GOVERNMENT OF TAMILNADU

STANDARD SIX

TERM - I

VOLUME - 3

SCIENCE

A publication under Free Textbook Programme of Government of Tamil Nadu

Department Of School Education

Government of Tamil Nadu

First Edition - 2018

(Published under Uniform System of School Education Scheme in Trimester Pattern)

NOT FOR SALE

Content Creation

State Council of Educational Research and Training

Printing & Publishing

Tamil NaduTextbook and Educational Services Corporation

www.textbooksonline.tn.nic.in

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PREFACE

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

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

HOW TO USE THE BOOK

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

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

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

SCIENCE TERM - I

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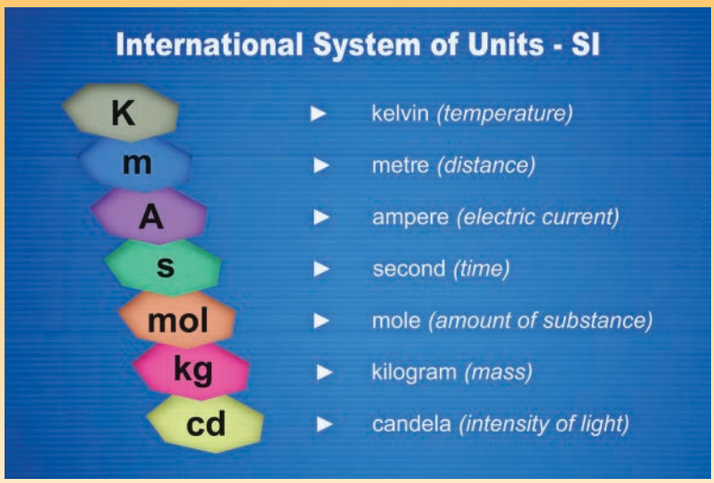
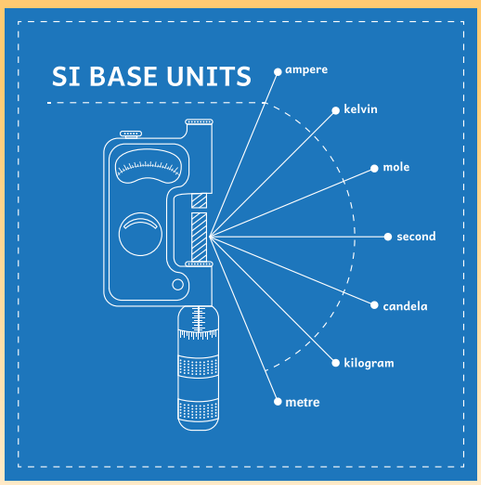




Learning Objectives

- Able to understand the need for measurement in our life.
- Able to define length, mass, time and volume.
- Able to evaluate the values of some physical quantities in terms of their units and sub units.
- Able to identify zero error and parallax error.
- Able to measure the volume of solids and liquids.
- Able to construct their own measuring tools (models)

Few Questions to start with:

- Your cousin asks you what your height is. How will you measure and inform him?
- Your friends decide to play kabbadi. How will you measure and draw the border lines?
- Your father gives you a bag and asks you to get potatoes. How will you ask the shopkeeper? A bag full of potatoes or how will you ask?
- Your mom daily gets milk from the milkman. How much does she get? A cup of milk or two tumblers of milk or how?
- How long will it take to reach your school from your house?
- How does the shopkeeper measure kerosene while selling it?

Introduction

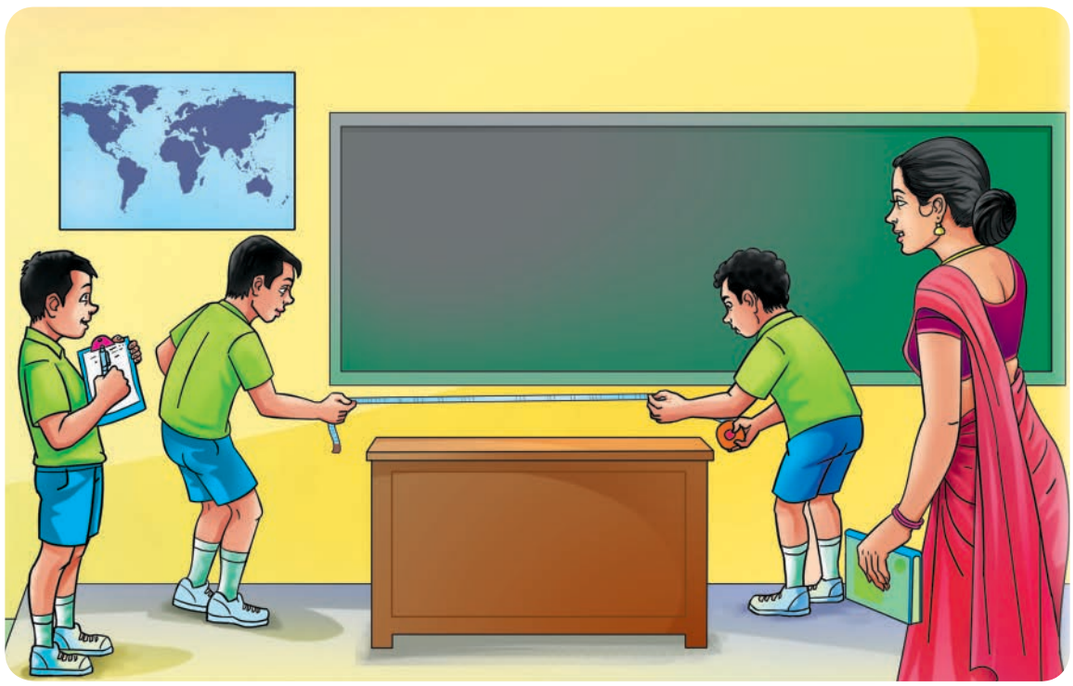
We have already heard about the words like weight, kilogram, litres, millilitres, kilometre, length, distance etc. In this chapter let's have a deeper look at length, weight, volume and time and the necessity to measure them. To do the tasks given above we need to know about measurement. The comparison of unknown quantities with some known quantities is known as measurement. Measurement of a quantity has two parts: a number and its unit.

What are the measuring tools that you know?

