pairs with their unlike poles on the same side. They must be separated by a piece of wood and two pieces of soft iron should be placed across their ends.



For a horse-shoe magnet a single piece of soft iron can be used as a magnetic keeper across the poles.

1.10 Usage of Magnets

We use various equipment with magnets in day to day life.

Discuss with your friends about the usage of the magnets in the following instances.

In speakers

In small electric motors

In some door locks

Bags

In some toys

In compasses

In pencil boxes

Stickers on refrigerators

Phone covers

Pin holders

Magnetic crane

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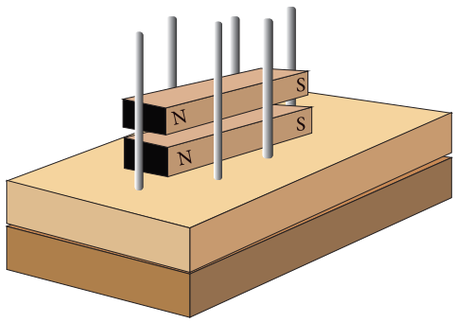
1.11 Science Today – Bullet Trains



We Know that Like poles of the magnet repel each other. Keep two Bar magnets as shown in the Figure.

What do you observe? _____

By using repulsion we can levitate a magnetic object. Let us make a toy and enjoy magnetic levitation.

Levitating propeller

Ring magnets

Bottle propeller

Plastic bottle filled with sand

Tape

Scissors

Stiff plastic straw

1. Make a propeller from a 500-ml plastic bottle. Make a hole in the bottle lid.

2. Screw the lid with the hole on a bottle half filled with sand. Press fit a stiff straw in the lid. Embed the straw in the sand to make it stand erect.

Place a few ring magnets in the straw. Similar poles will repel each other.

3. Place two magnets each inside and outside the propellor lid.These magnets will automatically stick to each other.

4. Like poles repel and this levitates the bottle fan. The ceiling fan makes it spin.

5. Place the propeller on the stiff straw.Ther magnets in the straw and the propeller should repel each other. This will make the propeller levitate. On placing it under a ceiling fan the propeller will spin very fast!

EDHGIX

Have you enjoyed with this toy? Electromagnetic train is working in the same principle. Have you heard about it?

Electromagnetic train is called as suspension train and also called as flying train. It does not require diesel or petrol. This technology uses the property of magnetic attraction and repulsion to run these super fast electromagnetic trains.

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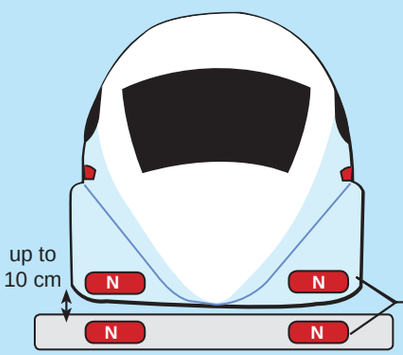
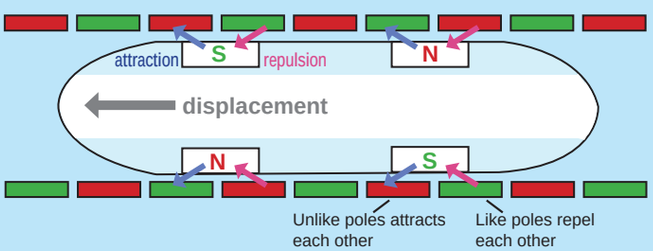
Maglev Train

Levitation



Propulsion

- By using attraction and repulsion at the same time the train move forward. The magnets are controlled by electricity.



Key features

No friction	High speed	No noise

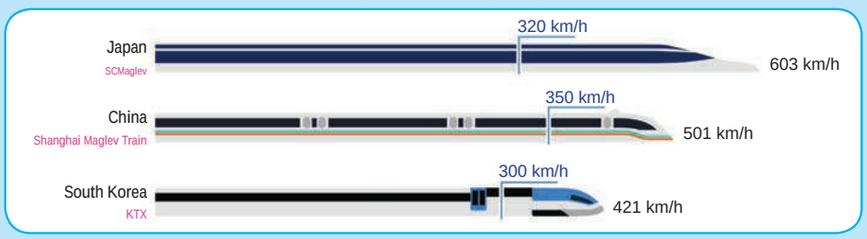
Which Countries?

China Japan South Korea

These three countries are currently using Maglev Trains for public transport. Many countries explore possibilites to use it.

How much Speed?

Maximum Operating Speed (km/h) ●
Speed Record (km/h) ●



In India

Mumbai-Delhi, Mumbai-Nagpur, Chennai-Bengaluru-Mysuru routes are considered for proposal.

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How does the electromagnetic train work?

Electromagnets are used in Electromagnetic train. Electromagnets are magnetised only when current flows through them. When the direction of current is changed the poles of the electromagnets are also changed. Like poles of the magnets which are attached at the bottom of the train and rail track repel each other. So, the train is lifted from the track up to a height of 10 cm.

We Know that we can move any magnetic object with the force of attraction or repulsion properties of magnets. This train also moves with the help of the magnets attached on the sides of track and the magnets fitted at the bottom sideway of the train. By controlling the current we can control the magnets and movement of the train.

As there are no moving parts, there is no friction. So, the train can easily attain a speed of 300 km per hour. These trains are capable of running up to 600 km/ hour. They do not make any noise. They require less energy and they are eco-friendly.

Even though, many countries have taken effort to use these trains, such trains are used for public transport only in China, Japan and South Korea. In India the possibilities of introducing these trains are under consideration.

Write the differences between a normal train and an electromagnetic train.

_____

_____

_____

Points to remember

- Magnetites are natural magnets. They are called magnetic stones.
- Man-made magnets are called artificial magnets.
- Substances which are attracted by magnet are called as magnetic substances.
- Substances which are not attracted by magnet are called non-magnetic substances.
- A freely suspended magnet always comes to rest in north-south direction.
- The end of the magnet that points to the north is called the North Pole. The end that points to the south is called the South Pole.
- A compass is an instrument which is used to find directions.
- Like Poles (N-N, S-S) repel each other and unlike poles (N-S, S-N) attract each other.
- Magnets lose their properties if they are heated or dropped from a height or hit with a hammer.

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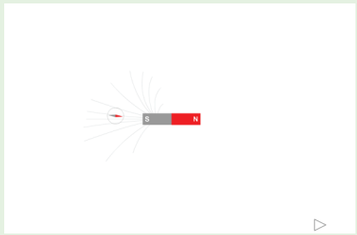
ICT Corner

Magnet



Through this activity you'll be able to understand the properties of magnetic poles and magnetic field lines.

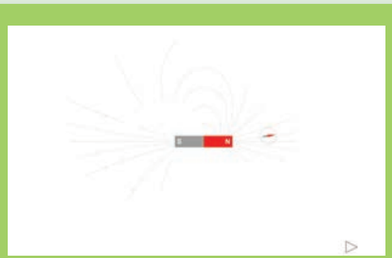
Step 1: Type the URL given or scan the QR code to launch the activity page.

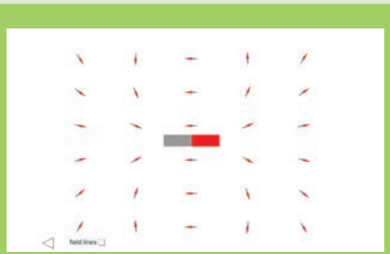
Step 2: A diagram of a bar magnet and a magnetic needle are there. Click and drag the magnetic needle with the use of mouse, around the bar magnet. Observe the position of the magnetic field lines and how the needle rotates according the poles.

Step 3: Click the 'Next navigation icon'. A grid of magnetic needles around a bar magnet will appear. Click and drag the bar magnet. Observe the changes of the needles.

Step 4: Click the 'field lines' check box at the bottom of the activity window to see the magnetic field lines.

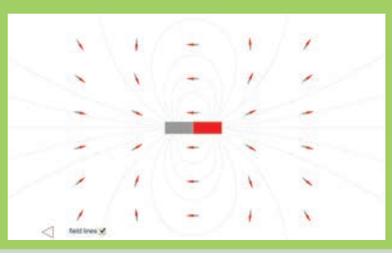
Step 1





Step 2

Step 3



Step 4

Magnet URL:

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

*Pictures are indicative only

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Evaluation

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I. Choose the appropriate answer

1. An object that is attracted by magnet.

   a. wooden piece b. plain pins

   c. eraser d. a piece of paper

2. People who made mariner's compass for the first time.

   a. Indians b. Europeans

   c. Chinese d. Egyptians

3. A freely suspended magnet always comes to rest in the _____ direction

   a. North - east b. South - west

   c. East - west d. North - south

4. Magnets lose their properties when they are

   a. used b. stored

   c. hit with a hammer d. cleaned

5. Mariner's compass is used to find the

   a. speed b. displacement

   c. direction d. motion.

II. Fill in the Blanks

1. Artificial magnets are made in different shapes such as _____, _____ and _____.
2. The Materials which are attracted towards the magnet are called_____.
3. Paper is not a _____ material.
4. In olden days, sailors used to find direction by suspending a piece of _____.
5. A magnet always has _____ poles.

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

1. A cylindrical magnet has only one pole.
2. Similar poles of a magnet repel each other.
3. Maximum iron filings stick in the middle of a bar magnet when it is brought near them.
4. A compass can be used to find East-West direction at any place.
5. Rubber is a magnetic material.

IV. Match the following

1.	Compass	-	Maximum magnetic strength
2.	Attraction	-	Like poles
3.	Repulsion	-	Opposite poles
4.	Magnetic poles	-	Magnetic needle

V. Circle the odd ones and give reasons

1. Iron nail, pins, rubber tube , needle.
2. Lift, escalator, electromagnetic train, electric bulb.
3. Attraction, repulsion, pointing direction, illumination.

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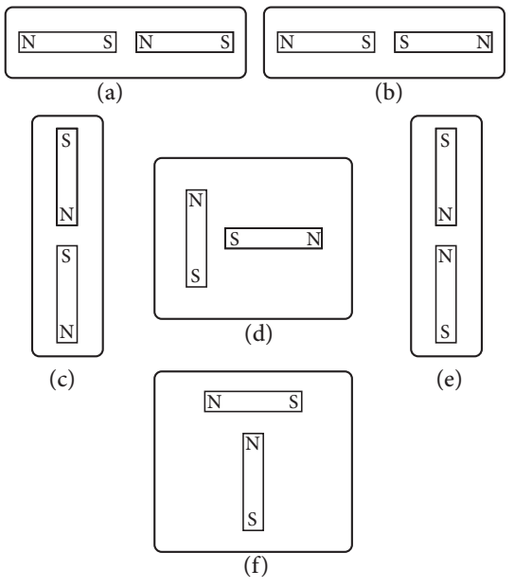
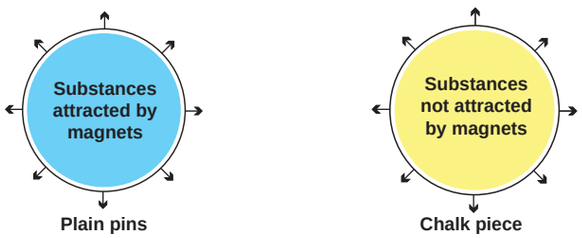
VI. The following diagrams show two magnets near one another. Use the words, 'Attract, Repel, Turn around' to describe what happens in each case.



VII. Write down the names of substances.



VIII. Give short answer

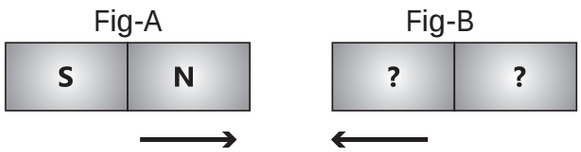
1. Explain the attraction and repulsion between magnetic poles.
2. A student who checked some magnets in the school laboratory found out that their magnetic force is worn out. Give three reasons for that?

IX. Answer in detail

1. You are provided with an iron needle. How will you magnetize it ?
2. How does the electromagnetic train work?

X. Questions based on Higher Order Thinking Skills

1. You are provided with iron filings and a bar magnet without labelling the poles of the magnet. Using this...
   a. How will you identify the poles of the magnet?
   b. Which part of the bar magnet attracts more iron filings? Why?
2. Two bar magnets are given in the figure A and B. By the property of attraction,identify the North pole and the South pole in the bar magnet (B)



3. Take a glass of water with a few pins inside. How will you take out the pins without dipping your hands into water?

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Unit 2 Water

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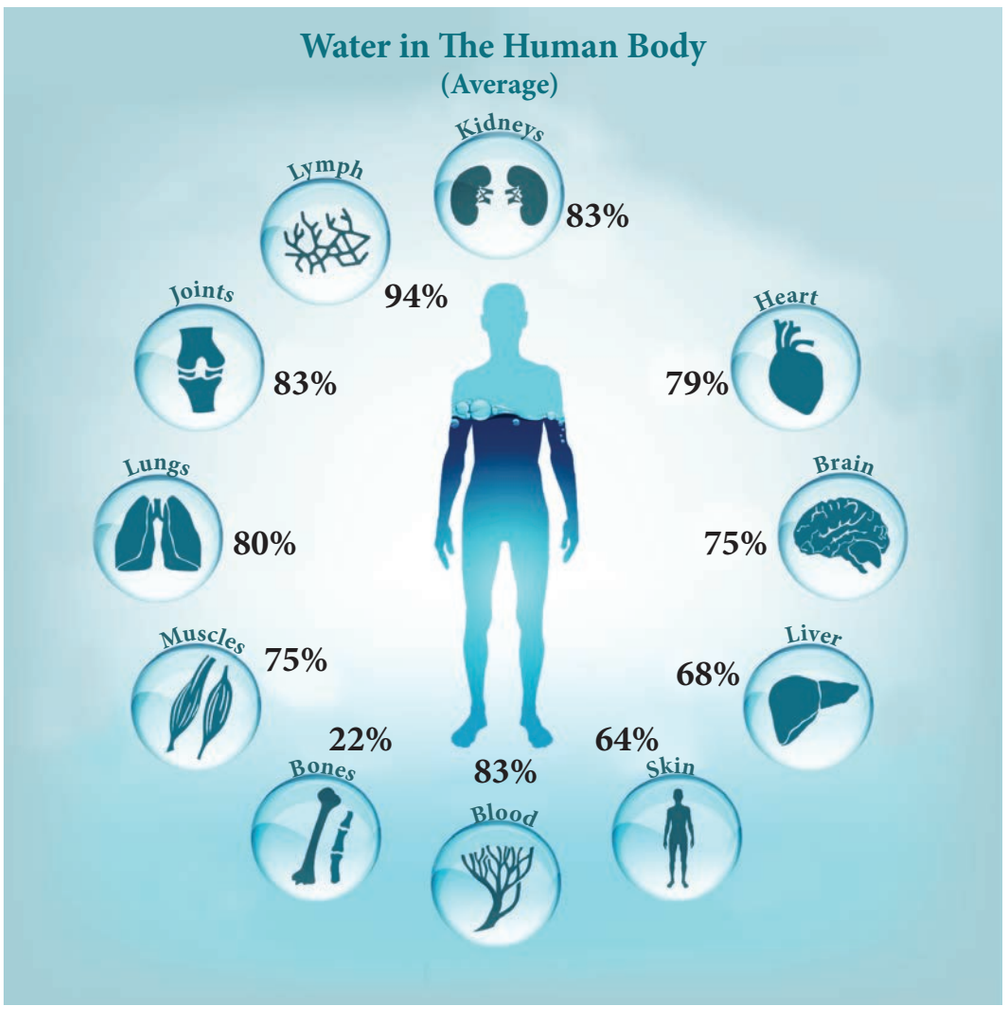

Learning Objectives

- To recognize the sources and availability of water
- To clarify the composition of water and the process of water cycle
- To develop skills in suggesting ways to conserve water
- To realize the importance of water for life on earth
- To appreciate the efforts made to conserve water

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Introduction

Water is one of the basic substance present in the earth. It plays a vital role in the evolution and survival of life. It is impossible to imagine life on the earth without water. Water helps to regulate the temperature of our planet. It also helps to maintain the temperature in organisms.

2.1 Where do we get water from?

We need water to perform several day to day activities like cooking food, washing clothes, cleaning utensils etc.

We get water from different water sources in our surroundings. In villages / towns wells, canals, tanks, ponds, rivers, water tanks, hand pipes are the main sources of water.

List out the sources from where you get water in your village/town.

For example Ramu says he and his family get water from the pipes in washrooms and kitchens. Sankar says he has to use handpump daily both in the morning and evening to collect the water. Raja says his mother used to get up early and walks to pond to get water.

Where do you get water for your household uses?

2.2 Where and how water is found on the earth?

Water is available in nature in three forms – Solid, Liquid , Vapour.

- **Solid form of water - Ice** - It is present in ice bergs and ice caps on top of tall mountains, galaciers and polar regions.
- **Liquid form of water – Water** – It is present in oceans, seas, lakes, rivers and even underground.
- **Gaseous form of water – Vapour** – It is present in the air around us.

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2.3 Availability of water

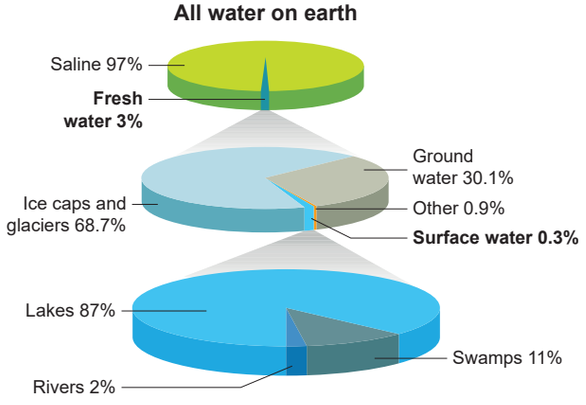
We know that nearly ¾th of the surface of the earth is occupied by water. Most of the water, that is 97% of the total amount of water that exits on earth is found in seas and oceans.

Can we drink the water available in the sea?

Sea water is salty. But water used for our daily purposes is not salty. It is known as fresh water. Water obtained from ponds, puddles, river, tube-wells and taps at home is usually fresh water.

If the total water on earth be 100%, let's see what percent would be the availability of fresh water.

Look at the pie chart given below.



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From the pie chart, it can also be noted that 97% water is saline water. Only 3% found is the freshwater and that too in polar ice caps and glaciers. So this portion of water is not readily available for drinking.

The distribution of the totally available (3%) freshwater is as follows:

Polar ice caps and glaciers	68.7%
Ground water	30.1%
Other sources of water	0.9%
Surface water	0.3 %

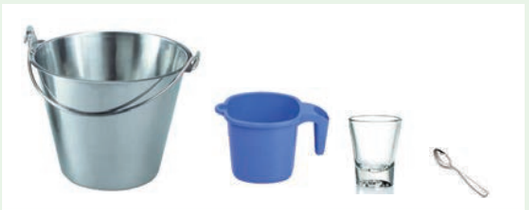
The distribution of total 0.3% of surface water is as follows:

Lakes	87%
Rivers	2%
Swamps	11%

Thus the above pie chart explains that we have a very small amount of fresh water available for human usage and so maintaining the water table and the conservation of water is very essential. Isn't it?