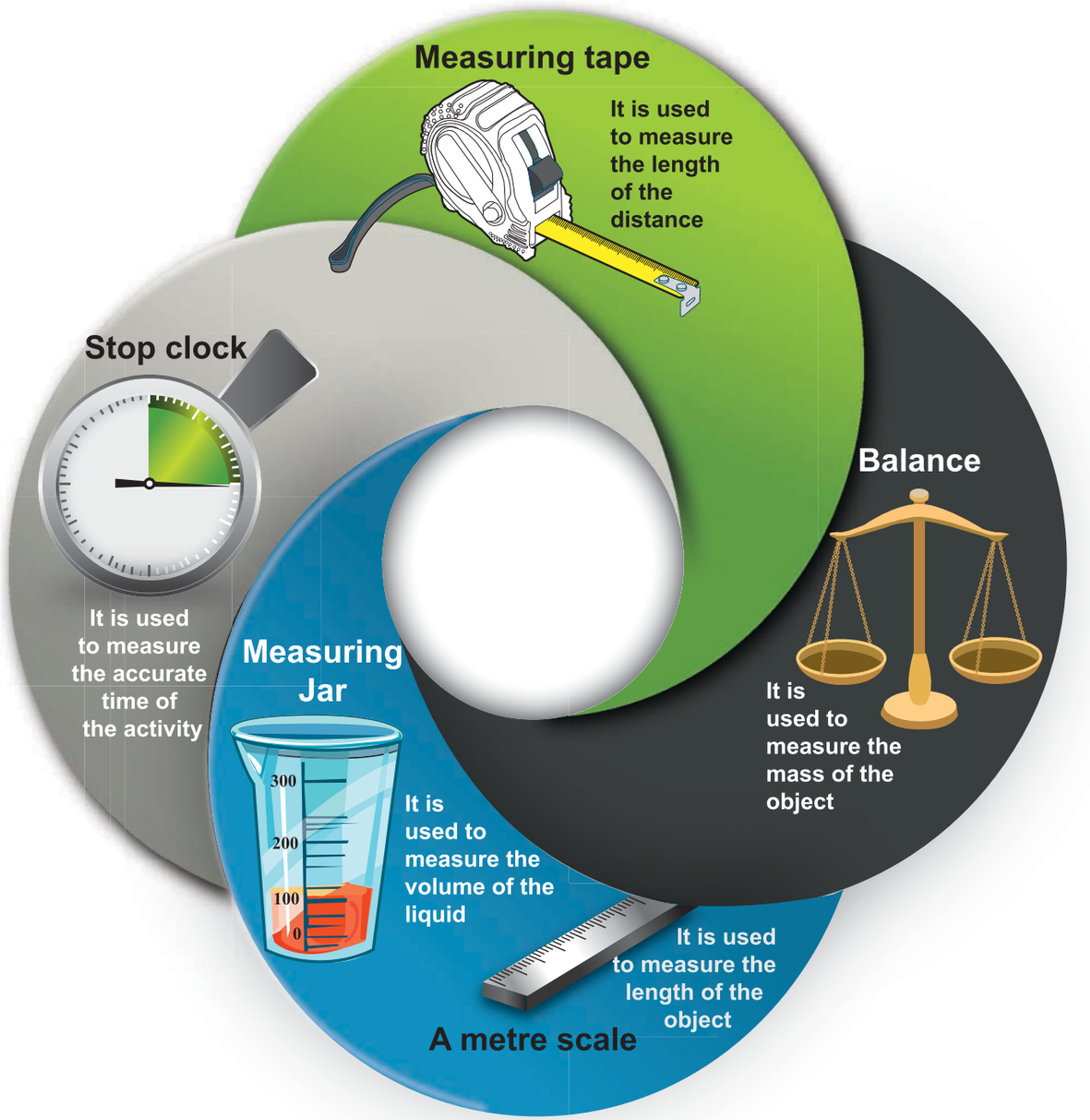
Which of these tools will you use to do the tasks listed above and the similar ones?

1.1 Length

What is length? The distance between one end and the other desired end is called as length. It may be the distance



Measuring Tools



between the edges of a book or a table or the corners of a football ground or even from your home to school.

The standard unit of length is 'Metre'. It is represented by letter ‘m’. Very small lengths can be measured in mm and cm. Still larger measures, say height of a building, a banner or a lamp post are all measured in metre. How to express still longer lengths? Say distance between two cities or villages or distance between your school and home? It is expressed in kilometre (km).

Know the unit of length

1 km (kilometre)	=	1000 m (metre)
1 m (metre)	=	100 cm (centimetre)
1 cm (centimetre)	=	10 mm (millimetre)

Think: Can you convert 1 km in terms of cm?

Measure the length of your pencil now. For sure the lengths of all your pencils are not the same.

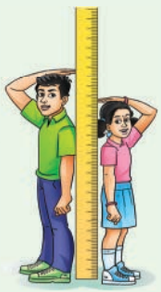
1. Take the meter scale
2. Check lines with marking 1,2,3,4 … till 15 (for smaller scales) or till 30 (bigger scales). The distance between 1 and 2 is denotes a centimetre (it is written as ‘cm’).
3. Notice, in between 1 and 2 there will be smaller markings. If you count, there will be 9 such lines. The distance between any two consecutive smaller markings within a ‘cm’ denotes a millimetre (written as ‘mm’).

Let us now understand more about the three important quantities – Length, Mass and Time.

From the activity:1 you see that your measurement is different from that of your friends. Also different measuring units are used in different countries.

Activity 1

Form a group of 5 members. Select one person and others measure her/his height individually using your hand span and cubit. Compare your answers with others. Do you find any differences? Why? Now you all stand in front of a wall and mark your height on the wall. Measure your height with a scale. What differences do you infer?



Why do we need SI Units?

The sake of uniformity, scientists all over the world have adopted a common set of units to express measurements. This system is called as the International System of Units or SI Units.

SI unit for length is Metre

SI Unit for mass is Kilogram

SI Unit for time is Second

Area of Surface = m^2

Volume of Solid = m^3

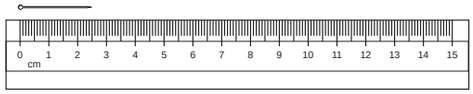
Multiples and sub multiples of SI Units

Prefixes used in SI Units. (Always remember the base unit is metre, litre, kilogram)

1.1.1 Corrective Measures for Measurement

Measurement has to be accurate and the approach has to be correct always. In our day to day life approximation may not have much impact. But it has a large impact in scientific calculations. For example, if the curvature of key (lock and key) is changed by even 1 mm, the lock would not open. Let us look at some common mistakes that occur while using a scale.

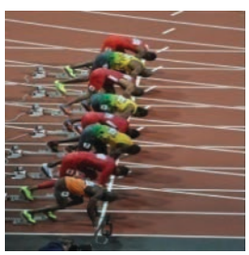
To measure the length of a pin using a scale



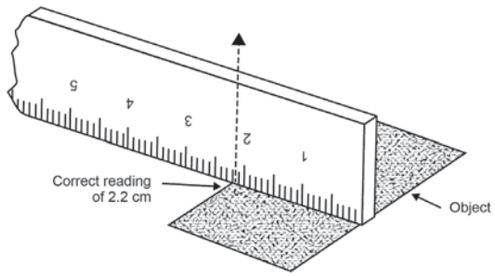
- The head of the pin has to coincide with '0' of the scale.
- Count the number of centimetre and from there count the number of finer divisions. The count of the division is 'mm'
- In the above example the length of pin is 2 cm and 6 mm.

Prefix	Abbreviation	Submultiple/ Multiple	For Metre
Deci	d	Submultiple: 1/10	10 decimetre = 1 metre
Centi	c	Submultiple: 1/100	100 centimetre = 1 metre
Milli	m	Submultiple: 1/1000	1000 millimetre = 1 metre
Nano	n	Submultiple: 1/1000000000	1000000000 nano metre = 1 metre
Kilo	k	Multiple: 1000	1000 metres = 1 Kilometre

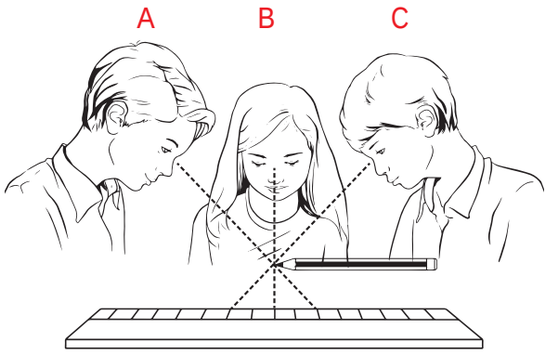
In the given activity, measure the quantities using suitable measuring units and express them with suitable multiple and submultiples.

Picture	Activity	Measuring Unit m / kg / s	Multiple / Submultiple
	Length of tip of pencil.	metre	millimetre
	Length of the pen	_____	_____
	Distance between two cities	_____	_____
	Mass of dry fruits in tablets	_____	_____
	Mass of jewellery	_____	_____
	Time taken to finish 100 m race	_____	_____

- Take care to write the correct submultiple



Parallax is a displacement or difference in the apparent position of an object viewed along two different lines of sight.



Correct position of the eye is also important for taking measurement. Your eye must be exactly in front of vertically above the point where the measurement has to be taken. In the above representation, to avoid parallax error, reading will be correct. From positions 'A' and 'C', the readings will be different and erroneous.

Methods of measuring Length of a curved line:

Activity 2

Aim: To find the length of a curved line using a string.

Materials needed: A meter scale, a measuring tape, a string and a sketch pen

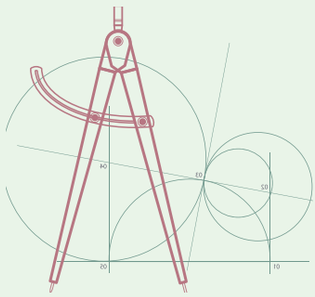
Method:

- Draw a curved line AB on a piece of paper
- Place a string along the curved line. Make sure that the string covers every bit of the curved line.
- Mark the points where the curved line begins and ends on the string.
- Now, stretch the string along the length of a meter scale and measure the distance between the two markings of the string. Note it.
- This will give you the length of a curved line.

Find the length of a banana.

Activity 3

Measuring the length of a curved line using a divider



Draw a curved line AB on a piece of paper

Separate the legs of the divider by 0.5 cm or 1 cm using a ruler.

Place it on the curved line starting from one end. Mark the position of the other end. Move it along the line again and again cutting the line into number of segments of equal lengths. The remaining parts of the line can be measured using a scale.

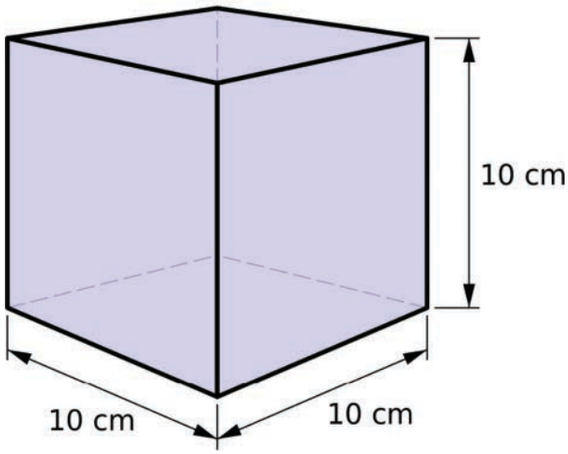
Count the number of segments

Therefore, the length of the line = (number of segments × length of each segment) + length of the left over part.

1.2 Volume

1.2.1 Volume of Solids

Length is a fundamental quantity. That means, it connot be expressed in any other quantities. Using length, we can find out other measurements like Area and Volume. Area is obtained by using two lengths. So, **Area = Length × Breadth.** Now, you can guess how to measure the area of your text book, your classroom or your playground.

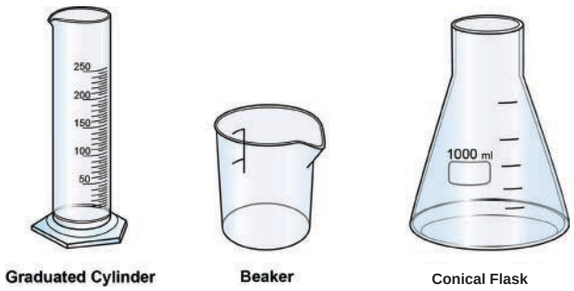


Volume is also a derived quantity and it can be measured from measuring lengths. Let us calculate volume of a box. To know the volume of a box we need to know the length (l), breadth (b) and height (h). With a measuring scale measure the three parameters in cm. The volume of the box = l × b × h. Unit of volume would be obviously cm × cm × cm = cubic cm or cm^3. What do you infer from this? Assume the volume of cubical box is 1000 cubic cm. It means 1000 cubes each with dimensions 1cm × 1cm × 1cm can be placed inside the box. Try to express this quantity in suitable unit.