Water while passing through layers of soil dissolves salts and minerals to a maximum extent. These salts and minerals have been deposited in seas and oceans for millions of years and are still being deposited. In addition, the oceanic volcanoes which are present inside, also add salts to the sea. Water with large amounts of dissolved solids is not potable or suitable for drinking. Such water is called saline water.

Activity 1: Relative amount of water at various sources



Take a 20 litre bucket, a 500 ml mug, a 150 ml tumbler and a 1 ml spoon. If the capacity of the bucket is 20 litre, then it represents the total amount of water present on the Earth. Now, transfer a mug of water from the bucket and it is 500 ml and then it represents the total amount of fresh water present in the Earth. The water left in the bucket represents seas and oceans. This water is not fit for human use.

The water present in the mug represents the freshwater which is present in frozen form on snow-covered mountains, glaciers and polar ice caps. This water is also not readily available for human use. Next, transfer 150 ml of water to the tumbler, then it represents the total amount of ground water. Finally, take one-fourth spoonful of water while the capacity of the spoon is 1 ml, then it represents the total amount of surface water (i.e) water seen in all the rivers, lakes and ponds of the world. It can be taken as potable water.

When such a small amount of potable water is available, then we should be more cautious in handling water. Is it not?

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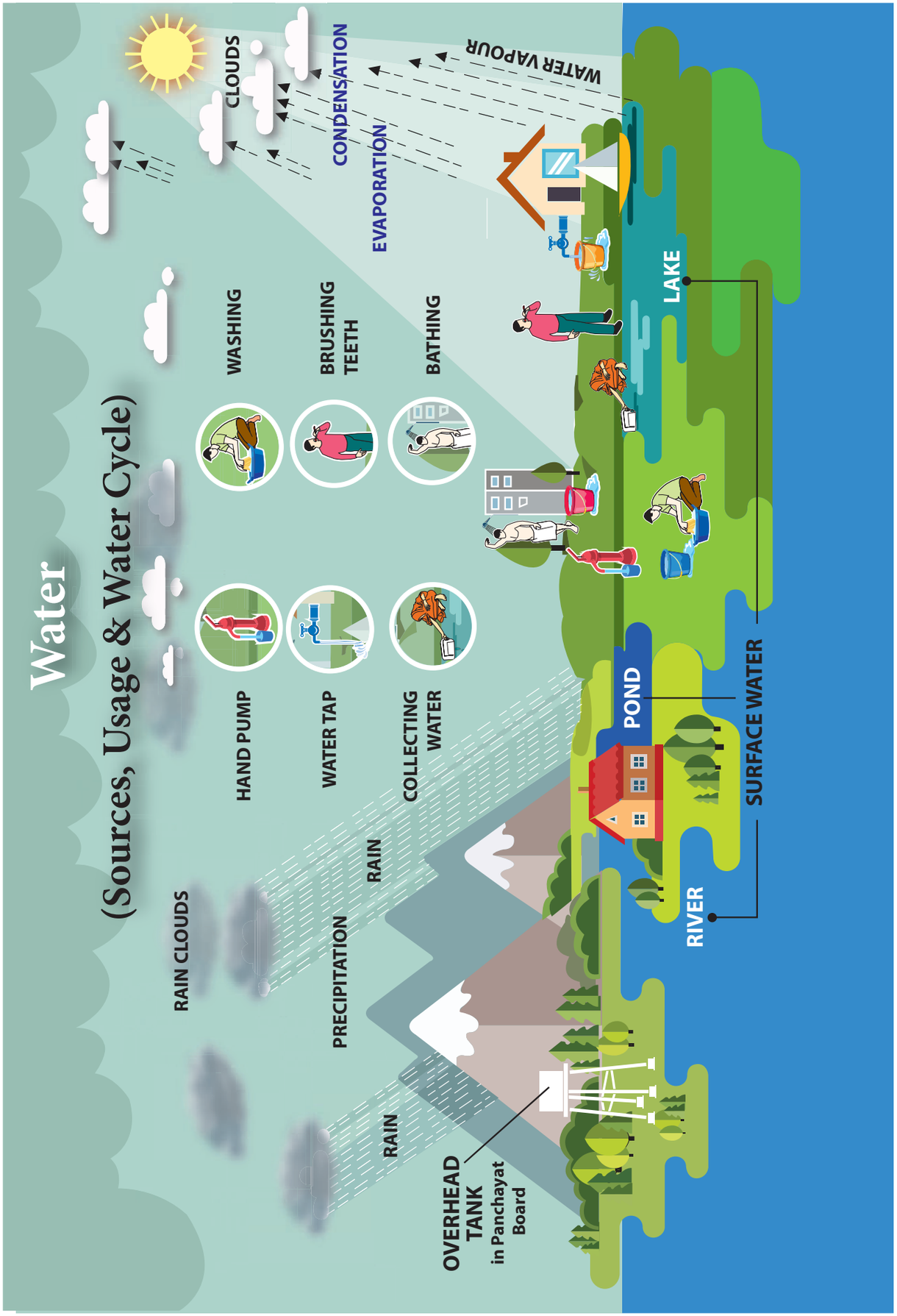

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Activity 2: Conduct the activity with common salt,sand, chalk powder, charcoal powder and copper sulphate.

Fill up the following table.

Substance	Dissolves in water	Does not dissolve in water
common salt		
sand		
chalk powder		
charcoal powder		
copper sulphate		

From the above activity we could observe that common salt and copper sulphate dissolve in water and contribute their properties like colour and other properties to water but sand, chalk powder and charcoal powder do not dissolve in water.

2.4 Composition of water

Water is a transparent, tasteless, odourless and nearly colourless chemical substance. It is composed of two atoms of hydrogen combined with one atom of oxygen. The molecular formula of water is H_2O.

However, the physical composition of water changes from place to place. It can be clear or cloudy, oxygenated or not very oxygenated and it can be fresh or salty. The amount of salt in water is termed as salinity. Based on its salinity water is classified into three main categories such as freshwater, brackish water and sea water. Fresh water contains 0.05% to 1% of salt. Brackish water contains upto 3% of salt and seawater contains more than 3% of salt. Ocean water is composed of many substances. The salts include sodium chloride, magnesium chloride and calcium chloride.

Water freeze at 0^o Celsius at normal pressure.

Every year march 22^{nd} is observed as the world water day.

Activity 3: Water contains dissolved salts

Take some tap water in a china dish and heat it. Continue heating till all the water gets dried up. Stop the heating and look at the china dish. What do you observe inside the china dish?

Deposits of some solid particles on the surface of china dish can be observed. The deposit is of salts that are dissolved in water. This shows that water has dissolved salts in it.

Note: Do not use distilled water or water from purifier or RO unit and the like for this activity.

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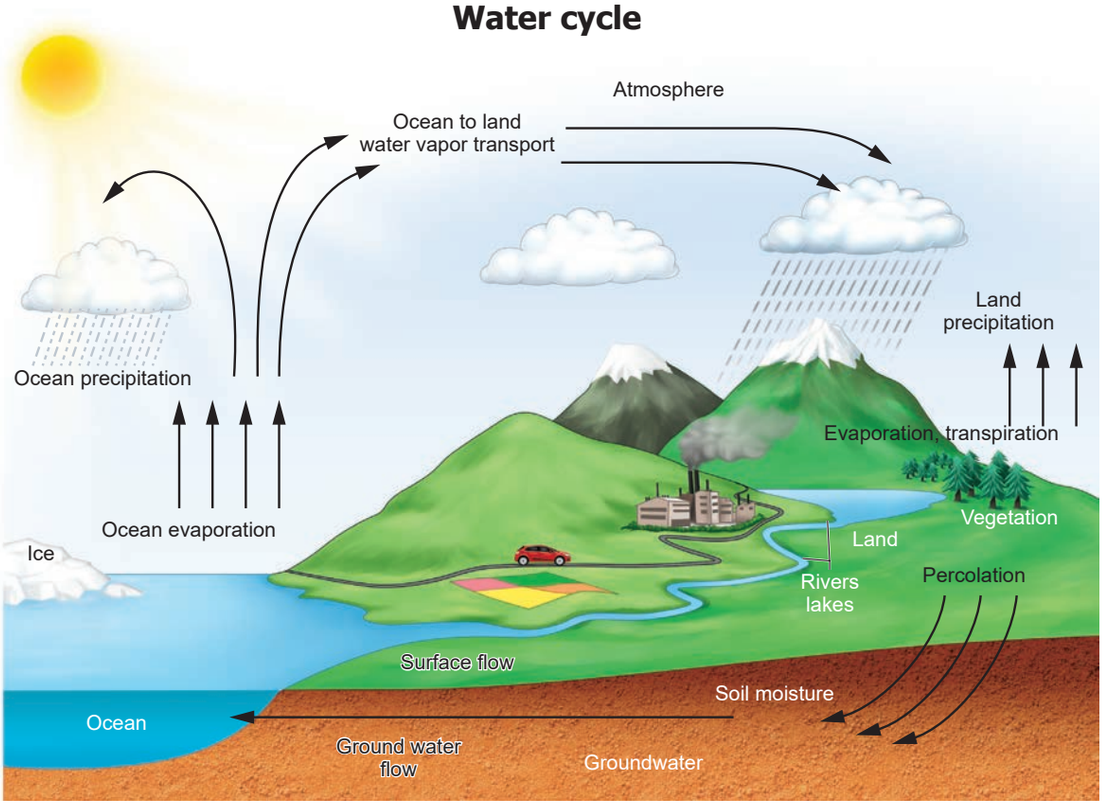
Water cycle



2.5 Water cycle

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The water on the earth evaporates into the atmosphere due to the heat of the sun. The water vapour in the atmosphere forms clouds. From the clouds water falls on the earth in the form of rain or snow. By this natural process, water gets renewed. This is called **water cycle.**

Water cycle is a continuous process. It involves three stages - **evaporation, condensation and precipitation.** It is also called the **hydrological cycle.**

Evaporation : Water from oceans, lakes,ponds and rivers evaporates due to the heat of the sun.

Condensation : Water vapour which enters into the atmosphere by evaporation moves upward with air, gets cooled and changes into tiny water droplets that form clouds in the sky.

Precipitation : The millions of tiny droplets collide with one another to form larger droplets. When the air around the clouds is cool these drops of water fall in the form of snow or rain.

Activity 4: Spread a piece of wet cloth in the sunlight. Observe after some time. Where has the water in the wet cloth gone?

The water evaporates into the atmosphere due to the heat of the sun.

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Have you heard of transpiration?

It is the process of loss of water from the aerial parts of a plant in vapour form.

There is a continuous cycling of water and it exists in three forms in nature.

Water evaporating from lakes, rivers and oceans forms the gaseous state. Rain water forms the liquid state. Snow on mountains and polar ice caps forms the solid state.

These three states occur in nature, keep the total amount of water on the earth constant even when the whole world is using it!

How do you know that atmosphere has water vapour?

Let us do the following activity...

Activity 5: Condensation of water vapour.

Take a glass half filled with water. Wipe the outer surface of the glass with a clean piece of cloth. Add some ice into the water. Wait for one or two minutes. Observe the changes that take place on the outer surface of the glass.

From where do water drops appear on the outer side of the glass?

The cold surface of the glass containing icy water cools the air around it and the water vapour of the air condenses on the surface of the glass. This process is also the result of condensation of water vapour.

2.6 Natural Sources of fresh water

Three types of natural sources of fresh water are available on the earth.

Surface water

Water present on the surface of the earth such as river,lake,ponds, streams or fresh water wetland is called surface water.

Frozen water

Water that is present in the frozen form as polar ice-caps and glaciers are called frozen water. A larger portion of water is 68.7% of the total available fresh water is in frozen state.

Ground water

Ground water is the water present beneath Earth's surface in soil. This water is

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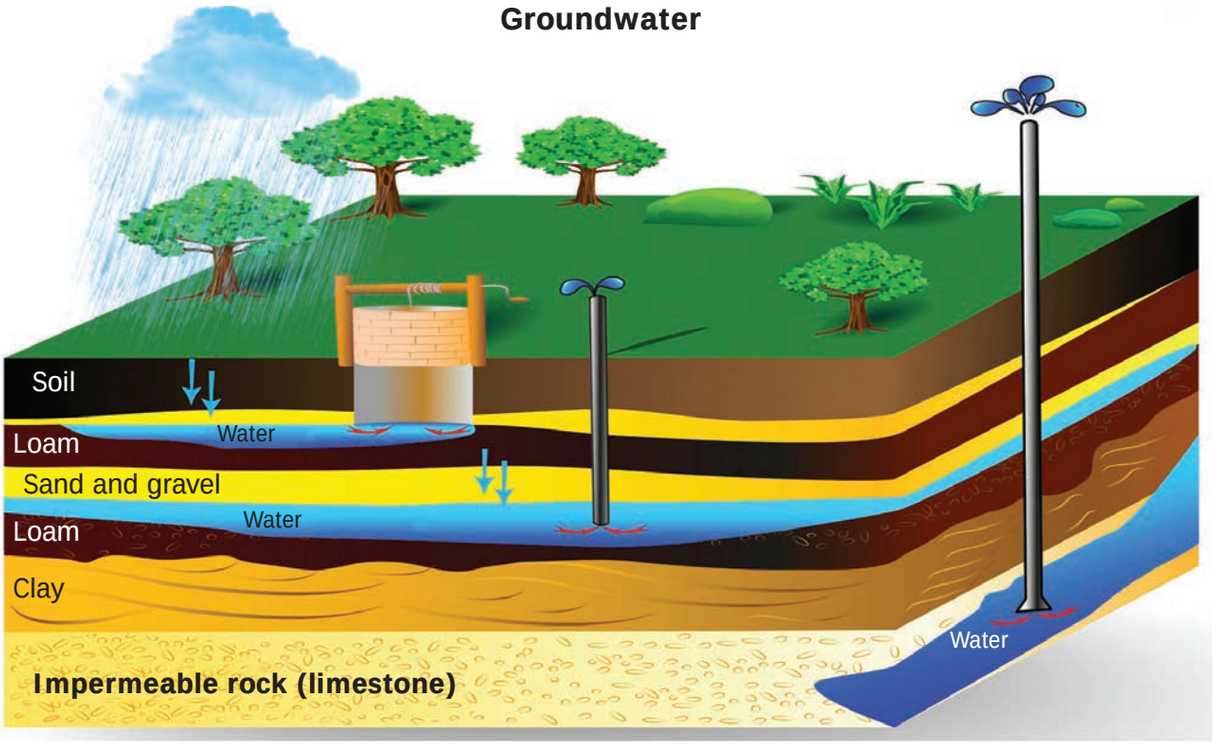

obtained through springs, open wells, tube wells, or hand pumps etc.,

The Himalayas

The Himalayas, contain ice caps, ice bergs and glaciers. Ten of Asia's largest rivers flow from the Himalayas and more than a billion people's livelihoods depend on those rivers.

More to know: Water, is measured in litre and millilitre. Gallon is also a measure of volume of liquids.

1 Gallon = 3.785 litre

Water level in the reserviors is measured in TMC/feet. Water released from dams is measured in cusec (cubic feet/sec).

Aquatic animals

During winter, water in lakes and ponds in the cold countries will be frozen and a solid layer of ice is formed on the surface of water. Still aquatic animals living under the ice do not die. This is because the floating layer of ice acts as a protective coat, and doesn't permit heat to escape from water. So as the water at the surface alone turns to ice, it the existence of aquatic animals.

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2.7 Conservation of water

There is no change in the total quantity of water available on the earth. It remains the same. But the water useful for plants, animals and man is decreasing day by day. It is called scarcity of water.

What are the reasons for scarcity of water?

The main reasons for water scarcity

1. Population explosion
2. Uneven distribution of rainfall
3. Decline of ground watertable
4. Pollution of water
5. Careless use of water

We should take care to prevent scarcity of water. Otherwise,it is impossible for organisms to live on the earth. The only method of preventing scarcity of water is conservation of water. Saving water for the future generations by using water carefully and in a limited way is conservation of water.

Methods of water conservation:

Mainly, two methods can be followed for the conservation of water.

1. Water management

Water management consists of the following factors:

a. Bringing awareness about the bad effects of throwing wastes into the water bodies

b. Recycling of water by separating pollutants.

c. Minimizing the use of chemical fertilizers in agriculture. It reduces the pollution of underground water.

d. Controlling deforestation

e. Adopting drip irrigation and sprinkler irrigation in agriculture. By this way lesser amount of water can be used for the irrigation

2. Rainwater harvesting

Direct collection and use of rain water is called rainwater harvesting.

There are two types of rainwater harvesting.

a. Collecting water from where it falls.

(e.g): Collecting water from the roof tops of the houses or buildings (Roof water harvesting).

b. Collecting flowing rain water

(e.g): Collecting rainwater by constructing ponds with bund.

Coovam is an estuary!

Estuaries are wetlands where water bodies meet the sea. It is a combination of fresh water from land meeting the salty seawater. **Estuaries** are home to unique plants and animal species.

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2.8 Importance of water

Human body: Our body uses water in all its cells, organs and tissues to help regulate its temperature and maintain other bodily functions. On an average, the human body requires 2 – 3 litres of water per day for proper functioning. Water helps in digestion of food and removal of toxins from the body.

Domestic: Apart from drinking, people use water for many other purposes. These include: cooking, bathing, washing clothes, washing utensils, keeping houses and common places clean, watering plants, etc.

Swamps are wetlands that are forested. They occur along large rivers or on the shores of large lakes. The water of a swamp may be freshwater, brackish water or seawater. Swamps are important for providing fresh water and oxygen to all life. Pichavaram Mangroves in Chidambaram, Muthupet mangrove wetland. Pallikkaranai wetland in Chennai, Chembarambakkam in Kancheepuram are a few examples of swamps in Tamilnadu.

Agriculture: Water is also essential for the healthy growth of farm crops and farm stock and is used in the manufacture of many products.

Industry: Industry depends on water at all levels of production. It is used as a material, a solvent and for generating electricity.

Activity 6: Estimation of water consumed by a family on a day

Activity	Amount of water used (in litres)
Brushing	
Bathing	
Washing clothes	
Toilets	
Cooking	
Washing utensils	
Cleaning floor	
Any other purpose	
Total amount of water used by a family in a day	

2.9 Water distribution and treatment system

We know that water is distributed by local bodies. In some areas which water is obtained from river, lake and ground water is treated and distributed. Model of water distribution and treatment plant is shown in figures.