1.2.2 Volume of Liquid

Measuring the volume of a liquid is quite easy. Liquids take the shape of the container in which they are kept. A liquid whose volume is to be found can simply

be poured into a graduated container. Graduated cylinders, beakers, pipettes and burettes are available for measuring exact volumes. The volume of liquid is usually measured in litres.



Graduated Cylinder Beaker Conical Flask

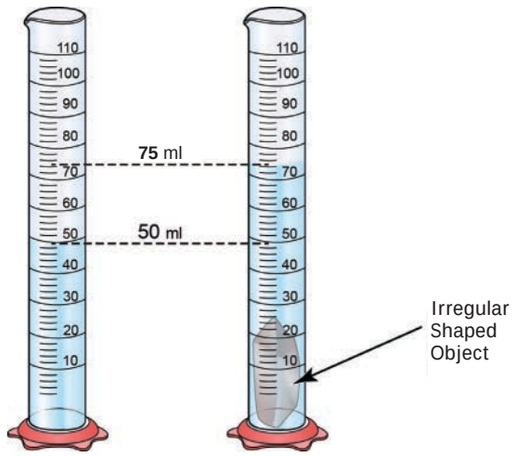
We would have often heard the word litre in our daily life. For an example 1 litre milk packet, 20 litres water can.

Do you know the quantity of blood in a human body?

Measuring the volume of objects with irregular shape

Suppose you want to measure the volume of an object which has irregular shape. How will you do this? There is no mathematical formula to measure this but there are many ways to do. Remember, volume is the space occupied by an object. We can use this property to measure the volume of an object with irregular shape, for example a stone.

Let us try to find volume of a small piece of stone.



Fill a graduated measuring cylinder with water to certain level, say 50 ml. Tie the stone with a piece of fine thread. Immerse the stone completely into water.

As the stone is immersed, we can observe that water level increases. Why? The stone displaces the water to occupy the space inside the measuring cylinder. How much water would be displaced? It would be equal to the space taken up by stone. So the amount of water displaced will be the volume of the stone. This method is called as water displacement method.

Suppose initially the water level was 50 ml. After you immerse a stone the water level rises to 75 ml. What is the volume water displaced? Volume of the water displaced is 75 ml – 50 ml = 25ml

1ml = 1 cubic cm

25ml = 25 cm^3. the volume of stone = 25cm^3

1.2.3 Volume of gas

We can also measure the volume of gases. Gases expand to fill the container into which they are placed. When you compress, a gas you can make the same gas to occupy lesser space. (as in LPG gas cylinder). Therefore it is not easy to talk about the volume of gas in the same way as a volume of a stone or a liquid. It is essential to take into account the pressure at which the gases are kept. We will learn about these later.

SI unit for Volume of solid is cubic metre. Liquids and gases are usually measured in litres. But also can be measured in m^3 or cubic metre. Similar to the length,

$1\ m^3 = 1$ kilolitre (kl or kL)

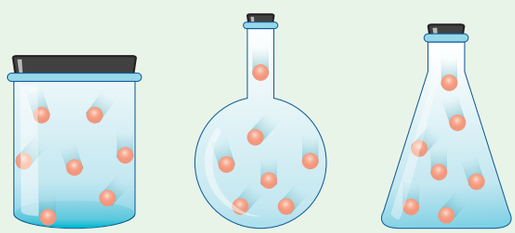
$1cm^3 = 1$ millilitre (ml or mL)

$1mm^3 = 1$ microlitre (µl or µL)

Activity 4

Take three vessels filled with water. By looking at the amount of water guess which vessel has more volume of water. How will you check this experimentally?

How to measure the volume of the given vessel?



1.3 Mass

1.3.1 Mass and Weight

Mass is the measure of the amount of matter in an object. Weight is the gravitational pull experienced by the mass.

Hold a sheet of paper in one hand and a book in another. Which hand feels the heavyness? The mass of the book is more than that of a single sheet of paper. Therefore the pull on the book is more than that of the paper. Hence our hand has to give more force to hold a book than a paper. This force is what we experience as 'heaviness'.

More to Know

The weight is directly proportional to the mass on earths surface. On moon where the gravitational force is lesser than earth, the weight will reduce but the mass will remain same. The moon's gravitational pull is one sixth of the earth's pull. Thus objects weigh six times lighter on the Moon than on the Earth.

The SI unit of mass is kilogram. It is represented by the 'kg'.

Now a question, what is your mass? If you measure it grams that would be a huge number is it not? So it is expressed in kilogram. Bigger weights are measured in tonne or Metric Tonne.

1000 milligram = 1 gram

1000 gram = 1 kilogram

1000 kilogram = 1 tonne

1.3.2 Beam Balance

We use beam balances to measure mass. A beam balance works by comparing the

mass of an object to that of known mass (called a standard mass)

Activity 5

Construct your own beam balance using two scrapped coconut shells, strings or twines thick cardboard as frame and a little sharpened pencil as index needle.

What can you achieve?

1. Find which object is heavier
2. Find approximate weight of lighter things (leaves, piece of papers, etc)

1.3.3 Electronic Balance

An electronic balance is a device used to find accurate measurements of weight. It is used very commonly in laboratories for weighing chemicals to ensure a precise measurement of those chemicals for use in various experiments. Electronic balances may also be used to weigh food, other grocery items, as well as jewellery.

1.4 Time

Day changes into night and night in to day. Seasons also change. We know time passes. How do we measure the passage of time? Clocks are used to measure time. You know how to read a clock face and note the time. You can also use your pulse to measure 'rough' time. Count the number of pulses. That can tell you the time elapsed. In your normal speed of speaking, say "one little second"; "two little second" to count the passage of time.

Activity 6

Ask four or five of your friends to run a race from one end of the school to another. Mark the starting point and the ending point. Using your pulse (or counting by saying 'one little second' etc) count the time taken for each of them to complete the race. Check who is faster?

In earlier days people used sand clock and sundial to measure the passage of time during the day. The shadow cast by a stick can be used to estimate time. One can also use a vessel with a small hole for computing time. Take a vessel or bottle with a small hole in it and fill it with water. The time taken for water to drain can also be used as a measuring device.

These are rough methods for counting passage of time. We can use electronic clock, stopwatch and other instruments to count even smaller durations of time.

Sand Clock

Fast Facts

An odometer is a device used for indicating distance travelled by an automobile.

The metric system or standard set of units was created by the French in 1790.

A ruler or scale, used now a days to measure length was invented by a William Bedwell in 16th century.

A standard metre rod made of an alloy of platinum and iridium is placed at the Bureau of weights and measures in Paris. National Physical Laboratory in Delhi has a copy of this metre rod.

One kilogram is equal to the mass of a certain bar of platinum-iridium alloy that has been kept since 1889 at the International Bureau of Weights and Measures in Sèvres, France.

Numerical Problems

- Look at a meter scale carefully and answer the following:
- How many mm are there in a cm?
- How many cm are there in a m?
- Complete the following:
  - 7875 cm = _____ m _____ cm
  - 1195 m = _____ km _____ m
  - 15 cm 10 mm = _____ mm
  - 45 km 33 m = _____ m.

A Quick Look

- The comparison of an unknown quantity with some known quantity is known as measurement.

- All physical quantities have standard units for the sake of uniformity.
- Length, mass and time are some of the fundamental physical quantities.
- The SI units for

Length	-	metre
Mass	-	kilogram
Time	-	second
Volume	-	litre (or) cm^3

- While using ruler, the accurate measurement can be arrived by avoiding three types of possible errors.
- Volume of solids, liquids and regular objects is measured by direct measurement.
- Volume of irregular objects can be measured by water displacement method.
- Electronic balance is an instrument to provide accurate measurement of mass correct up to milligram.

Some open ended questions

- The school authority planned to conduct a mini marathon race within the school campus. They decided that the running distance to be 2 kilometres. Is it possible to have a school campus with circumference of 2km? Discuss with your friends of how big the campus should be?
- Give other options if it is not a big campus.
- Is the distance in the sea also calculated in kilometres? How is it possible to calculate the distance in sea water? Explore!
- We know that the distance between celestial bodies is calculated in terms of light year. (Ah! Unit of distance in terms of year???) Yes, it's the distance travelled by light in one year. Now without calculator find how many kilometres light would have travelled in a year. (No Calculator). Get the speed of light from your class teacher.
- We see that the distances between Chennai and Madurai is '462' kms. But from which point to which point is this distance calculated?. As we are science students we need to know it with the precision. Is it between the two bus stands? Or between the two railway stations? Discuss and figure it out. Check your answers with your class teacher.
- A person needs to drink two litres of water a day. Note down how much water you drink each day? Make a rough calculation and check if you are drinking the required amount of water.

ICT CORNER

AREA & PERIMETER

Lets play with
Area N Perimeter

Steps:

- Access the application by typing **Area N Perimeter** or install with the help of the link given below or the given QR code
- Open the Application and click **START** button.
- You can see the field whose area is to be measured. Drag and put the tiles on field.
- Use the (+) and (-) to find out the area of the given field.
- Click the **CHECK** button to check your answer.
- You can view your whole results by clicking the **RESULT** button.

Step1

Step2

Step3

Step4

URL:

https://play.google.com/store/apps/details?id=com.bodhaguru.AreaNPerimeter

Pictures are indicative only

Evaluation

ATIPDL

I. Choose the correct answer

1. The girth of a tree can be measured by

   a) Metre scale c) plastic ruler

   b) Metre rod d) measuring tape

2. The conversion of 7 m into cm gives

   a) 70 cm c) 700 cm

   b) 7 cm d) 7000 cm

3. Quantity that can be measured is called

   a) Physical quantity c) unit

   b) Measurement d) motion

4. Choose the correct one

   a) km > mm > cm > m

   b) km> mm > cm > km

   c) km > m > cm > mm

   d) km > cm > m > mm

5. While measuring length using a ruler, the position of your eye should be

   a) Left side of the point.

   b) Vertically above the point where the measurement is to be taken.

   c) Right side of the point

   d) Any where according to one's convenience.

II. True or False

1. 126 kg is the correct way of expressing mass.
2. Length of one's chest can be measured by using metre scale.
3. Ten millimetres makes one centimetre.
4. A hand span is a reliable measure of length.
5. The SI system of units is accepted everywhere in the world.

III. Fill up the blanks

1. SI Unit of length is symbolically represented as _____.
2. 500 gm = _____ kilogram
3. Distance between Delhi and Chennai can be measured in _____.
4. 1 m = _____ cm
5. 5 km = _____ m.

IV. Analogy

1. Sugar: Beam balance; Lime juice?
2. Height of a person: cm; length of your sharpened pencil lead?
3. Milk: volume; vegetables?

V. Match the following

Column A	Column B
1. Length of the fore arm	Metre
2. SI unit of length	Second
3. Nano	10^3
4. SI Unit of time	10^{-9}
5. Kilo	Cubit

VI. Complete the given table

Volume_____	Kg _____
Length of your little finger _____	Km_____

VII. Arrange in increasing order of unit

1 Metre, 1 centimetre, 1 kilometre, and 1 millimetre.

VIII. Find the answer for the following questions within the grid

1. 10^{-3} is one _____
2. SI Unit of time _____
3. Cross view of reading for a measurement leads to _____
4. _____ is the one what a clock reads
5. _____ is the amount of substance present in an object
6. _____ can be taken to get the final reading of the recordings of different of students for a single measurement.
7. _____ is a fundamental quantity
8. _____ shows the distance covered by an automobile
9. A tailor use _____ to take measurements to stitch a cloth
10. Liquids are measured with this physical quantity

IX. Answer in a word or two.

1. What is the full form of SI system?
2. Name any one instrument used for measuring mass.
3. Find the odd one out

   Kilogram, Millimetre, Centimetre, Nanometre
4. What is the SI Unit of mass?
5. What are the two parts present in a measurement

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

X. Answer in a sentence or two.

1. Define measurement.
2. Define mass.
3. The distance between two places is 43.65 km. Convert it into metre and cm.
4. How will you measure the volume of irregular objects?
5. What are the rules to be followed to make accurate measurement with scale?

XI. Solve the following

1. The distance between your school and your house is 2250 m. Express this distance in kilometre.
2. While measuring the length of a sharpened pencil, reading of the scale at one end is 2.0 cm and at the other end is 12.1 cm. What is the length of the pencil?

XII. Write in detail

1. Explain two methods those you can use to measure the length of a curved line.
2. How will you measure the volume of irregular objects?
3. Fill up the following chart.