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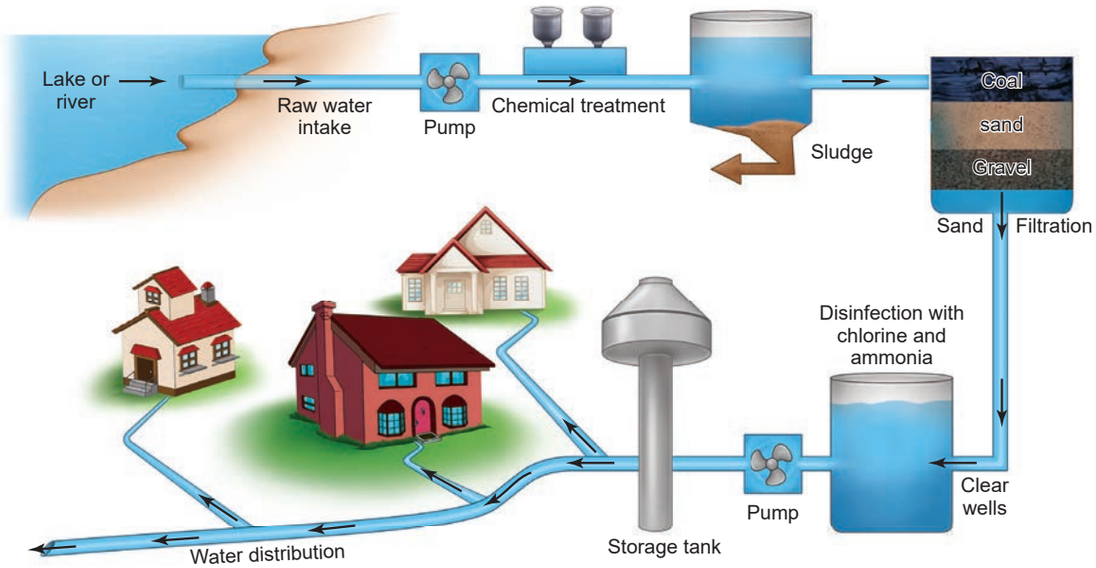
The Water distribution and water treatment system



Let us avoid wasting water

When you happen to see any leaking tap in your school or home, keep a bucket to collect the water that is leaking and measure the amount of water and the time taken to fill the bucket. After noting the time taken to fill a bucket, you can estimate the amount of water getting wasted on a day.

Can you please think over the amount of water getting wasted all around the world from the leaking taps?

Points to remember

- Water is one of the most important components that all animals including human beings and plants depend on for their livelihood.
- To an extent of 97% of the total water that exists on Earth is found in seas and oceans.
- Only 3% of the freshwater is available in polar ice caps and glaciers.
- Lakes, rivers, swamps constitute only 0.3% of the surface water.
- The moisture in the soil indicates the presence of underground water.
- The continuous circulation of water in nature is called the water cycle. It is effected by evaporation, condensation, precipitation and transpiration.
- Ground water is the water present beneath Earth's surface in soil.

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ICT Corner

Water

Through this activity you will be able to know what happens to water when it is taken out of nature, into our house and once it leaves our houses.

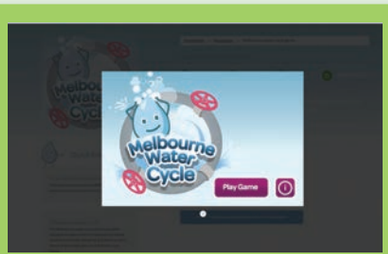
Step 1: Type the URL or scan the QR code to launch the activity.

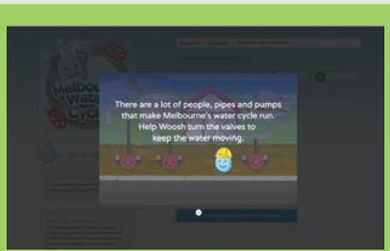
Step 2 : A page of 3 games will open, click on the first game 'Melbourne water cycle', and click the "Play the Melbourne water game" button to start the game.

Step 3: Play the game by following the instructions and using the navigation keys. Observe the steps of water usage and the process of recycling the used water.

Step 4: Play the other two games to know about the Natural water cycle and Sources of water.

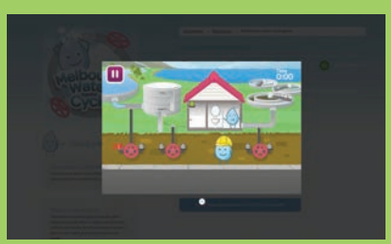
Step 1

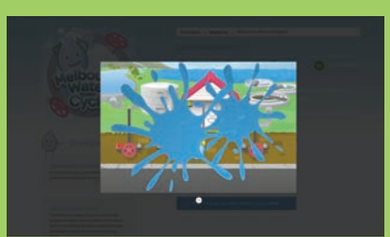




Step 2

Step 3





Step 4

Simple Circuit's URL:

https://www.educationsoutheastwater.com.au/resources?audience=&keywords=&topic=&yearLevel=&type=online-game

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*Pictures are indicative only

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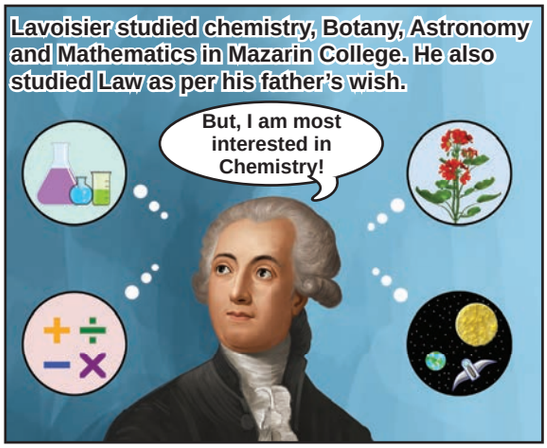
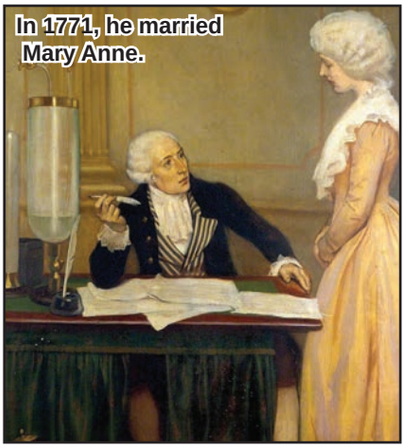
The Revolution in Chemistry

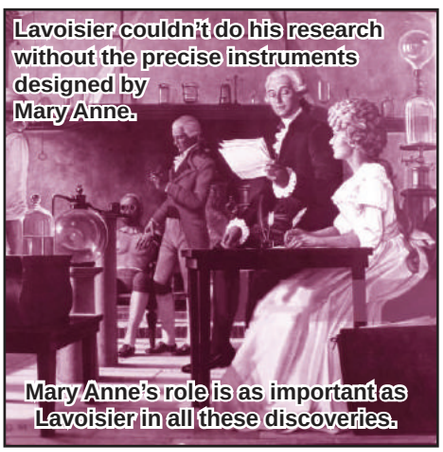
Lavoisier studied chemistry, Botany, Astronomy and Mathematics in Mazarin College. He also studied Law as per his father's wish.



In 1771, he married Mary Anne.

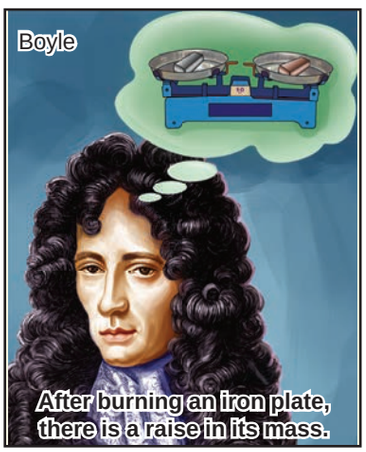


Lavoisier couldn't do his research without the precise instruments designed by Mary Anne.



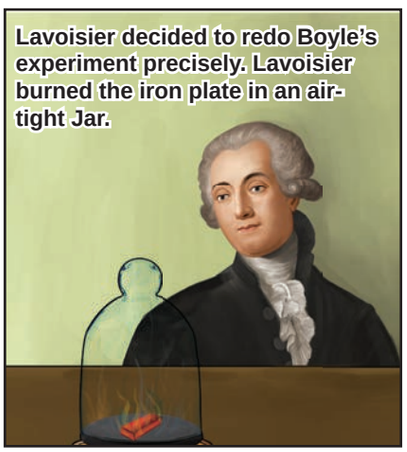
Mary Anne's role is as important as Lavoisier in all these discoveries.

Boyle

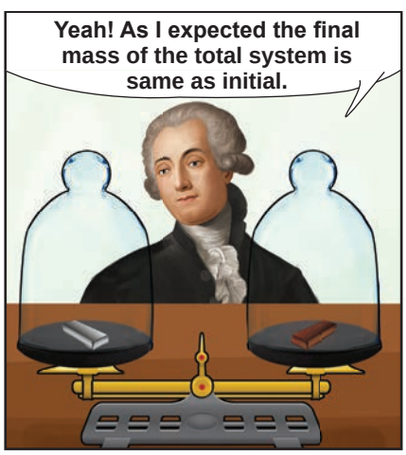


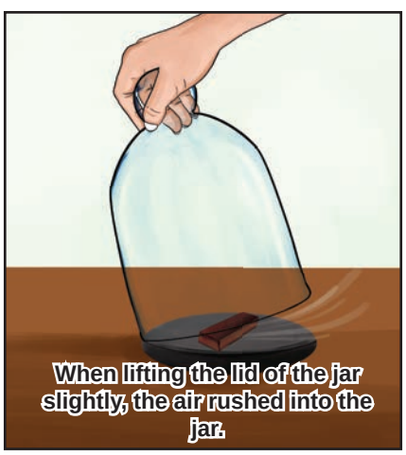
After burning an iron plate, there is a raise in its mass.

Lavoisier decided to redo Boyle's experiment precisely. Lavoisier burned the iron plate in an air-tight Jar.



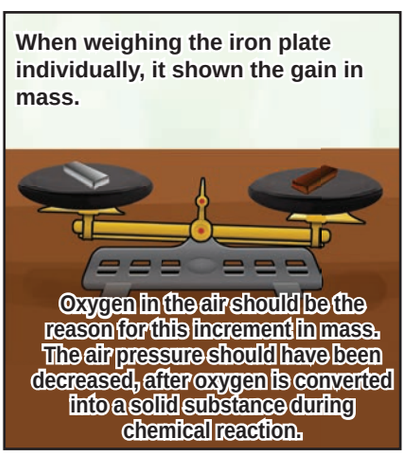
Yeah! As I expected the final mass of the total system is same as initial.





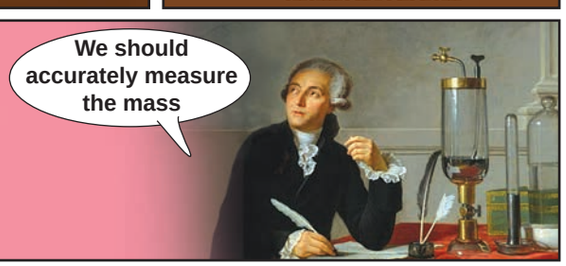
When lifting the lid of the jar slightly, the air rushed into the jar.

When weighing the iron plate individually, it shown the gain in mass.



Oxygen in the air should be the reason for this increment in mass. The air pressure should have been decreased, after oxygen is converted into a solid substance during chemical reaction.

In a chemical reaction, the initial and final mass should be same. so matter can never be created nor destroyed. With a chemical reaction, chemical compound may be changed. We can change the chemical composition of substances by chemical reaction



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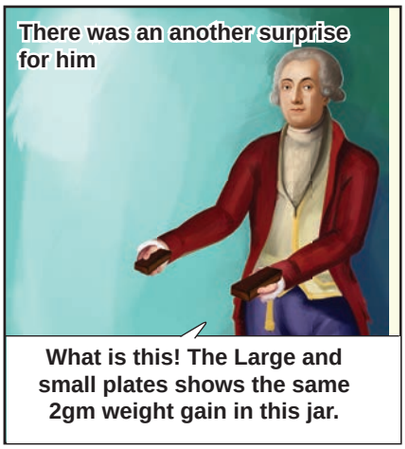

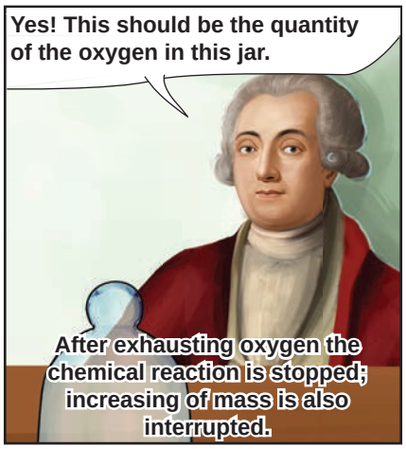

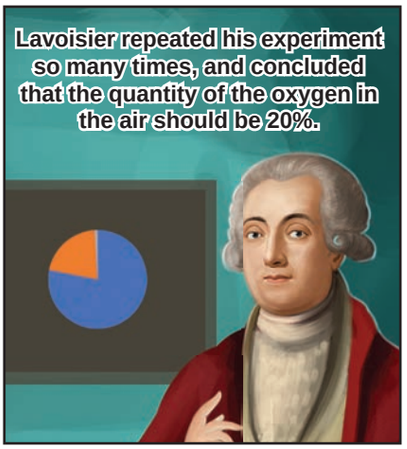

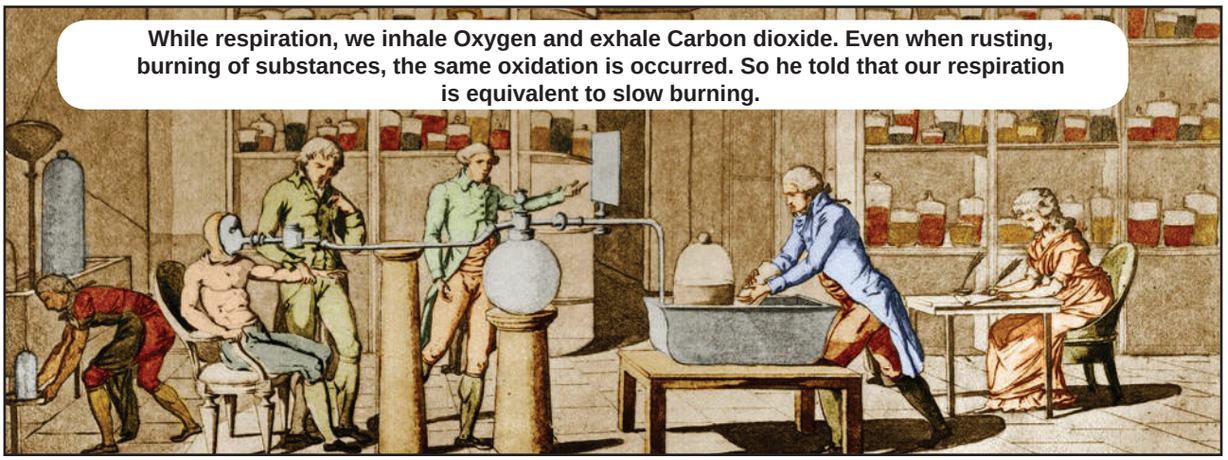

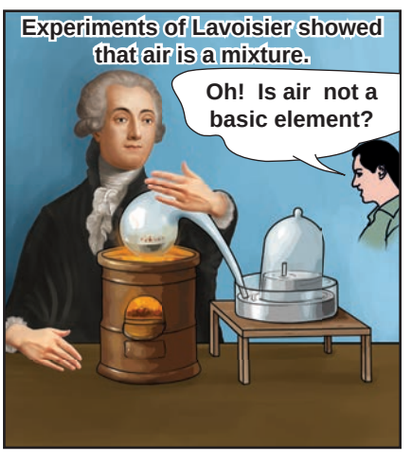

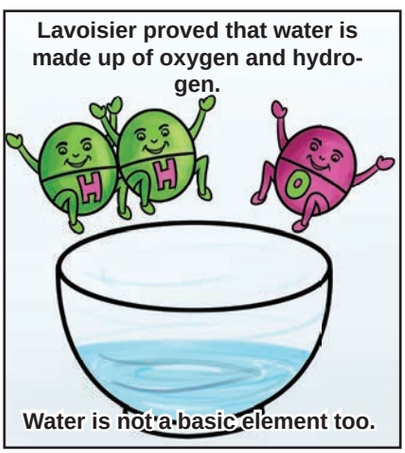

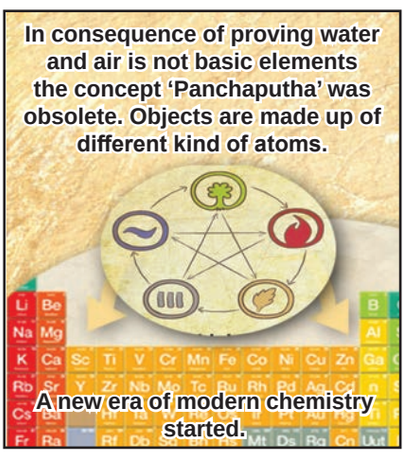

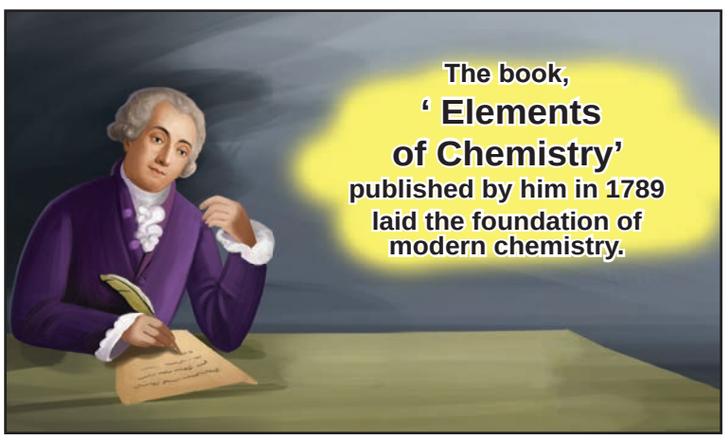

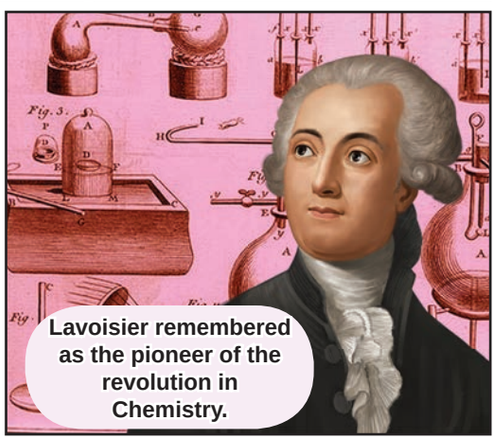

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Evaluation

EF2RTT

I. Choose the appropriate answer

1. Around 97% of water available on earth is _____ water.

   a. fresh b. pure

   c. salty d. polluted

2. Which of the following is not a part of water cycle?

   a. evaporation b. condensation

   c. rain d. distillation

3. Which of the following processes add water vapour to the atmosphere?

   i. Transpiration ii. Precipitation

   iii. Condensation iv. Evaporation

   a. ii and iii b. ii and iv

   c. i and iv d. i and ii

4. About 30% of the fresh water is found in?

   a. glaciers

   b. ground water

   c. other sources of water

   d.0.3%

5. Using R.O. plant at home eliminates lot of non-potable water. The best way to effectively use the expelled water of R.O. plant is _____.

   a. make the expelled water go and seep near the bore well

   b. use it for watering plants

   c. to drink the expelled water after boiling and cooling

   d. to use for cooking as the water is full of many nutrients

II. Fill in the blanks

1. Only _____ percent of natural water is available for human consumption.
2. The process of changing water into its vapour is called _____.
3. _____ is built on rivers to regulate water flow and distribute water.
4. Water levels in rivers increase greatly during _____.
5. Water cycle is also called as _____ .

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

1. Water present in rivers, lakes and ponds is unfit for use by human beings.
2. Seas are formed when the water table meets the land surface.
3 The evaporation of water takes place only in sunlight.
4. Condensation results in the formation of dew on grass.
5. Sea water can be used for irrigation as such.