Property	Definition	Basic Unit	Instrument used for measuring
Length			
Mass			
Volume			
Time			

Unit 2 Forces and Motion

ATSKF9







Learning Outcomes

- Identify push or pull or both is involved when there is a motion
- Understand that some forces act on contact and some are non-contact forces
- When a force is applied, it can make things move, change direction or change its shape and size
- Distinguish rest and motion and understand that they are relative
- Infer motion is caused by application of force
- Classify the different types of motion
- Deduce the definition of average speed
- Use and understand the unit of speed
- Distinguish uniform and non-uniform motion
- Compute time, distance and speed

Introduction

We had studied in our earlier classes that push or pull results in some motion of the object. When we open the door, kick a football, lift our school bag, all involve motion and there is some push or pull.

2.1 Motion and Rest

2.1.1 What is rest? What is motion?

Suppose there is a book on your table right in the middle. Is the book moving? You will say "it is not moving; it is at rest". If you push the book to one side of the table to clear space for keeping your notebook, then you will say the book is moving.

When the book was at the same place with respect to the table, you say the book was at rest; but when it was pushed from one place on the table to another place, you say it was moving.

Activity 1

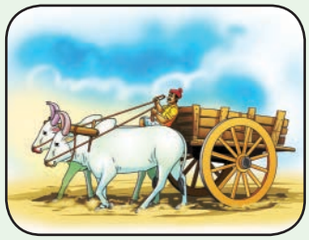
Can you identify whether it is push or pull that results in motion in the following cases?

Push / Pull

Push / Pull

Push / Pull

Push / Pull



Push / Pull

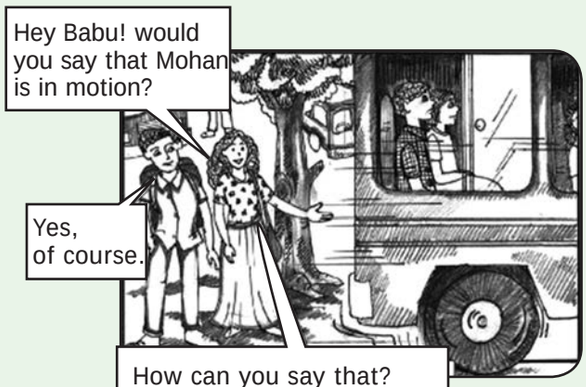
Push / Pull

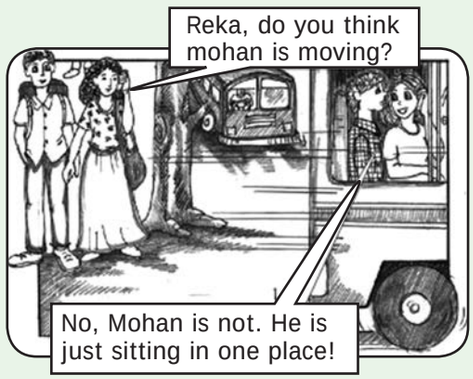
When there is a change of position of an object with respect to time, then it is called motion, if it remains stationary it is called rest.

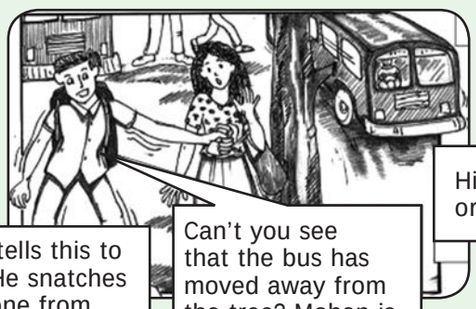
2.1.2 Is Mohan in motion?

Observe the following pictures and say whether Mohan is in motion or at rest

Anitha and Babu are standing under a tree at the bus stand waiting for a bus to Madurai. Two more of their friends, Reka and Mohan, get into a bus to go to Thanjavur. The bus starts.

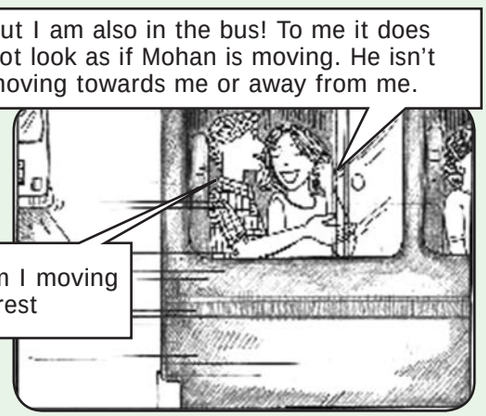




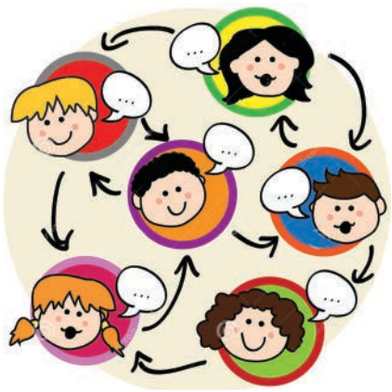


Anitha tells this to Babu. He snatches the phone from her and says irritably to Reka,

Can't you see that the bus has moved away from the tree? Mohan is in the bus hence Mohan moving along with the bus.



Discuss: Who is correct? Is Mohan really in motion?



We can readily observe that both Reka and Babu are correct. From the point of view of Babu, Mohan along with the bus is in motion; but for Reka who is sitting beside him, he is at one place; therefore stationary. So, according to Babu, Mohan is in motion; Mohan is at rest from Reka's observation. Can you think any other examples?

Hi! Please answer honey by observing the situation in the picture

Event 1: The man in the boat is **moving** with respect to the bank of river. He is at **rest** with respect to the boat.

Event 2:

The girl on the swing is _____ with respect to the seat of the swing.

She is _____ with respect to the garden.

Event 3: Nisha is going to her grandmother's house by bicycle. The girl on the bicycle is _____ with respect to the road.

She is _____ with respect to the bicycle.

Take the case of a book on a table at rest. Is it really without any motion? We know that Earth is rotating on its axis; therefore the table along with the book must be rotating. Is it not? We are also moving along with the earth. Therefore, from the point of view of ground on which we stand, the book is at 'rest'. Similarly,

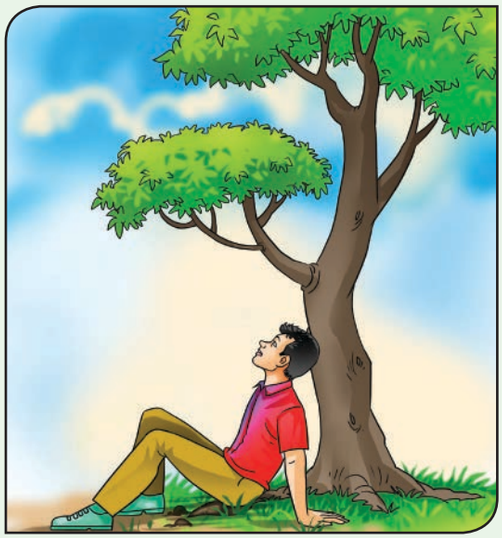
while travelling in a speeding bus, we feel that the poles and trees seem to move backwards, and the things inside the bus are stationary.