IV. Match the following

1.	Flood	-	Lake
2.	Surface water	-	Evaporation
3.	Sun light	-	Water vapour
4.	Cloud	-	Pole
5.	Frozen water	-	Increased rain fall

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V. Arrange the following statements in correct sequence

1. These vapours condense to form tiny droplets of water.
2. The water droplets come together to form large water droplets.
3. The heat of the sun causes evaporation of water from the surface of the earth, oceans, lakes, rivers and other water bodies.
4. The large water droplets become heavy and the air cannot hold them, therefore, they fall as rains.
5. Water vapour is also continuously added to the atmosphere through transpiration from the surface of the leaves of trees.
6. Warm air carrying clouds rises up.
7. Higher up in the atmosphere, the air is cool.
8. These droplets floating in the air along with the dust particles form clouds.

VI. Analogy

1. Population explosion : Water scarcity :: Recycle : _____
2. Ground water : _____ :: Surface water : lakes

VII. Give very short answer

1. Name four different sources of water
2. How do people in cities and rural areas get water for various purposes?
3. Take out of cooled bottle of water from refrigerator and keep it on a table. After some time you notice a puddle of water around it. Why?
4. We could see clouds almost every day. Why doesn't it rain daily?
5. Name the places where water is found as ice.
6. How do aquatic animals manage to live in Arctic and Antarctic Circle?
7. What are the types of rain water harvesting?

VIII. Give short answer

1. Differentiate between surface water and ground water.
2. Write a few slogans of your own on the topic "Save Water".
3. About 71% of earth's surface is covered with water, then why do we face scarcity of water?
4. Give reason for the following statement – Sewage should not be disposed of in rivers or oceans before treatment.
5. The fresh water available on earth is only 3%. We cannot increase the amount of water. In that case, how can sustain the water level?

IX . Answer in detail

1. What is potable water? List down its characteristics.
2. Who is known as waterman of India? Browse the net and find the details about the award, the waterman received for water management. State the findings by drafting a report.

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3. What is rainwater harvesting? Explain in a few sentences how it can be used in houses.

X. Question based on Higher Order Thinking Skills

1. When there is no pond or lake in an area, will there be formation of clouds possible in that area?

2. To clean the spectacles, people often breathe out on glasses to make them wet. Explain why do the glasses become wet.

XI. CROSSWORD

DOWN

1. A method of water conservation.

2. Process of getting water vapour from sea water.

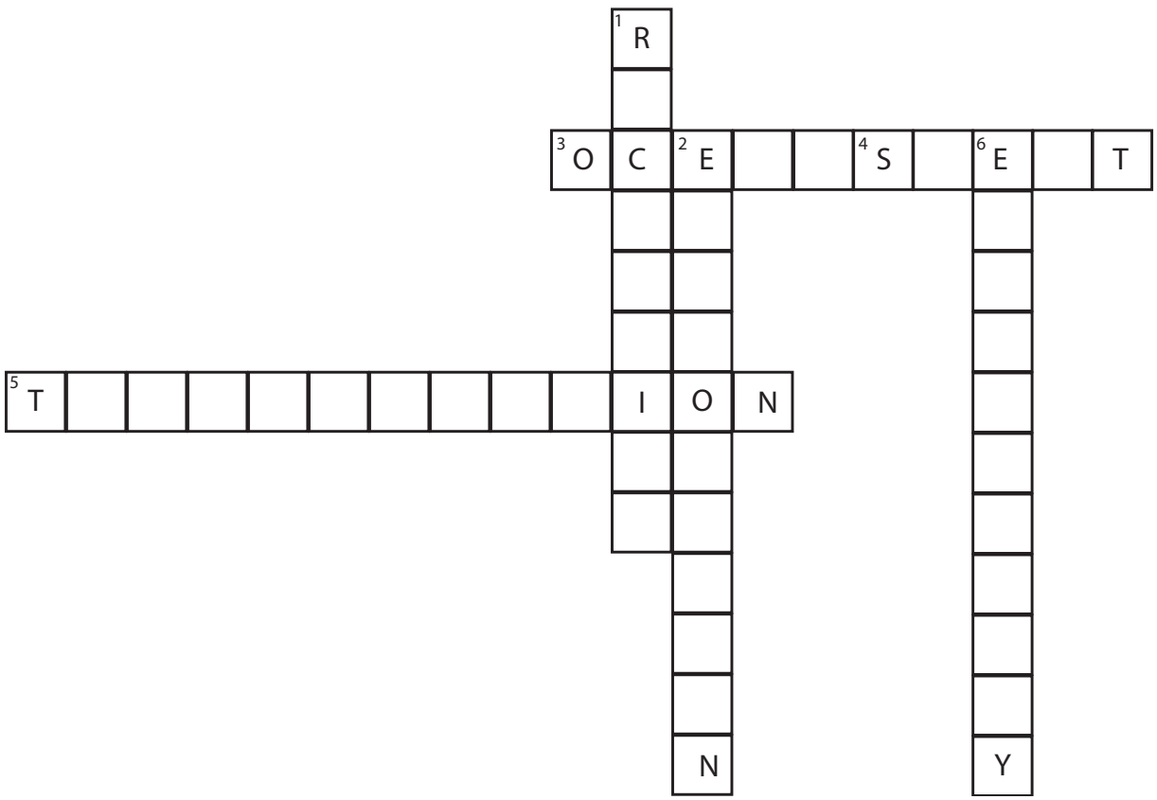
6. Water stored in dams is used for generation of _____.

ACROSS

3. _____ is a large body of non-potable water found in nature.

4. In summer, the body loses water as _____.

5. Plants undergo _____ and contribute to water cycle.



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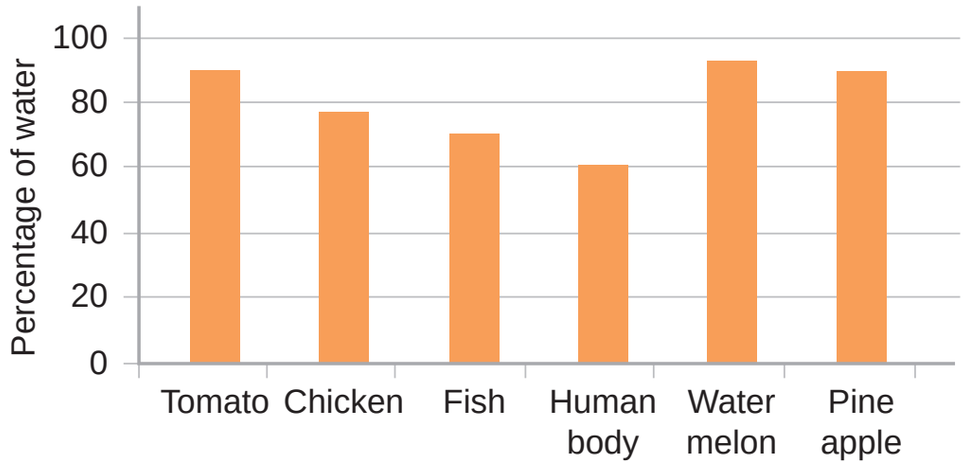
XII. (1). Observe the given graph carefully and answer the questions.



a. What percentage of water is seen in fish?

b. Name the food item that has maximum amount of water in its content.

c. Name the food item that has minimum amount of water in its content.

d. Human body consists of about _____ percentage of water.

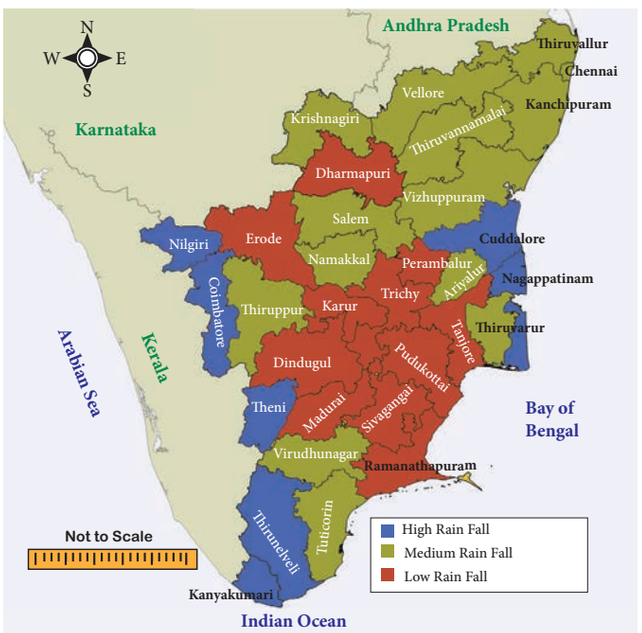
e. Specify the food item that can be consumed by a person when he / she is suffering from dehydration.

(2) Look at the map of Tamilnadu showing annual rainfall and answer the questions given below

a. Identify the districts that get only low annual rainfall in Tamilnadu.

b. Identify the districts that get a medium annual rainfall in Tamilnadu.

c. State the districts that enjoy high annual rainfall in Tamilnadu.



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Unit 3 Chemistry in Everyday life

Learning Objectives

- To understand the importance of science in everyday life
- To understand the preparation of soaps and detergents
- To know about kinds of fertilizers and its uses
- To know about uses of cement, gypsum, Epsom, and plaster of paris
- To know about uses of phenols and adhesives in day to day life

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Introduction

We have studied earlier about the physical changes and chemical changes. Can you identify, from the following list which are physical changes and which are chemical changes?

- breaking of a stick into two pieces
- burning of a paper
- tearing paper into small pieces
- dissolving of sugar in water
- burning of petrol or LPG gas
- water boiling into water vapour
- coconut oil becoming solid during winter

Can you see the important difference between the chemical change and physical change? When you cut a paper into two, both are still paper pieces, but once you burn it, there is no longer the paper, only some ash and the smoke is mixed with the air.

Chemical change results in the change of the substance; In **physical change** only the shape, size or volume changes; the state of the matter may also change, from liquid to gas or from liquid to solid, however the substance remains, chemically as it is.

Let us do the following experiment. Add a pinch of turmeric powder to water; water turns yellow. Take a small quantity of soap water in a beaker and add a pinch of turmeric powder to it. Now, What happens? Is there any change in colour of the solution? Is it also turning to yellow or to some other colour?

Try adding turmeric powder to various household liquids and observe the result. Try it on, say, tamarind extract. Try it on with cleaning liquids in the house. Does it change the colour?

Chemists identify turmeric powder as a **'natural indicator'.** The change in colour indicates that the material is either acid or base medium.

Find answer for the following questions with the help of your teacher. This will help you to understand how chemistry plays vital role in our life.

- How does milk change into curd?
- How can you remove stain on the copper vessels?
- Idli is a little bit hard while we cook by using newly grinded idli dough but it is soft with old dough. Why?
- How does rusting of iron happen?
- Why does white sugar change into black when heating?

We can understand the chemical changes that happen around us by knowing the answers for the above questions.

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We use chemical changes in various forms in our daily life. **Chemistry** is the branch of science which deals with the study of particles around us. The beauty of chemistry is that, it explains the properties of the basic components of particles such as atoms and molecules and the effects of their combination.

We can consider all the particles around us as chemicals. The water (H_2O) we drink is the combination of hydrogen and oxygen. The salt (NaCl) we use in our kitchen is a combination of the chemicals, sodium and chlorine. Even our body is made up of a lot of chemical particles.

We could prepare soft idly as a result of a chemical change named fermentation takes place in the idly batter. During fermentation the idly batter undergoes a chemical change by bacteria. While cooking, the food products undergo so many chemical changes. As a result there are favourable changes in colour, flavour and taste in the food.

We can use chemical changes to produce certain materials. For example, some of the objects such as soaps, fertilizers, plastics and cement which we use in our daily life can be prepared by making chemical changes in some naturally occurring objects.

Activity 1: Discuss with your group and list out few chemicals which we use in our home and school.

_____

_____

_____

We can study about the manufacturing processes and usages of certain materials we use in our daily life such as **soaps, fertilizers, cement, gypsum, Epsom, plaster of paris, phenol** and adhesives in this lesson.

DO YOU KNOW?

When we cut onion, we get tears in the eyes with irritation, because of the presence of a chemical, propanethial s-oxide in onion. This is easily volatile. When we cut onion some of the cells are damaged and this chemical comes out. It becomes vapour and reach our eyes result in irritation and tears in eyes. When we crush the onion, more cells will be damaged and more chemicals come out.

3.1 Soaps and Detergents

Bathing soap and washing detergents are kinds of soaps which we use in our daily life. In addition to this, we are

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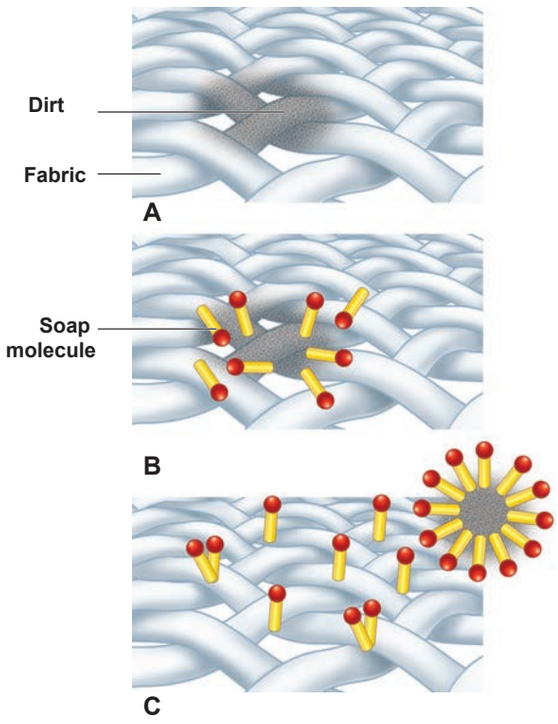
using wash powder to remove strong stains on the clothes.

The detergent molecules have two sides, one side **water loving**, other **water hating**. Water hating goes and joins with dirt and oil in the cloth while the water loving joins with the water molecules.

When you agitate the cloth the dirt is surrounded by many molecules and is taken away from the cloth. The cloth becomes clean, and the dirt surrounded by the detergent molecules float in the water making it dirty.

How soaps clean clothes?



We can prepare our own soap by the following activity.

Activity 2: Preparation of Soap

Materials Required: 35 ml of water

10 g. of Lye (Sodium hydroxide) 60 ml of coconut oil.

Process : Cover your work area with old newspaper. Take 35 ml of water in a jar. Add 10 gram of concentrated sodium hydroxide and allow it to cool.

Then add 60 ml of coconut oil drop by drop and stir it well. Pour that solution into an empty match box, soap can be obtained after getting dried.

Try this soap to wash your handkerchief.

Different soaps for different purposes are prepared with various raw materials. We can understand this by doing the following activity.

Activity 3: Collect various kinds of soap's wrapper. Complete the following table based on the information provided in the wrapper.

S. No	Name of the Soap	Ingredients
1.	Bathing soap	
2.	Washing soap	
3.	Bathing soap for kids	
4.	Toilet cleaners	
5.	House floor cleaner liquid	

Inference: Nature of the soaps varies according to its constituents.

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CHEMISTRY IN EVERY DAY LIFE

01 Soaps and Detergents

Gets clothes cleaner and cleans your body

02 Fertilizers

It helps plants to grow. organic fertilizers restore soil fertility

03 Adhesives

Helps the materials fixing it up together

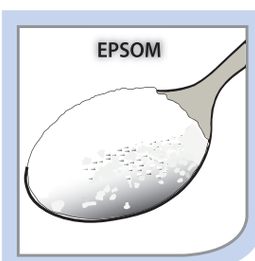
04 Cement

Important material in construction industry

05 Plaster of Paris

Used in surgery for setting fractured bones and used for making casts for statues and toys

06 Gypsum & Epsom



Helpful to humans, animals, plants and environment

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3.2 Fertilizers

Apart from water, sunlight and air, certain nutrients are also needed for the growth of plants. We know that the plants get their nutrients from the soil.

Nitrogen (N), Phosphorous (P) and Potassium (K) are the three important nutrients among the various nutrients needed for the growth of plants. These three are called as **Principal Nutrients.**

The table given below depicts the quantity of elements absorbed by certain common plants.

Crop	Yield per hectare (kg) (Approxi-mate)	Nitrogen (kg)	Phosphorous (kg)	Potassium (kg)
Rice	2,240	34	22	67
Corn	2,016	36	20	39
Sugarcane	67,200	90	17	202
Groundnut	1,904	78	22	45

❖ What would happen to the nutrient content of the soil, if the field is farmed continuously?

_____

❖ How could we resend these nutrients back to the soil?

_____

Fertilizers are organic or inorganic materials that we add to the soil to provide one or more nutrients to the soil.

Fertilizers given to plants can be classified into two. They are organic and inorganic fertilizers.

Organic fertilizers

Fertilizers containing only plant or animal-based materials or those synthesized by micro-organisms are called organic fertilizers.

These fertilizers can be prepared easily. This type of fertilizers are economical. **(e.g) Vermi compost, compost.**

Inorganic fertilizers

The fertilizers prepared by using natural elements by making them undergo chemical changes in the factories are called inorganic fertilizers. **(e.g) Urea, Ammonium sulphate and Super phosphate.**

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The table given below lists the nutrients in inorganic fertilizers

Name of fertiliser	Nitrogen(%)	Phosphorus(%)	Potassium (%)
Urea	46	0	0
Super phosphate	0	8-9	0
Ammonium sulphate	21	0	0
Potassium nitrate	13	0	44

If we use 50 kg of urea, then according to the table, 23 kg of nitrogen (46 percent) will be added to the soil.

❖ The percentage of nitrogen in ammonium sulphate is

_____

❖ If 50 kg of potassium nitrate is added to soil, how much potassium would the soil get?

_____

Earthworms take organic wastes as food and produce compost castings. So earthworms are known as **Farmers' friends** because of the multitude of services they provide to improve soil health and consequently plant health.

Activity 4: Make a visit to agriculture field in your area. List out the various crops and type of fertilizers used there.

S. No.	Name of the Crop	Name of the Fertilizer
1.		
2.		
3.		

3.3 Cement

In ancient period, the houses were constructed by using the mixture of lime, sand and wood. At present, the people are widely use the cement for construction of houses, dams and bridges. **The cement is manufactured by crushing of naturally occurring minerals such as lime, clay and gypsum through milling process.**

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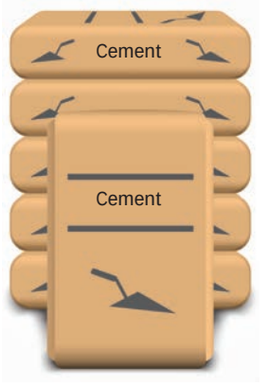

Cement becomes hardened when it is mixed with water. Gypsum plays a very important role in controlling the rate of hardening of the cement. During the cement manufacturing process, a small amount of gypsum is added at the final grinding process. Gypsum is added to control the "setting of cement".

In 1824, Joseph Aspdin invented Portland cement by burning finely ground chalk and clay in a kiln. It was named "Portland" cement because it resembled the high-quality building stones found in Portland, England.

Uses of cement

Cement is used as **mortar, concrete and reinforced cement concrete.**

Mortar

Mortar is a paste of cement and sand mixed with water. In houses, mortar is used to bind building blocks for constructing walls, to apply coating over them and to lay floor.

Concrete

Concrete is a mixture of cement, sand and gravel. It is used in the construction of buildings, bridges and dams.

Reinforced Cement Concrete

Reinforced cement concrete is a composite material by mixing iron mesh with cement. This is very strong and firm. It is used in the construction of dams, bridges, centering works in houses and construction of pillars. Huge water tanks, water pipes and drainages are built with this.

Activity 5: Take three empty tumblers of same size and name them as A, B and C. Add two tea spoonful of cement in each of the container. Then pour one tea spoonful of water in container A and two spoonful of water in B and three spoonful of water in C.

After an hour, observe which container of the cement set fast? Touch the containers and see if they are warm or cool. From this experiment, we understand that water and cement should be mixed in a certain ratio for fast setting.

3.4 Gypsum

Gypsum is a soft white or grey, naturally available mineral. The chemical name of gypsum is **calcium sulphate dihydrate.**

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The molecular formula of gypsum is $CaSO_4 \cdot 2H_2O$.

Uses

- Used as fertilizers.
- Used in the process of making cement.
- In the process of making Plaster of Paris.

3.5 Epsom

Epsom salt is **magnesium sulphate hydrate.** The molecular formula of Epsom is $MgSO_4 . 7H_2O$. It offers a wide range of uses.

Uses

- Eases stress and relaxes the body
- Helps muscles and nerves function properly
- Medicine for skin problems
- Improving plant growth in agriculture

3.6 Plaster of Paris

Plaster of Paris consists of fine white powder **(calcium sulphate hemihydrate)** The molecular formula of Plaster of Paris is $CaSO_4 . 1/2H_2O$. Known since ancient times, plaster of paris is so called because of its preparation from the abundant gypsum found near Paris, capital of France. Plaster of paris is prepared by heating gypsum, where it gets partially dehydrated.

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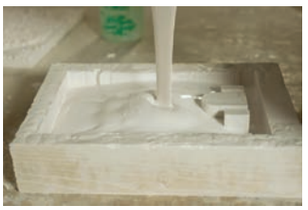

Uses

- In making black board chalks.
- In surgery for setting fractured bones.
- For making casts for statues and toys etc.
- In construction industry.

3.7 Phenol

Have you ever observed the oily material which is used to clean your house? Do you know what it is? It is a chemical named as Phenol.

Phenol is a **carbolic acid** of an organic compound. It is a necessary ingredient for preparing variety of phenol products. The molecular formula of phenol is C_6H_5OH, it is a weak acid. It is a volatile, white crystalline powder.

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It is a colorless solution, but changes into red in the presence of dust.

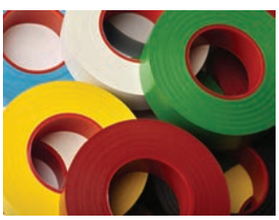
It irritates when exposed on human skin. It is widely used for industrial purposes.

Phenol itself is used (in low concentrations) in mouthwash and as a disinfectant in household cleaners. Phenol used as surgical antiseptic since it kills micro organisms.

3.8 Adhesives

EG4B1E

What will you do when a page of your book is torn accidentally? It can be fixed by using a cello tape. How cello tape works? There is a paste like material in one surface of the cello tape. Have you ever discussed about this material? The paste like substance is called adhesive. It is commonly known as glue, mucilage, or paste. The substances applied to one surface, or both the surfaces of two separate items that binds them together and resists their separation are called **adhesives**.



Adhesives are substances that are used to join two or more components together through attractive forces acting across the interfaces.

A practical experience

Do you notice how puncture of your bicycle is repaired by the shop keeper? He ensures the punctured surfaces are clean, dry and free of dust, and roughens the area around the hole using a metal scraper. He takes an appropriate patch of tyre-tube and applies a suitable adhesive to both the roughened area and to the underside of the patch, apply firm pressure and allows drying completely. Why does he apply pressure? This increases the adhesive capacity at both the surfaces and ensures proper binding.

Types of adhesives

There are two kinds of adhesives, one is natural made from starch and another one is artificial made from chemicals. The one used in puncture shop is an artificial adhesive.

Artificial adhesives may be classified in a variety of ways depending on their utilities. Their forms are paste, liquid, film, pellets, tape.

It is used in various conditions such as hot melt, reactive hot melt, thermo setting, pressure sensitive, and contact.

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Points to Remember

- Soaps are prepared by heating the mixture of olive oil, animal fat and concentrated sodium hydroxide solutions.
- Fertilizer facilitates growth of plants.
- Vermi compost has high nutrient benefits and it is useful for sustaining the land fertility.
- Cement is manufactured by using lime, clay and gypsum.
- Plaster of Paris is used to fix bone fractures.
- Diluted phenol is used as a cleaner, disinfectant and mouthwash.
- Adhesives are substances that are used to join two or more components together.

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ICT Corner

Nutrients for life

Through this activity you will be able to learn about the 4Rs of crop nutrients and their importance.

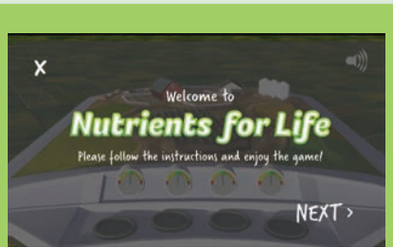
Step 1: Type the following URL in the browser. 'NUTRIENTS FOR LIFE' activity page will open.

Step 2: Click the ' X ' icon on the top left of the activity window to close the welcome note and start the activity or click on 'Next' on the bottom to read the instructions.

Step 3: A corn field , 4 cubes and 4 dials are shown, Using the mouse grab the cubes at the bottom which are labelled WATER , N, P, K and drop them over the crop.

Step 4: Each time you apply water or nutrients on the crop it will rise the dial. Keep all the dials in the green. Repeat the same process till the crop is fully grown.

Step 1



Step 4

Nutrients for life URL:

http://seedsurvivor.com/agrium-games/Feeding%20the%20Future/

*Pictures are indicative only

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Evaluation

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I. Choose the appropriate answer

1. Soaps were originally made from _____ .

   a. proteins

   b. animal fats and vegetable oils

   c. chemicals extracted from the soil

   d. foam booster

2. The saponification of a fat or oil is done using _____ solution for hot process.

   a. Potassium hydroxide
   b. Sodium hydroxide
   c. Hydrochloric acid
   d. Sodium chloride

3. Gypsum is added to the cement for _____.

   a. fast setting b. delayed setting

   c. hardening d. making paste

4. Phenol is _____.

   a. carbolic acid b. acetic acid

   c. benzoic acid d. hydrochloric acid

5. Natural adhesives are made from _____.

   a. Protein b. fat

   c. starch d. vitamins

II. Fill in the Blanks

1. _____ gas causes tears in our eyes while cutting onions.
2. Water, coconut oil and _____ are necessary for soap preparation.
3. _____ is called as farmer's best friend.
4. _____ fertilizer is ecofriendly.
5. _____ is an example for natural adhesive.

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

1. Concentrated phenol is used as a disinfectant.
2. Gypsum is largely used in medical industries.
3. Plaster of Paris is obtained from heating gypsum.
4. Adhesives are the substances used to separate the components.
5. NPK are the primary nutrients for plants.

IV. Match the following

1.	Soap	-	C_6H_5OH
2.	Cement	-	$CaSO_4.2H_2O$
3.	Fertilizers	-	NaOH
4.	Gypsum	-	RCC
5.	Phenol	-	NPK

V. Arrange the following statements in correct sequence

1. Pour that solution into an empty match box, soap can be obtained after drying.

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2. Take necessary quantity of water in a jar.
3. Then add coconut oil drop by drop and stir it well.
4. Add concentrated sodium hydroxide in the jar and allow it to cool.
5. Try this soap to wash your hand kerchief.
6. Cover your work area with old newspaper.

VI. Analogy

1. Urea : Inorganic fertilizer: Vermi compost: _____.
2. _____: Natural adhesives: Cello tape: Artificial adhesives.

VII. Give very short answer

1. What are the three main constituents of soap?
2. What are the two different types of molecules found in the soap?
3. Give an example for inorganic fertilizer.
4. Mention any three physical properties of phenol.
5. Explain the uses of plaster of paris.
6. What are the ingredients of the cement?
7. Why gypsum is used in cement production?

VIII. Give short answer

1. Why earthworm is called as farmer's friend?
2. Explain the process of manufacturing cement.
3. What are uses of Gypsum?

IX. Answer in detail

1. How are detergents manufactured?

X. Questions based on Higher Order Thinking Skills

1. Ravi is a farmer; he rears many cattle in his farm. His field has many bio wastes. Advise Ravi how to change this bio waste to compost by using vermi -composting techniques. Explain the benefits of vermi castings.

XI. Project

- ❖ Take 100 ml of hot water in a glass jar.
- ❖ Add 50 gram of maida in the hot water and stir it well.
- ❖ A paste like substances are formed. Add a small quantity of copper sulphate for a long use.
- ❖ Now you test this paste by binding your damaged book.

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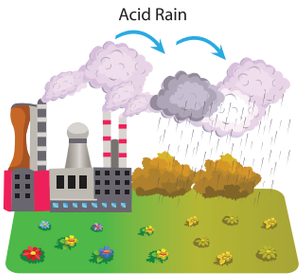
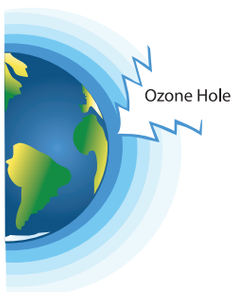
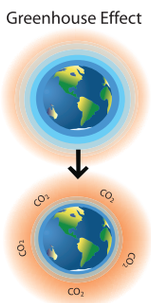
Unit 4 Our Environment







Learning Objectives

- To acquire knowledge about ecosystems and their components
- To understand food chains and their role in ecosystems
- To learn about waste, its management and recycling
- To find out the difference between biodegradable and non-biodegradable waste
- To study different types of pollution and their impact on environment

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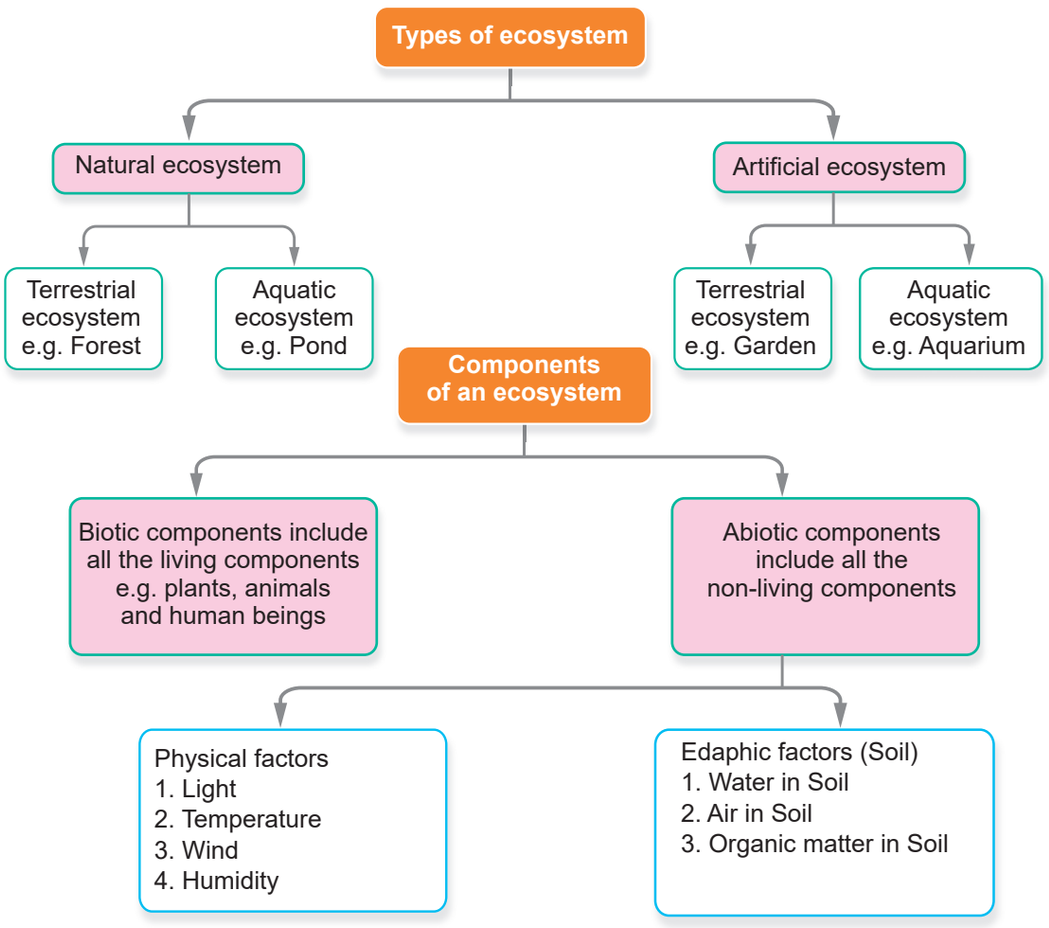
Introduction

The surroundings or space in which a person, animal, or plant lives, is known as on **environment**. Environment is everything that is surround us. It can have both living (biotic) and non-living things (abiotic). **Abiotic factors** are non-living parts such as sunlight, air, water and minerals in soil. **Biotic factors** are living things of our environment such as plants, animals, bacteria and more. Organisms live, constantly interact with one another and adapt themselves to conditions to their environment.

4.1 The Ecosystem

Ecosystem is a community of living and non-living things that work together. Each part of an ecosystem has a role to play. Any changes in the environment such as increased temperature or heavy rains, can have a big impact on an ecosystem.

Ecosystems can be either natural or artificial.



Activity 1: Think of the objects in your home. Just keep in mind, the books, toys, furniture, food materials and even pets of your home. These living and non-living things together make your home. Look at the following picture and list out the living and non-living things.

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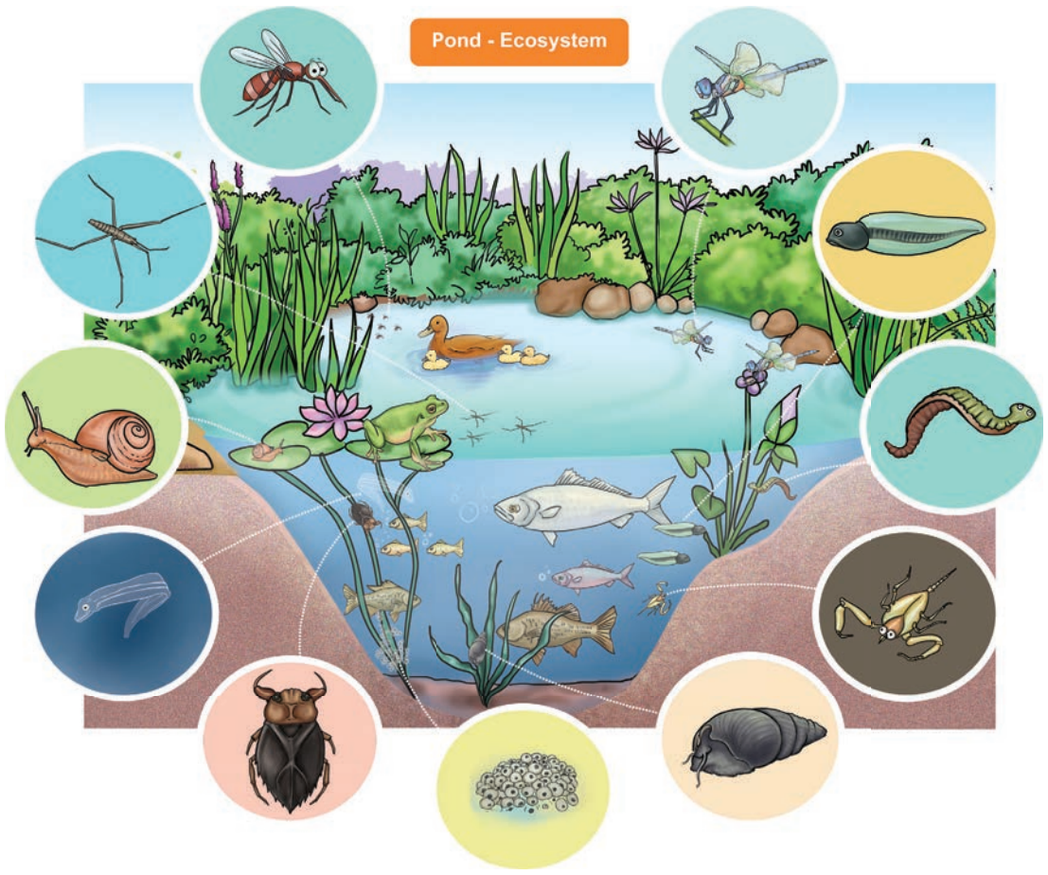

Natural ecosystem

Ecosystem originated without human intervention is called a **natural ecosystem**. This can be an aquatic ecosystem or a terrestrial ecosystem.

The ecosystem in water is called **aquatic ecosystem**. Sea, river, lake, pond and puddle are some examples of natural aquatic ecosystem.

Ecosystems outside the water body and on land are called **terrestrial ecosystems.** Forests, Mountain regions, deserts etc., are examples of natural terrestrial ecosystems.

Artificial ecosystem

Artificial ecosystems are created and maintained by human. They have some of the characteristics of natural ecosystems. They are much simpler than the natural ecosystems.

These can be the terrestrial ecosystems such as paddy fields, gardens etc. or the aquatic ecosystem such as fish tank.

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DO YOU KNOW?

Aquarium:

Aquarium is a place in which fish and other water creatures and plants are maintained. An aquarium can be a small tank, or a large building with one or more large tanks.

Terrarium:

Terrarium is a place in which live terrestrial animals and plants are kept. Plants and animals are kept in a terrarium with controlled conditions that copy their natural environment

Aquariums and Terrariums are used to observe animals and plants more closely. They are also used for decorations.

4.2 Food Chain and Food Web

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Living organisms need food to perform their life processes. Some organisms can produce their own food, such as plants, while other organisms cannot do this and need to feed on other organisms to obtain their energy.

We can therefore identify different feeding types in an ecosystem, based on how the organism obtain (gets) its food. They are **producers and consumers.**

Producers

Producers are organisms that are able to produce their own organic food. They do not need to eat other organisms to do this. Producers are also called **autotrophs.** Can you name an organism that prepare it's own food?

Plants are producers because they make their own food by photosynthesis.

What do plants need in order to photosynthesis?

Consumers

Organisms which cannot produce their own food, need to eat other organisms as food. These organisms are called **consumers.** All animals are consumers as they cannot produce their own food. Consumers are also called **heterotrophs.**

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There are many types of consumers and we can classify them into specific groups depending on the food that they consume. These are:

- **herbivores**

Animals which eat plants or plant products e.g: cattle, deer, goat and rat.

- **carnivores**

Animals that eat other animals e.g: Lion, tiger, frog and owl.