An object may appear to be stationary for one observer and appear to be moving for another. An object is at rest in relation to a certain set of objects and moving in relation to another set of objects. **This implies that rest and motion are relative.**

Activity 2

Moon or Cloud?

Observe the moon on a windy night with a fair bit of cloud cover in the sky. As a cloud passes in front of the moon you sometimes think it is the moon which is moving behind the cloud. What would you think if you were to observe a tree at the same time?



Aryabatta, an ancient Indian astronomer, said that like the banks of the river appear to move back to a person in a boat floating gently in a river, the night sky studded with stars appear to move from east to west while Earth rotates from west to east. Learn more by asking others and reading up on your own.

2.1.3 How things move?

When we kick a ball it moves. When we push the book on the table, it moves. When a bullock pulls the cart moves. Motion occurs when the object is pulled or pushed by an agency.

In daily life, we pulled out water from the well, with bucket or "the animal pulls a bullock cart". It is a person or animal, that is an animate agency that does the pushing or pulling.

Sometimes we see a tall grass in the meadow dancing in the wind, a piece of wood is moving down a stream. What pushes or pulls them? We know that blowing wind and flowing water is the cause. Sometimes the push or pull can be due to the inanimate agency.

Forces are push or pull by an animate or inanimate agency.

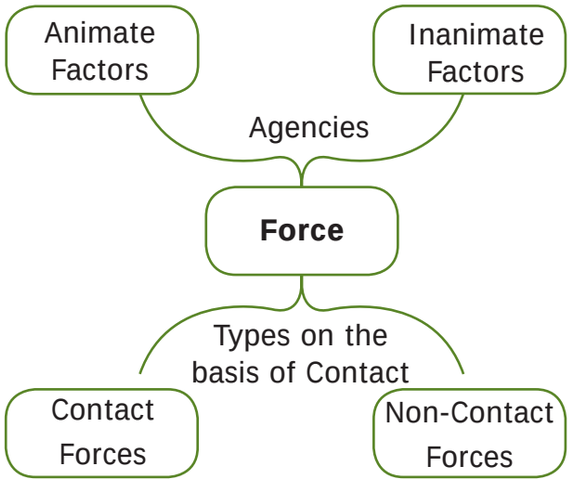
Contact, Non-Contact Forces

In all the above cases, the force is executed by touching the body. so, these type of force is called Contact Force.

Mysteriously ripen coconut falls to the ground. What pulls it to the ground? We would have heard of the 'force of gravity' of Earth. Gravity pulls the ripen coconut from the tree to the ground.

Bring a magnet near the small iron nail. Suddenly the nail jumps into the air and sticks with the magnet. Observe that the magnet and the nail did not touch each other. Still, there was a pulling force that made the nail to jump towards the magnet. In these two examples, the force is applied without touching the object. Such forces are known as "non-contact forces"

Forces can be classified into two major types; contact and non-contact forces. Wind is making a flag flutter, a cart pulled by a bullock are contact forces. Magnetism, gravity are some examples of non-contact forces.

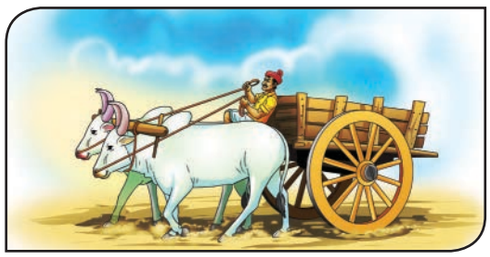


2.1.4 What happens when we apply a force on an object?

What happens when you apply a force on an object? Say you push a book on the table. The book moves. Application of force in an object results in motion from a state of rest.

What happens when a batsman hit a ball? The ball is already in motion, but with the strike, the speed of the ball increases. Moreover the direction of the ball changes. Application of force on object results in a change in its speed and change in its direction.

Crush a balloon, apply force on roti dough, pull a rubber band. In these cases the shape of the object change on application of force. Application of force in object results in expansion or contraction.



Look at this picture. The person is applying force to stop the cart from moving. When the force is applied against the direction of the motion, the speed can be reduced, or even the motion stopped completely.

Discuss what happens when you apply break in a speeding bicycle.

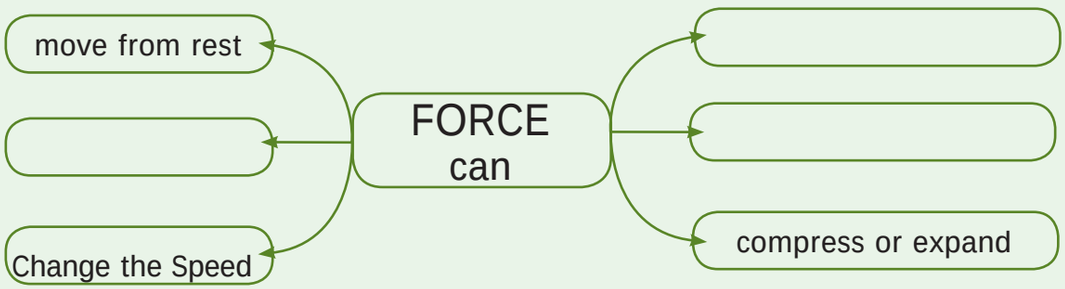
In a nutshell, the applied force is an interaction of one object on another that causes the second object to move from rest, or speed up, slow down, stop the motion, change the direction, compress or expand.