- **omnivores**

Animals that eat both plants and animals e.g: Humans, dog and crow

- **decomposers**

Micro-organisms that obtain energy from the chemical breakdown of dead organisms (both plants and animals). They break complex organic substances into simple organic substances that goes into the soil and are used by plants. (e.g) Bacterium, Fungi

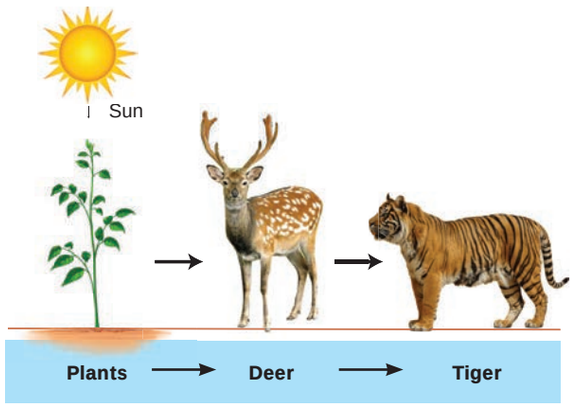
Food chain

In a forest, deer eats grass; and in turn we know tiger eats deers. In any ecosystem there is a chain like relationship between the organisms that live there. **This sequence of who eats whom in an ecosystem is called as food chain.**

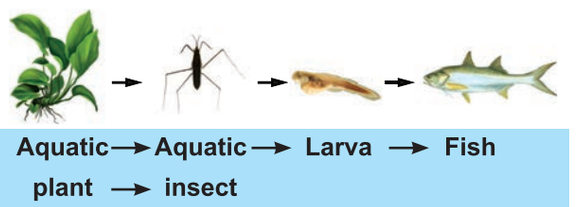
It describes how organisms get energy and nutrients by eating other organisms.

A food chain shows the relationship between producers (e.g. grass) and consumers (e.g. deer, goats, cows and tiger).

E.g. Food chain in a terrestrial (grassland) ecosystem



E.g. Food chain in an aquatic (lake) ecosystem



Energy flow

The food chain begins with the energy given by the Sun. Sunlight triggers photosynthesis in plants. The energy from the Sun is stored in the plant parts. When the grasshopper eats the grass, the energy flows from grass to grasshopper. Frog gets energy by eating grasshopper. This energy is transferred to a crow, when the frog is eaten by a crow. Thus we conclude the primary energy production in the world of living things is made by plants; that is by photosynthesis.

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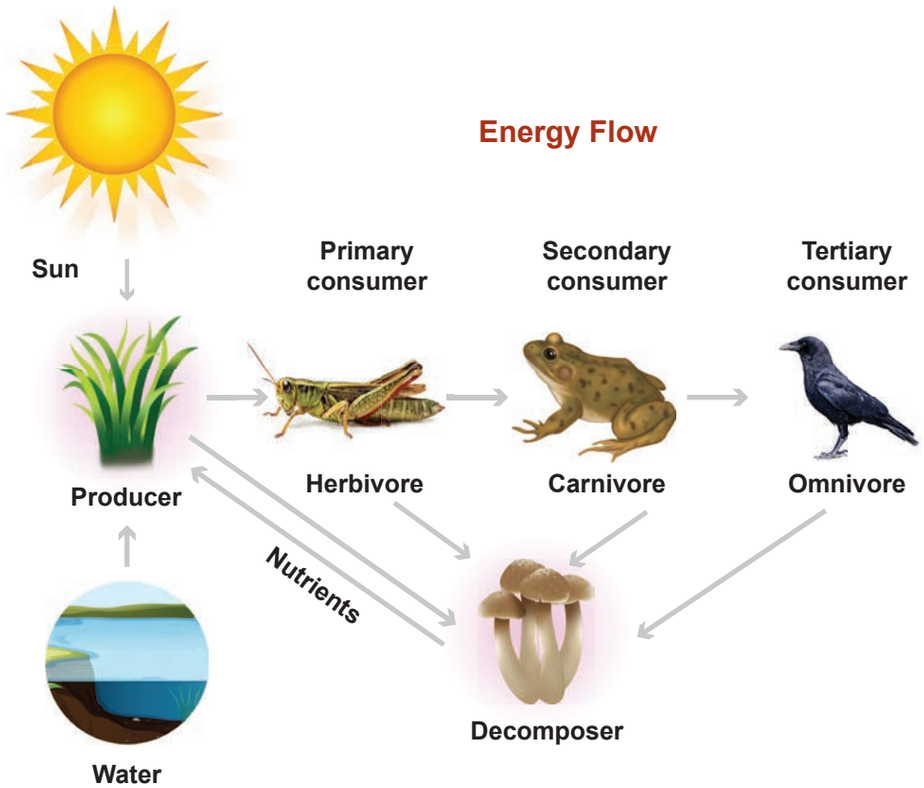


The micro organism reduce the excreata and the dead bodies of animals into primary simple components and puts them back into soil. It is this material that help the plants to grow. Thus we can see that there is a cycle of materials from primary producers to highest level predators, then back to soil.

Trophic levels

We see that the energy is passed along from the producer to the consumers. But, there are three different consumers in any food chain. How can we distinguish different consumers?

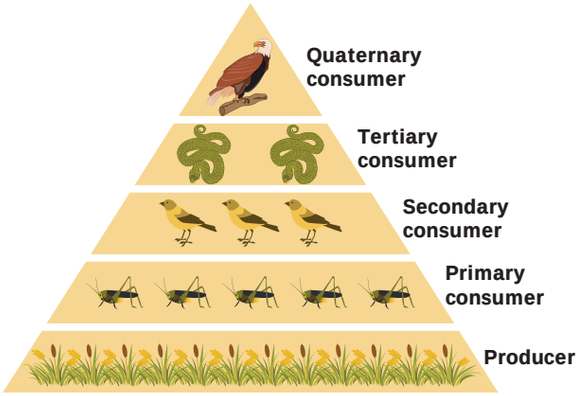
Animals that eat plants are **primary consumers.**

Animals that eat primary consumers are called **secondary consumers.**

Animals that eat the secondary consumers (mostly predators) are the **tertiary consumers.**

There may even be large predators that eat tertiary consumers. They are called as **quaternary consumers.**

Each of these levels in the food chain is called a **trophic level.**



Organism uses up to 90% of its food energy for its life processes. Only about

10% of energy goes into new body cells and will be available to the next animal when it gets eaten. This loss of energy at each trophic level can be shown by an **energy pyramid.**

A rat eats grains; and in turn we know snake eats rat. Now snake is a prey for peacock and in turn peacocks are easy prey for tigers and leopards. Now think? Do tigers have any natural predators?

In all food chain there is a top level predator that has no natural predators. In an aquatic ecosystem there are no natural predator for alligator; in a forest there are no natural predators for tigers.

Importance of food chain

1. Learning food chain help us to understand the feeding relationship and interaction between organisms in any ecosystem.

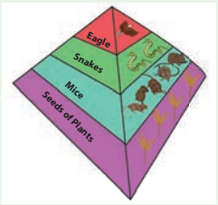
2. Understanding the food chain also helps us to appreciate the energy flow and nutrient circulation in an ecosystem. This is important because pollution impacts the ecosystem. The food chain can be used to understand the movement of toxic substances and their impacts.

Food web

Consumers have different sources of food in an ecosystem and do not rely on only one species for their food. If we put all the food chains within an ecosystem together, then we end up with many interconnected food chains. This is called a food web.

A food web is very useful to show the many different feeding relationships between different species within an ecosystem.

Activity 2: Take a square paper. Fold its diagonals. Draw three lines in three triangles as shown in the picture.

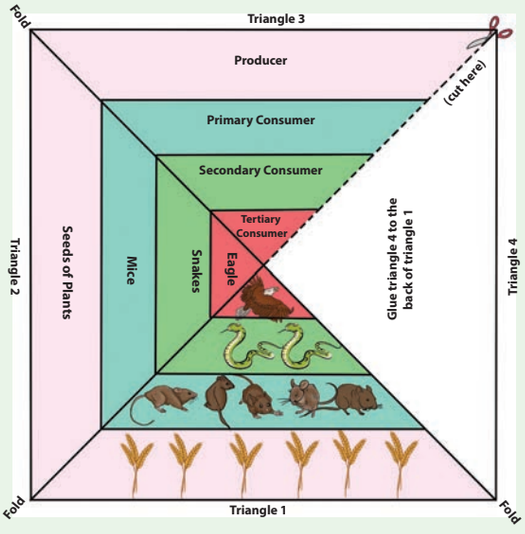


Cut from the edge of the diagonal to the center as shown in the picture.

If you fold this triangle and paste behind the third triangle you get a pyramidal shape.

In one of the triangles, draw images of each of the organisms in the different levels.

In another triangle write the names of the organisms. In the last triangle, write the energy level of the organism. Have a look at the following example. You must come up with different organisms!.



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POLLUTION

When something harmful or poisonous is added to the environment.

FOOD CHAIN AND FOOD WEB

The flow of energy and nutrients.

OUR ENVIRONMENT

is everything around us.

AN ECOSYSTEM

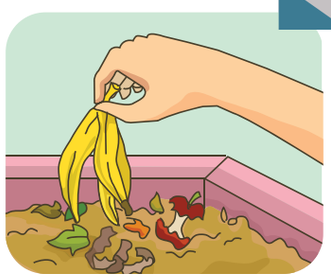
is a community made up of living organisms and non-living components.

3R PRINCIPLE

Idea of shifting from a mass consumption society

Reduce Reuse Recycle

BIODEGRADABLE



Materials which can be broken down by bacteria, fungi and earthworms.

NON-BIODEGRADABLE

Materials that cannot be broken down by the action of living organisms.

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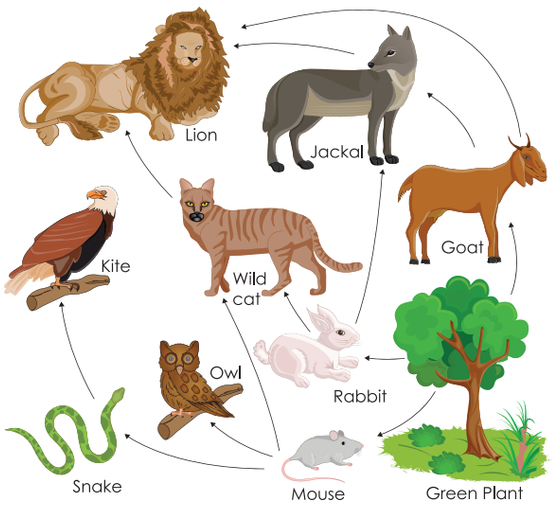

Food Web

4.3 Waste Management and Recycling

To protect our environment, it is very important to reduce waste, manage it properly and maximise recycling. Waste is any substance or material that has been used but is not wanted anymore. This is either because it is worn out, broken or no longer has any purpose. Everyone produces waste and our waste has an impact on all ecosystems. However, most of us do not know where our garbage goes. There are many types of waste. There is liquid waste (in our drains), there are gases hiding in the air (like pollutants from factories), and there is solid waste (garbage) we put in our waste bins.

4.4 Biodegradable and Non-biodegradable Waste

Solid waste we generate can be classified into two major types:

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1. Biodegradable waste

2. Non-biodegradable waste

Activity 3:

Take two mud pots or glass jars and fill them up with garden soil. In the first pot, mix wastes such as banana peel, some vegetable peels and a few tree leaves into the soil. In the second pot, mix a piece of plastic carry bag, sweet wrapper and metal foil into the soil.

What happen to the waste materials placed in both pots? Do you notice a difference between first and second pot? Observe the changes over two weeks and discuss with your classmates.

Biodegradable waste

The term **'Biodegradable'** is used for those things that can be easily

decomposed by natural agents like water, oxygen, ultraviolet rays of the sun, micro-organisms, etc.

One can notice that when a dead leaf or a banana peel is thrown outside,

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it is acted upon by several micro-organisms like bacteria, fungi or small insects in a time period. Biodegradable waste includes vegetable and fruit peels, leftover food and garden wastes (grass, leaves, weeds and twigs).

Natural elements like oxygen, water, moisture, and heat facilitate the decomposition thereby breaking complex organic forms to simpler units. Decomposed matter eventually mixes or returns back to the soil and thus the soil is once again nourished with various nutrients and minerals.

Non-biodegradable waste

Those materials which cannot be broken down or decomposed into the soil by micro-organisms and natural agents are labeled as **non-biodegradable.** These substances consist of plastic materials, metal scraps, aluminum cans and bottles, etc.

These things are practically immune to the natural processes and thus cannot be fed upon or broken down even after thousands of years.

Give some examples for Biodegradable and Non-biodegradable waste.

S. No.	Biodegradable waste	Non-bio-degradable waste
1.	Food Waste	Plastic Bottles
2.		
3.		
4.		
5.		

Discuss with your teacher and friends.

1. Are animal bones biodegradable?
   _____

2. Are all types of clothes biodegradable?
   _____

Rani and her garbage

Rani gets home from school. She is hungry. She eats a banana and a packet of chips. She puts the banana peel and plastic chips packet into the waste bin. In the waste bin, the waste mixes together and the banana peel makes the plastic chips packet dirty. The waste bin starts to smell and Rani's mother puts the waste outside on the street. The municipality collects the waste from outside Rani's house and many other houses in a tractor. The tractor drives to a big open dump and leaves all mixed wastes there.

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Sometimes, there are fires in the open dump. When waste like Rani's chips packet burns, unhealthy chemicals pollute the ecosystem. These chemicals are present in the air we breathe. The leftover ash from burning waste pollutes the soil.

When it rains, some of the dangerous chemicals goes into the ground. Some of the rain never reaches the ground as it collects in the plastic garbage at the dump. Little pools of water let mosquitoes to breed and they can spread unwanted diseases like dengue and malaria. Cows and dogs go into the open dump looking for food. As the waste is mixed, many things that are not good to eat such as plastics, smell like food. The animals get confused and eat some plastics by accident. This makes them sick.

Rani is a student like you. She does not want to make animals sick. She does not want to pollute beautiful Town. She does not like mosquitoes and wishes that no one ever gets sick from them. So Rani takes this decision "I plant trees and reduce all type of pollution".

Do you want the same as Rani does? Become a detective. Learn about the 3R's and how you can start to solve these problems.

4.5 Solid Waste Management

It is our duty to reduce creating waste and protect environment. 3R's are important in protecting environment. The first R is reduce and the second R is reuse and the last R is recycle.

The waste hierarchy or pyramid shows the bestwaysto manage solid waste.

3R-Cycle

1. Avoid

Avoid the usage of unwanted materials which create more debris. Before you buy anything, think that "Do I really need it?" (e.g) Avoid buying packaged foods. Refuse to buy use and throw plastic products.

2. Reduce

We can reduce the waste by using durable goods that last longer instead of things that are used once and thrown away. (e.g) Write on both sides of papers. Instead of unnecessary printing, use electronic facilities. Share newspapers, magazines and other things with others.

3. Reuse

Reusing means using a thing again and again, rather than using and throwing after a single use. (e.g) Instead of using plastic bags, use and throw pens and batteries, use cloth bags, fountain pens and rechargeable batteries. Reuse glass bottles for other purposes. Repair foot wears and use them.

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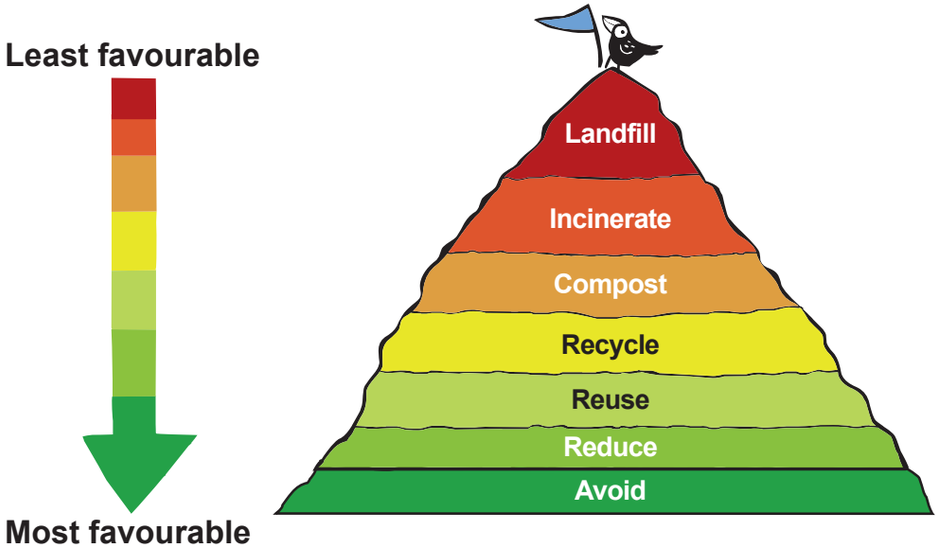

Creative reuse

Creative reuse or Up-cycling is the process of converting waste materials or useless products into new materials or products of better quality or for better environmental value. When you upcycle, you are giving an item a new purpose. (e.g) Used tyres into chairs. Used PET bottle into penstand.

4. Recycle

The process by which waste materials are used to make new products is called recycling.(e.g) Using old clothes to make paper and melting some plastics to make floor mats, plastic boards and hose pipes.

5. Compost

The process of degradation of organic wastes into manure by the action of microorganism is called **composting**. The manure thus obtained becomes natural fertilizer for the plants as well as increases the soil fertility.

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6. Incinerate

The burning of solid waste in incinerator is called incineration. Human anatomical wastes (discarded medicines, toxic drugs, blood, pus) are disposed by means of incineration. During incineration, the enormous heat kills all contagious disease-causing germs. We can also produce electricity with the help of this heat.

7. Landfill

Landfilling is a method in which wastes are dumped into naturally occurring or man-made pits and covered with soil. Garbage buried inside landfills remain here for a long time as they decompose very slowly and become manure. These places can be converted into parks, gardens, etc.,

Earlier in the chapter, you learn about Rani and how she did not want to cause pollution. Simple steps in your daily life can make big differences. There are two steps you should remember.

1. The first step should always be to reduce waste. Think of the 3R's and the waste pyramid and remember the order of the levels.
2. The second step is to keep waste separate. This way the waste will remain clean and can be easily reused or recycled. Mixing different types of waste together (e.g. biodegradable and non-biodegradable) makes waste dirty. Dirty waste gets sent to a landfill or open dump.

Waste separation exercise

The Solid Waste Management (SWM) rules, 2016 say that,

1. Every Household should segregate and store the waste generated by them in **three separate streams – namely bio-degradable, non bio-degradable and domestic hazardous waste** in suitable bins and handover segregated wastes to authorised waste pickers or waste collector as per the direction or notification by the local authorities from time to time.
2. No body shall throw, burn, or bury the solid waste on streets, open public spaces outside his premises or in the drain or water bodies.

Domestic hazardous waste means discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines,

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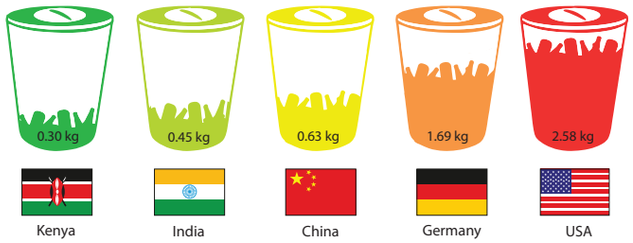
broken mercury thermometers, used batteries, used needles and syringes and contaminated gauge, etc., generated at the household level.

Learn how to separate waste correctly into 3 waste bins so you can keep Tamilnadu clean and beautiful!

How much waste does each person make around the world every day?



The average person in India produces 0.45kg of waste every day. It may be small amount of waste. But, India has a large population and imagine you collected all the waste today and put it into tractors. You would fill so many tractors that you could create a traffic jam approximately 2,800 kilometres long. Imagine, a road all the way from Kanyakumari to New Delhi completely blocked with tractors carrying garbage and no space to walk in between. This is how much waste we create in India each day! If we reduce the waste, we reduce the pollution.

India produces 532 million kilos of solid waste every day.

Activity 4: Preparation of vermi compost

Dig a pit for about one feet depth in the backyard or garden of your home or school. Fill the pit by bio wastes, paper and food wastes, place few earth worms in it, sprinkle water and close the place with jute or cardboard and ensure moisture all the time.

After 45 days the vermi casting layer formed just above the pit. These castings will be applied to the plant. This contains water soluble nutrients. This type of compost helps in plant growth as well as sustain the land is fertility.

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4.5 Pollution

Pollution occurs when the environment gets contaminated by waste, chemicals and harmful substances.

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Pollution is the damage caused to the environment mainly because of human activities. Any substance that causes pollution is known as a **pollutant**. Pollution is an unwanted change in the physical, chemical and biological characteristics of our land, air and water.

4.6 Types of Pollution

There are four major kinds of pollution:

1. Air pollution
2. Water pollution
3. Land (soil) pollution
4. Noise pollution

4.6.1 Air pollution

Most air pollution is caused by the burning of fossil fuels (e.g. oil, petrol, coal and natural gas). These fossil fuels are used in factories (industries), power plants and motor vehicles. Burning these fossil fuels release toxic gases and fine particles (such as ash and soot) into the air causing air pollution. Air pollution is also caused by burning solid waste (especially some plastics), gases or chemicals released from factories and fumes from aerosols (like deodorant spray cans) or paints.

Certain toxic gases produced by industries mix with raindrops high in the atmosphere and make rain unusually acidic. This is called acid rain. It damages plants, washes the nutrients out of soils and kills fish. Air pollution is harmful to all living organisms including humans. Polluted air affects skin, eyes and respiratory system.

How can we reduce air pollution?

1. Cycle or walk short distances instead of using a motor vehicle.
2. Travel by public transport (bus or train)
3. Do not burn solid waste.
4. Avoid fireworks.

4.6.2 Water pollution

Water pollution occurs when wastes from factories, houses and farms mixes with the water in rivers, lakes, ponds, the ocean or even groundwater. Contaminated or polluted water can spread diseases and chemicals which are not good for our health.

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The most significant sources of water pollutants are

1. Sewage (water we use at home for bathing, cleaning, cooking).
2. Industrial effluents (liquid wastes from factories).
3. Agricultural pollutants (chemical pesticides and fertilisers that get washed from farms).
4. Solid waste (when waste gets dumped into water bodies).

How can we reduce water pollution?

1. Do not pour leftover oil, old medicines or waste down the drain or into the toilet.
2. Reduce the use of chemical pesticides and fertilizers to grow crops.
3. Use waste water for garden in home.
4. Do not litter or dump waste – always use a waste bin.

4.6.3 Land (soil) pollution

In the same way as water and air get polluted, land or soil pollution happens when toxic chemicals change the natural balance in soil. Land pollution comes from farming (Excess use of chemical pesticides and fertilisers), mining (digging up metals and other materials), factories (industrial waste) and the solid waste from our own homes like plastics and broken electronics. Soil pollution affects animals, humans and even plants because soil or land acts like a sponge. When it rains, pollutant sinkss into the soil. If we grow plants to eat in polluted soils, these dangerous chemicals can get into our food.

How can we reduce land pollution?

1. First try to reduce waste, then recycle the rest.
2. Always use a waste bin and never litter.
3. Do not burn waste, the ash mixes easily with soil.

4.6.4 Noise pollution

Noise pollution affects the environment. We all like a quiet and peaceful place since unpleasant or loud sounds disturb us. Loud music, the sounds of motor vehicles, fire works and machines cause noise pollution. Continuous noise disturbs our sleep and does not let us to study. Noise pollution has been directly linked to stress and health impacts such as high blood pressure and hearing loss. Loud noise or even loud music can damage our ears. Noise pollution also

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disturb animals. Birds have to communicate (talk) louder so that, they can hear each other in noisy areas. Even underwater noise pollution from ships, can make whales lose their way as they use sounds to navigate.

How do we reduce noise pollution?

1. Turn off your electronics when you do not use them.
2. Lower the volume when you watch TV or listen to music.
3. Remind drivers not to use the horn too much.
4. Avoid fireworks.
5. Speak, do not shout (try to set an example).

Classroom Exercise

Identify who am I?

1. I am the type of pollution caused by burning of fossil fuels like petrol or coal and the smoke of burning garbage. I float around and cause breathing problems. I am _____ pollution.
2. I am the type of pollution caused by loud sounds and I can cause serious damage to your ears and also affect sleep. In India, I am mainly caused by loudspeakers and honking of air horns of cars. I am _____ pollution.
3. I flow from homes and farms into rivers and lakes. I kill fish and make water unfit for drinking. I am _____ pollution.
4. I am the type of pollution caused by using too much chemical fertilizers and pesticides by farmers. I lower the quality of soil and even move chemicals into plant parts which are eaten by people. I am _____ pollution.

Points to remember

- Living (biotic) and non-living (abiotic) components interact with one another.
- There are two types of ecosystems terrestrial (on land) and aquatic (in water).
- The feeding relationship in an ecosystem is called a food chain.
- Biodegradable and non-biodegradable waste should be kept separate
- The 3R's are in a certain order: First reduce, then reuse and finally recycle.
- Waste should never be burned as it causes air and soil pollution.
- Pollution occurs when the environment gets contaminated by waste, chemicals and harmful substances.
- Major types of pollution are four: air pollution, water pollution, land pollution, and noise pollution.
- There are many small habits, any student can practice to reduce pollution, manage waste correctly and protect the environment.

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ICT Corner

Eco System

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.

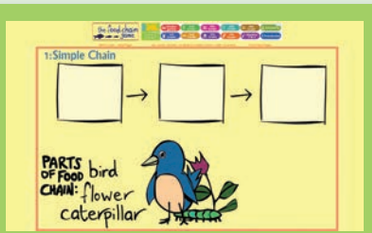
Step 1: Type the URL given or scan the QR code to launch the activity. Food chain page will open.

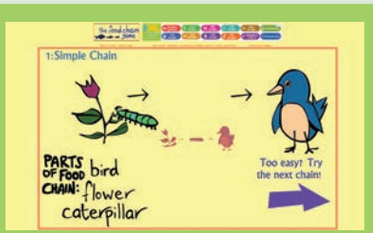
Step 2: With the use of mouse drag the parts of the food chain - the animals or plants given to their correct place - in the empty boxes.

Step 3: When the chain is complete you can watch the food chain in action.

Step 4: Continue the activity by click on the next icon. Play and observe the various complex levels of food chain.

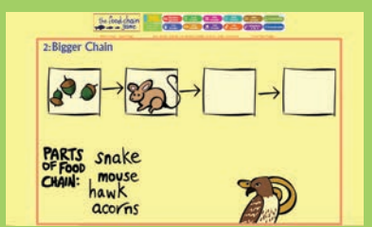
Step 1

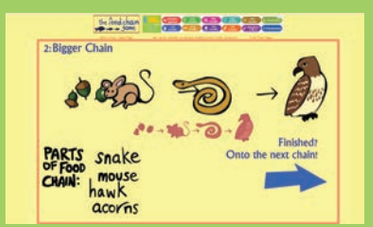




Step 2

Step 3





Step 4

Eco System URL:

http://www.sheppardsoftware.com/content/animals/kidscorner/games/foodchaingame.htm

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*Pictures are indicative only

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Evaluation

EHNLBA

I. Choose the appropriate answer

1. Identify the fresh water ecosystem.

   a. Pond b. Lake

   c. River d. All of them

2. Producers are_____

   a. Animals b. Birds

   c. Plants d. Snakes

3. It is a biodegradable waste.

   a. Plastic b. Coconut Shell

   c. Glass d. Aluminium

4. It is an undesirable change that occurs in air and water.

   a. Recycling b. Reuse

   c. Pollution d. Reduce

5. Usage of chemical pesticides and fertilisers causes _____ pollution.

   a. Air pollution

   b. Water pollution

   c. Noise pollution

   d. None of the above

II. Fill in the blanks

1. Primary consumers that eat plants are called _____.

2. Temperature, light and wind are _____ factors.

3. _____ is the process of converting waste materials into new materials.

4. Water pollution can spread _____ and chemicals.

5. The 3R's are Reduce, _____ and Recycle.

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

1. The Pacific ocean is an example of an aquatic ecosystem.

2. Bacteria and fungi are called decomposers.

3. Human and animal wastes are examples of non-biodegradable waste.

4. Excessive use of pesticides leads to air pollution.

5. In schools, waste management rules say that we should separate waste in two categories.

IV. Match the following

1.	Biotic factor	-	Terrestrial Ecosystem
2.	Sewage	-	Land pollution
3.	Fertilizers	-	Air pollution
4.	Desert	-	Water Pollution
5.	Smoke	-	Animals

V. Arrange the following in a correct sequence and form a food chain

1. Rabbit → Carrot → Eagle → Snake

2. Human → Insect → Algae → Fish

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VI. Give very short answer

1. Define ecosystem.
2. What are the two types of ecosystems?
3. Write any two things that can be recycled.
4. What are the types of pollution.
5. Give one example of a food chain in an aquatic ecosystem?
6. Name some pollutants.
7. What are the pollutions caused by the objects given below?

   a. Loud Speaker b. Plastic

VII. Give short answer

1. What is biodegradable waste?
2. How can we reduce water pollution?
3. Write the importance of the food chain.

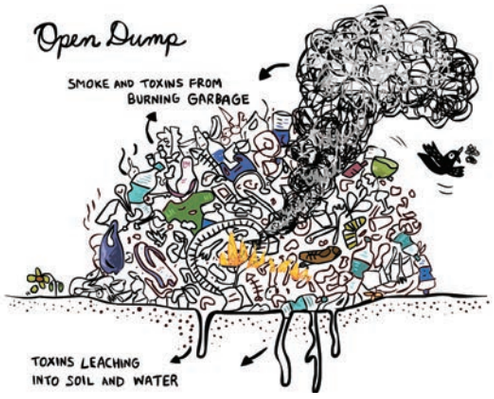
VIII. Answer in detail

1. Give two examples of how you can avoid or reduce waste?
2. Write a short note on noise pollution.

IX. Question based on Higher Order Thinking Skills

1. What would happen if an organism is removed from the food chain?
2. Explain the link between waste and dangerous diseases like dengue and malaria?

X. See the diagram and answer the following questions



1. Explain what is happening in the picture?
2. What types of pollution are caused by open dumps?

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Unit 5 Plants in Daily Life

Learning Objectives

- Able to acquire knowledge about various types and uses of plants
- Able to understand the economic importance of plants
- Able to appreciate the interrelationship between plants and animals and its economical importance

EHXHCX

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Introduction

We are living in a green planet. Plenty of natural plant resources are around us. Economic botany basically deals with all pervading plants in relation to human welfare as food, clothing, shelter and medicine either directly or indirectly.

Indirect usage includes the needs of mans' livestock and the maintenance of the environment; the benefits may be domestic, commercial, environmental, or aesthetic.

Plants bring about economy to the country in large extent and it is a fact that the wealth of any country largely depends upon its agriculture and plant products.

Economic botany is the study of relationship between people and plants and the uses of plants in economy.

From the earliest time rice, wheat and millet have been the staple food of a vast population of India as indicated by the presence of charred grains in most of the excavation sites. In addition, references are abundant in ancient literature about the existence and usage of several crops of economic importance.

Observe the following pictures carefully. Can you identify what they are doing?

Fig-1

Fig-2

Fig-3

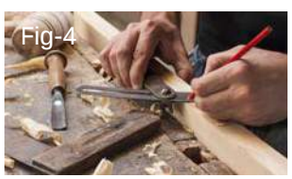
Fig-4

1. Why are the farmers harvesting paddy?
2. A woman makes rope using coir. Where does the raw material come from?
3. Neem leaves are collected in a plate. Do you know the uses of neem leaves?
4. What is the material used by the man to make a chair?

In this lesson let us discuss about the different crop plants of economic uses in relation to mankind. Based on their economic values and uses, plants may be broadly classified as follows.

1. **Plants as Food**
2. **Spice yielding plants**
3. **Medicinal plants**
4. **Fibre yielding plants**
5. **Timber yielding plants**
6. **Ornamental plants**

5.1 Plants as Food

Plants are the main source of food for humans. These plants are known as **food plants.**

EI7DEK

Do you have a vegetable garden in your house? Have you ever seen harvesting of ripened vegetables?

Which part of the plants is used as food for us?

We eat different parts of plants such as root, stem, leaf, seed unripe and ripe fruits. We can classify the food plants as following.

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1. **Vegetables**
2. **Cereals**
3. **Pulses**

Plants also give us coffee, tea, sugar and raw materials for oil.

Vegetables

We get vegetables from different parts of the plants.

Roots: eg: Beetroot, Carrot.

Leaves: eg: Curry Leaves, Cabbage.

Stems: eg: Potato, Yam.

Flowers: eg: Banana flower, Cauliflower.

Fruits: eg: Amla, Guava.

Cereals

Cereals are edible components of grain of cultivated grass. Example Rice, Wheat, Bajra, Millet.

Pulses

Pulses are edible seeds of plants legume family. Pulses are secured in pods. eg: Bengal gram, Green mung bean.

Bengal gram

Green mung bean

Activity 1: Tabulate the names of vegetables, Cereals and pulses you know.

S.No.	Vegetables	Cereals	Pulses
1.			
2.			
3.			
4.			
5.			

Activity 2: How do Rava, Maida, Sago and Vermicelli are made? Discuss with your friends.

5.2 Spices

Spices are aromatic parts of tropical plants traditionally used to flavour the food. Spices come from the bark or roots of

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DO YOU KNOW?

India is the second largest producer of fruits and vegetables in the world.

certain plants, leaves, flowers, or stems of plants primarily used for flavoring, coloring or preserving food.

Spices used in India

Following spices are included in a variety of Indian dishes:

Cardamom, black pepper, curry leaves, fenugreek, fennel, ajwain, bay leaves, cumin, coriander seeds, turmeric, cloves, ginger, nutmeg, and cinnamon.

DO YOU KNOW?

World Food Day, October-16.

The aim of celebration of this day is to promote worldwide awareness and action for those who suffer from hunger and for the need to ensure food security and nutritious diets for all.

Each year, World Food Day is celebrated by the Food and Agriculture Organization of the United Nations (FAO). World Food Day adopts a different theme each year. Ask your teacher about the theme of this year.

Cardamom

Black pepper

Curry leaves

Fenugreek

Fennel

Ajwain

Bay leaves

Cummin

Coriander seeds

Clove

Nutmeg

Cinnamon

EIG9G8

INDIAN SPICES

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5.3 Medicinal plants

Some of the plants around us are good in healing our diseases. We call these plants as **medicinal plants.** They alleviate burns, cut, cold, fever, sneezes and more. Some chemical compounds in the **medicinal plants** act against insects, fungi and certain germs. Medicinal plants are considered as rich resources of ingredients which can be used in drug preparation.

Here is a list of plants that have the highest medicinal value.

Plant name	Parts used	Medicinal use
Amla	Fruit	Cure Vitamin 'C" deficiency diseases like Scurvy. Improve immunity.
Tulsi	Leaves, seed	Cough, cold, bronchitis, expectorant.
Aloe	Leaves	Laxative, wound healing, skin burns and ulcer.
Neem	Bark, leaf and seed	Skin diseases
Turmeric	Rhizome	helps body to fight foreign invaders,

Activity 3: Ask your parents about the medicinal uses of plants such as Phylanthus, Vallarai, Black nightshade, Tippili, Vettiver, Thuthuvalai and make a write up. What are the other plants used for medicinal purpose in your area?

5.4 Fibre yielding plants

Plants which give us fibres necessary for our uses are called as **Fibre yielding plants.** The fibre from these plants can be spun into thread , rope, and cloth. These fibres are called as natural fibres.

We can classify the Fibre yielding plants into two types based on the uses and the parts of the plant from where we get the fibre.

Based on Use

1. **Textile Fibres** (making cloth), eg: Cotton
2. **Cordage Fibres** (making rope) eg: Coconut Fibre
3. **Filling Fibres** (making mattresses). eg: Silk cotton

EIQ5HV

Based on the plant parts

1. **Plant Fibres include seed hairs** eg: cotton;
2. **Stem (or bast) Fibres** eg: flax, jute;
3. **Leaf Fibres** eg: Agave,
4. **Husk Fibres** eg: coconut.

In India, Jute crop is grown in seven states – West Bengal, Assam, Odisha, Bihar, Uttar Pradesh, Tripura and Meghalaya. West Bengal alone accounts for over 50% of raw jute production.

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Activity 4: Take a small quantity of cotton swap. Hold it between your thumb and fore finger. Now, gently start pulling out the cotton, while continuously twisting the Fibres.

Are you able to make a yarn?

The process of making yarn from Fibres is called **Spinning.**

5.5 Timber yielding plants

The wood needed for the construction of buildings and making of furniture are obtained from certain plants. We use wood for these purposes due to their features like durability, stylish finishing and resistance to temperature changes.

Timber

All commercial timbers are classified into two classes as Hardwoods and softwoods based essentially on their structure.

Hardwoods

Hardwoods are angiosperms (flowering plants), the largest group of land plants. High-quality furniture, decks, flooring, and wooden construction are being made only using hardwood. eg. Teak, Jackfruit.

Softwoods

Softwoods come from gymnosperm (non-flowering plants) trees. Certain angiosperms also yield softwood

Softwoods have a wide range of applications such as making plywood, wooden boxes, medium-density Fibreboard (MDF) and paper making. eg: katampu, Pine.

The finely cut wooden boards from the wood are layered one above the other to make plywood. This is a kind of composite wood.

5.6 Ornamental plants

Plants which are grown for aesthetic reasons are called as **ornamental plants**. Producing flowers from floral plant is the important section of horticulture. eg: Jasmine, Rose, Chrysanthemum, Carnation, Jerbara

To decorate houses, gardens and parks we are planting shrubs such as Hibiscus, Crape Jasmine and Crotons and climbers like Mullai, Allamanda and Bougainvilleam, trees such as Golden shower tree, Mandarai, Delonix tree (Flame of the forest).

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What are the ornamental plants grown in your locality?

Floriculture

5.7 Interrelationship between plants and animals

Animal-plant Interactions

EIZ1JI

Animals rely on plants for their food and shelter. This relationship benefits not only animals but also plants. Such relationship is economically significant.

For example, silkworms feed on mulberry leaves and live of mulberry plants. This relationship between a worm and a plant is economically useful for us in silk production.

Silk worm

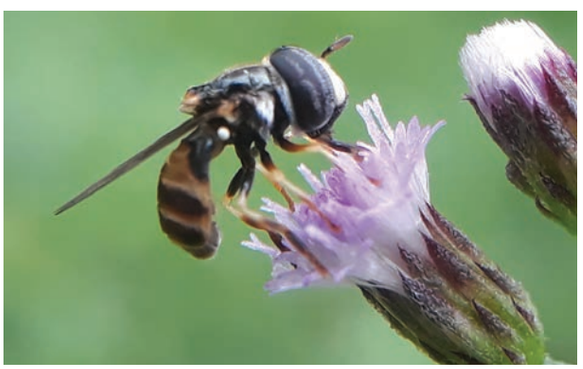
Animals, pests, and birds are essential for **cross-pollination** of plants.

Bright colours of flowers, smell and honey attract insects. As the insects go from one flower to another, they leave the pollen grains from their body. This results in cross-pollination and the formation of vegetables and fruits.

Humming Bird

These insect pollinators and birds need to be protected to produce the best yield.

Bees are the best pollinators. They also give us honey.



Honey bee

Plants and algae living in coral reefs are the food for variety of fishes. Fisheries work is done in these areas.

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Animals and birds play an important role in spreading seeds of various plants. The digestive enzymes in the digestive system of the birds soften the protective layer of the seeds and make it easier to germinate.

If these natural relationship between animals and plants are affected, it shows its impact on economy too.

Other uses of plants

1. Maintain soil fertility

Plants maintain soil fertility. Their droppings and shedding of leaves, fruits and other parts degrade in the soil to form humus. This humus increases soil fertility. Eg. Plants like blue green algae and bacteria like Pseudomonas are also extensively used to fix nitrogen in the soil for agriculture.

2. Prevent soil erosion

Plants when grown in dense will prevent **soil erosion** (ie) in times of wind or flood, the fertile top layer of soil is carried away by air or water. This is prevented by plants if grown around.

3. Bio – fuels

Some plants are also grown for the sake of bio - fuels. Plant fuel is less toxic as it does not emit harmful gases and also less expensive. **Eg. Jatropha.** Even the plant waste is used to generate electricity. **eg: Sugar mills**

Pala spinach

Osteoarthritis is a joint disease affecting joints and knee in old age and any age people. Currently Indian scientists at CDRI (Central Drug Research Institute – Lucknow) have made a nano formulation from the Palak (Pala spinach) to cure this disease..

4. Rubber and Natural plastic

We obtain rubber for tyre, wiring, seats etc from plants. Natural plastics are also produced from plants which are biodegradable. So it does not do harm to our environment.

5. Neem Oil coated Urea

Farmers in India used urea as a fertilizer to increase the agricultural productivity. Indian Scientists made Neem Coated urea which released nitrogen gradualy and helps the plants to absorb maximum nitrogen. It reduces the impact of urea on an environment.

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Points to remember

- Human beings directly or indirectly depend on plants for food, clothes and shelter.
- The branch of science which deals with the relationship between plants and human beings and the economical usages of plants is called economic botany.
- Plants are the main sources of food for human. The plants which give food to us are called food plants.
- Pulses are the edible seeds of plants in the legume family.
- Spices are the aromatic parts of tropical plants traditionally used to flavour food.
- Some chemcial compounds in the some plants act against insects, fungi and certain germs. They are called medicinal plants
- Plants are classified into Textile Fibres, Cordage Fibres and Filling Fibres based on usage.
- Timber yielding plants are classified as hard wood and soft wood depending on their strength and structure.
- Plants grown for decorative purposes are called as ornamental plants.
- When the interrelationship between animals and plants are affected, our economy is also affected.

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Kill or Cure?

ICT Corner

Through this activity you will be able to learn about medicinal properties of plants.

Step 1: Type the following URL in the browser. 'Kill or Cure?' activity page will open.

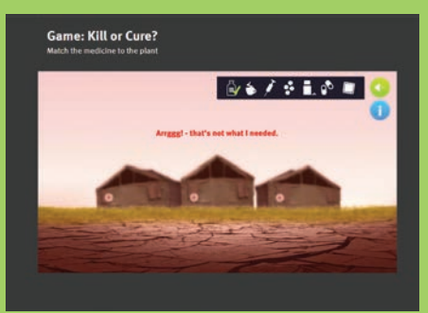
Step 2: Click the ' PLAY ' button then ' START ' button given in the activity window to start the activity.

Step 3: A small Figure of a Doctor will asking for a medicine/ drug by giving some clue.

Step 4: Click and Select the correct plant given at the bottom , from which the drug is extracted. For more information about the drug click the ' i ' icon at the top right of the activity window. Repeat the process to answer all the questions.

Step 1

Step 2



Step 3

Step 4

kill or cure URL:

http://www.rigb.org/education/games/natural-world/kill-or-cure

*Pictures are indicative only

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Evaluation

EJHSMT

I . Choose the correct answer

1. One of the following birds is an example of plant pollinator

   a. Duck b. Parrot

   c. Humming bird d. Dove

2. Natural Mosquito repellant is

   a. Nutmag b. Bamboo

   c. Ginger d. Neem

3. Which of the following is not a root ?

   a. Potato b. Carrot

   c. Radish d. Turnip

4. Which of the following medicinal plants has anticancer properties?

   a. Amla b. Tulasi

   c. Turmeric d. Aloe

5. Which is the national tree of India?

   a. Neem tree b. Jack tree

   c. Banyan tree d. Mango tree

II Fill in the Blanks

1. In every year October _____ is celebrated as world food day.
2. _____ is an example of textile fibre.
3. I am the state tree of Tamilnadu . Who am I _____?
4. The juice of the leaves of _____ plant relieves cough and bronchitis.
5. The edible seeds of leguminous plants are called _____

III. True or False – If false give the correct answer

1. Plants grown for decorative purposes are called as softwood.
2. Silkworm eats mulberry leaves.
3. Cauliflower is used for ornamental purpose.
4. Cotton cloth is not suitable for summer season.
5. Sugarcane is used as bio fuel.

IV. Match the following

1.	Fibre yielding plant	-	Chloramine
2.	Hardwood	-	Spice
3.	Neem	-	Hemp
4.	Clove	-	Cereals
5.	Millet	-	Teakwood

V. Analogy

1. mango : fruit :: maize : _____
2. coconut : fibre :: rose : _____
3. bees : pollinate insect :: earthworms : _____

VI. Give very short answer

1. What is food ?
2. What are medicinal plants?
3. How hard wood differ from soft wood?
4. What is a spice?
5. Name any three medicinal plants, which are available in your area?
6. What are the uses of timber?

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VII. Give short answer

1. What is a symbiotic relationship?
2. Write the uses of neem?
3. Name any five plants and their parts that we eat.

VIII. Answer in detail

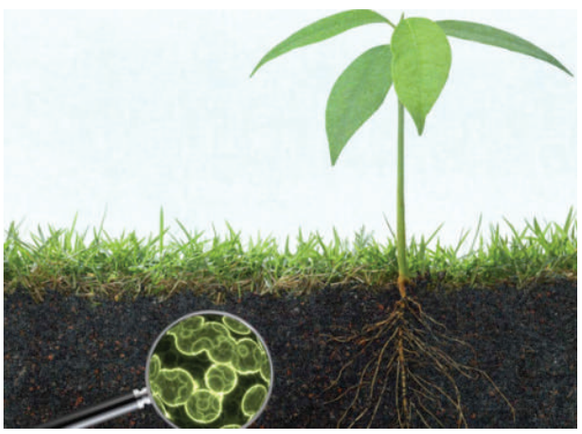
1 Write short notes on – Timber yielding plants.

2. Comment on importance of plant animal interaction.

IX. Questions based on Higher Order Thinking Skills

1. Desert does not have water. Why? Give the reason.
2. Kavitha said " Palm tree is a tall tree, so it gives hard wood"! Do you agree with her statement or not ? Explain Why?
3. Look at the diagram given below and answer the following questions.

a. Soil fertility is increased by bacteria How?



b. Honey bees are essential for the reproduction of the plants Why?

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Unit 6 Hardware and Software

Learning Objectives

- To identify Software and Hardware of a computer
- To distinguish the features of Hardware and software
- To recognize different types of software
- To identify some Open source software and utilize them effectively

EJRNPG

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Introduction

Computer is a device comprising both hardware and software. The functions of hardware and software combines together to make the Computer functional. A hardware device helps to enter input information. The software processes the input data and gives the output in the monitor, a hardware device. Thus computer is like a human body, where human body is the hardware and soul is the software.

6.1 Hardware

Hardware

Hardware is the parts of the computer which we can touch and feel. Hardware includes Input and Output devices, Cabinet, Hard Disk, Mother Board, SMPS, CPU, RAM, CD Drive and Graphics Card.

6.2 Software

Hardware is lifeless without software in a computer. Software are programmed and coded applications to process the input information. The software processes the data by converting the input information into coding or programmed language. Touching and feeling the software is not possible but we can see the functions of the software in the form of output.

Software

Email existed before the World Wide Web.

6.3 Types of Software

The software is divided into two types based on the process. They are

1. System Software (Operating System)
2. Application software

6.3.1 System Software

System Software (Operating system) is software that makes the hardware devices process the data inputted by the user and to display the result on the output devices like Monitor. Without the operating system, computer cannot function on its own. Some of the popular operating system are Linux, Windows, Mac, Android etc.

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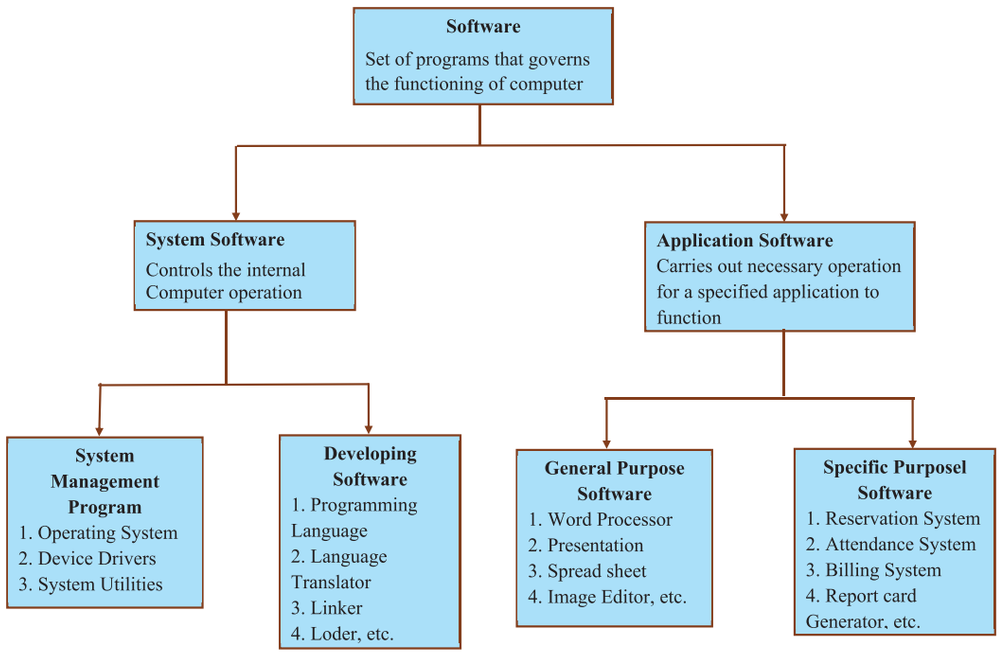
6.3.2 Application Software

Application software is a program or a group of programs designed for the benefit of end user to work on computer. The application programs can be installed in the hard disk for the usage on a particular computer. This type of application program completes one or more than two works of the end user. The following are the examples of application program: Video player, Audio player, Word processing software, Drawing tools, Editing software, etc.



6.4 System and Application Software types

The operating system and application software are available in two forms. They are:

1. Free and Open source
2. Paid and Proprietary Software

6.4.1 Free and Open source

Free and open software is available at free of cost and can be shared to many end users. Free software is editable and customizable by the user and this leads to updation

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or development of new software. Examples of Free and Open source software: LINUX, Open office, Operating System, Geogebra etc.

6.4.2 Paid and Proprietary Software

There is software that is to be paid to use either permanently or temporarily, these types of software are paid and need a license to use it. The license of the software would not be provided unless it is purchased. Similarly the end users are legally prohibited to steal the software program or to use the pirated version of the Paid and Proprietary Software. Some of the examples of Paid & Proprietary Software are: Windows, Microsoft office, Adobe Photoshop, etc.

The Open Source Initiative (OSI) is an organization dedicated to promote Open Source Software.

Evaluation

I. Choose the correct answer

1. Find out the part that is not found in CPU?

   a. Mother Board b. SMPS
   c. RAM d. Mouse

2. Which of the following is correct?

   a. Free and Open source
   b. Free and Traditional software
   c. Passive and Open source
   d. Passive and Traditional source

3. LINUX is a

   a. Paid Software
   b. Licensed Software
   c. Free and Proprietary software
   d. Free and Open source software

4. Find out Paid and Proprietary software from the given list

   a. Windows b. MAC OS
   c. Adobe Photoshop d. All the above

5. _____ is a Operating System

   a. Android b. Chrome
   c. Internet d. Pendrive

II. Match the following

1.	MAC OS	-	Free and Open source Software
2.	Software	-	Paid and Proprietary Software
3.	Hardware	-	Input Device
4.	Keyboard	-	RAM
5.	LINUX	-	Geogebra

III. Short answer

1. What is Hardware and Software?
2. What do you mean by Operating System? How it Works?
3. What is Free and Open Source Software? Give any two examples?

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Artificial magnet	-	செயற்கை காந்தம்
Adhesives	-	ஒட்டும்பொருள்கள்
Aloe	-	சோற்று கற்றாழை
Bio degradable waste	-	உயிரினச் சிதைவிற்கு உள்ளாகும் கழிவுகள்
Bio - fuel	-	உயிரி எரிபொருள்
Consumers	-	நுகர்வோர்கள்
Compost	-	மட்கிய உரம்
Cereal	-	தானியம்
Decomposers	-	சிதைப்பான்கள்
Disinfectant	-	கிருமி நாசினி
Electromagnet	-	மின் காந்தம்
Estuary	-	முகத்துவாரம்
Ecosystem	-	சூழ்நிலை மண்டலம்
Food Chain	-	உணவுச் சங்கிலி
Food web	-	உணவு வலை
Ground water	-	நிலத்தடி நீர்
Herbivore	-	தாவர உண்ணி
Hard wood	-	வன்கட்டை
Incinerate	-	எரித்துச் சாம்பலாக்குதல்
Inorganic fertilizer	-	கனிம உரம்
Land Fill	-	நிலத்தில் நிரப்புதல்
Like poles	-	ஒத்த துருவங்கள்
Magnet	-	காந்தம்
Magnetic Material	-	காந்தத்தன்மையுடைய பொருள்
Magnetic Compass	-	காந்த ஊசிப்பெட்டி
Magnetization	-	காந்தமாக்கல்
Magnetic attraction	-	காந்த ஈர்ப்பு
Magnetic repulsion	-	காந்த விலகல்
Non – Magnetic substances	-	காந்த தன்மையற்ற பொருள்கள்
North pole	-	வட துருவம்
South pole	-	தென் துருவம்
Natural Indicator	-	இயற்கை நிறங்காட்டி
Non Bio degradable waste	-	உயிரினச் சிதைவிற்கு உள்ளாகாத கழிவுகள்
Natural pesticides	-	இயற்கை களைக்கொல்லி
Organic fertilizer	-	கரிம உரம்
Ornamental Plant	-	அலங்காரத் தாவரங்கள்
Producers	-	தயாரிப்பாளர்கள்
Pollution	-	மாசுபாடு
Pulses	-	பருப்பு வகைகள்
Pollinators	-	மகரந்தச் சேர்க்கையாளர்கள்
Surface water	-	மேற்பரப்பு நீர்
Synthetic	-	செயற்கை
Swamp	-	சதுப்பு
Soft wood	-	மென்கட்டை
Spices	-	மசாலாப் பொருள்கள்
Turmeric Powder	-	மஞ்சள் தூள்
Timber	-	மரக்கட்டைகள்
Unlike poles	-	எதிரெதிர் துருவங்கள்
Vermi Compost	-	மண்புழுஉரம்
Water cycle	-	நீர் சுழற்சி
Water treatment plant	-	நீர் சுத்திகரிப்பு நிலையம்

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Authors List - VI Science

Advisory Committee & Chairperson

Dr. T.V. Venkateswaran
Scientist, DST, Vigyanaprasar,
New Delhi.

Dr. Mazher Sulthana
Professor & Head (Rtd.),
P.G. Department of Zoology,
Presidency College, Chennai.

Reviewers

Dr. V. Sivamadavi
Associate Professor,
Bharathi Women's College, Chennai.

Dr. G. Ramesh
Assistant Professor,
Dr. Ambedkar Govt. Arts College, Vyasarpadi, Chennai.

Dr. G. Rajalakshmi
Assistant Professor,
Department of Botany,
Bharathi Women's College, Chennai.

Content Readers

N. Thamaraikannan
P.G. Asst. Jai Gopal Karodia Hr. Sec. School,
Tambaram, Chennai.

Dr. S. Ravi Kasi Venkataraman
HM, Govt. G. Hr. Sec. School,
Dhesur, Thiruvannamalai Dist.

ICT Coordinators

D. Vijay Ananth
B.T Asst., (Eng.)
P.U.M.S. Attayampattayan Vattam,
Tharamangalam Block, Salem.

V. Suresh
B.T Asst.,
P.U.M.S, Kallikudi,
Muthupettai Block, Thiruvarur Dt.

Experts & Coordinators

Dr. Vanitha Daniel
Deputy Director,
SCERT, Chennai.

D. Prabakaran
Assistant Professor,
SCERT, Chennai.

S. Rajesh
B.T. Asst. GHSS, Vanganoor,
Thiruvallur.

Authors

D. Perumal Raj
BT Asst.,
PUMS, Manickamangalam, Valaingaiman Block, Thiruvarur.

Dr. M.N. Thanuja
BT Asst., GHSS, Devarsholai, The Nilgiris.

M. Mohanapriya
PGT. Asst., GGHSS, Koradachery, Thiruvarur Dt.

Dr. N. Vidhyageetha
Lecturer - DIET Aduthurai, Thanjavur.

M. Ananthan
BT Asst., GHS, Servaikaranpatti, Dindigul.

N. Manikandan
BT Asst., GHS, Rasingapuram, Theni.

N. Balusamy
HM (Retd.), Corporation Hr. Sec. School, Peelamedu, Coimbatore.

M. Tamilarasi
PGT (Retd.), St. Joseph GHSS, Vadugarpet, Lalgudi, Trichy.

Mr. Ribhu Vohra
Waste less, Auroville, Puduchery.

Dr. R. Asir Julius
Assistant Professor, SCERT, Chennai.

G. Dhavamani Maheswari
Senior Lecturer, DIET,
Tirur.

Art and Design Team

Illustration
K. Mathiyazhagan, Pramoth, Velmurugan, Gopu Rasuvel.

Layout Design
V.S. Johnsmith
T.Nagar, Chennai

Info Graph
V. Srinivasan
Valasaravakkam, Chennai.

Wrapper Design
Kathir Arumugam

QC
Manohar Radhakrishnan

Co-ordination
Ramesh munisamy

Typing
M. Sathya
New Perunkalathoor.

QR Code Management Team

R. Jaganathan
S.G.T. (SPOC)
PUMS Ganesapuram - Polur, Thiruvannamalai Dist.

N. Jagan
B.T. Asst.,
GBHSS Uthiramerur, Kanchipuram Dist.

J.F. Paul Edwin Roy
B.T. Asst.,
PUMS Rakkipatti, Salem Dist.

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