Forces can

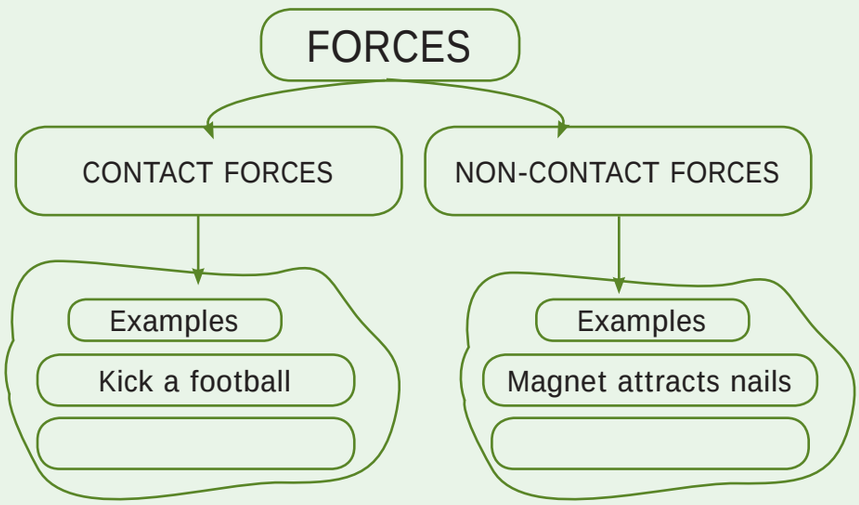
1. Change the states of body from rest to motion or motion to rest.
2. Either change the speed or direction or both of the body.
3. Change the shape of the body.

Activity 3

Fill in the empty spaces



Can you give example for contact and non-contact forces?



2.1.5 Types of motion

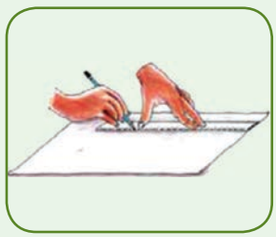
Activity 4

Play with pencil

Please do what Shanthi did...

(i) Shanthi took a pencil and sharpened it with a sharpener. (ii) Then she drew a circle using the pencil and a compass. (iii) Later she took her ruler (scale) and drew






a straight line in another paper. (iv) Then she kept the pencil between her finger and moved it back and forth.

Now, look at the motion of the pencil in all these four cases. How was it?

(i) In the first case, the pencil **rotated in its axis.**

(ii) In the second case, it went in **a circle.**

(iii) In the third case, the pencil travelled in **a straight line.**

(iv) Fourth case, the pencil tip moved **back and forth,** that is it oscillated like a swing.

That is its motion was 'rotational' and then 'circular' 'straight line or linear' and later 'oscillatory'.

Throw paper aeroplanes or paper dart. Watch its flight path when you throw it at an angle. The path curves i.e the paper flight is moving ahead but direction is changing while moving such paths are called curvilinear.

2.1.6 Periodic and non-periodic motions

A fly buzzing around the room is a combination of all these and flight path is zigzag.

You can classify the motion according to the path taken by the object.

a. Linear- moving in a straight line, like a person walking on a straight path, free fall.

b. Curvilinear - moving ahead but changing direction, like a throwing ball.

c. Circular -moving in a circle, swirling stone tied to the rope.

d. Rotatory -The movement of a body about its own axis, like a rotating top.

e. Oscillatory -coming back to the same position after a fixed time interval, like a pendulum.

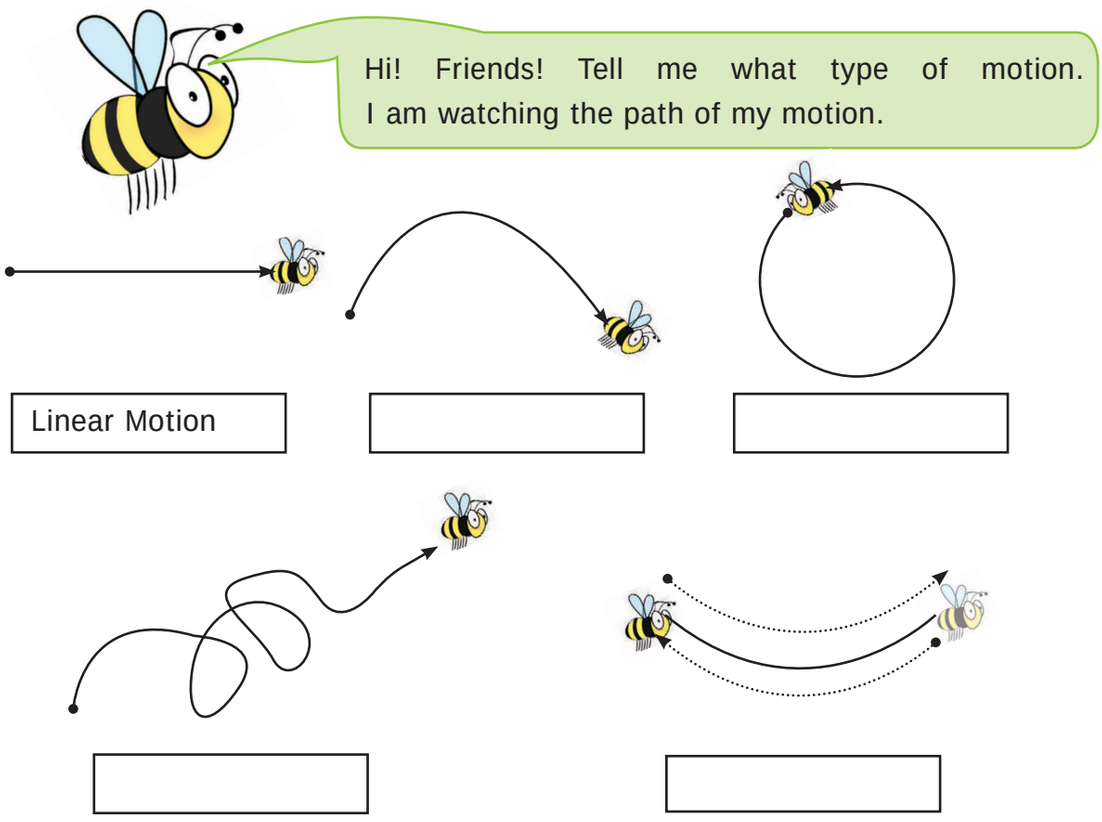
f. Zigzag (irregular)- like the motion of a bee or people walking in a crowded street.

Oscillations at Greater Speed

Ask your friend to hold the two ends of a stretched rubber band. Strike it in the middle. Do you see it oscillates very very fast? When the oscillation is very swift, it is called as vibration.

Fast oscillations are referred to as vibrations.

Activity 5



Activity 6

Classify the following according to the path it takes.

Linear ,Curvilinear, Circular,Rotatory,Oscillatory, Zigzag (irregular)

• A sprinter running a 100 m race	
• A coconut falling from a tree	
• striking a coin in a carom board game	
• Motion of flies and mosquitoes	
• Beating of heart	
• Children playing in a swing	
• The tip of hands of a clock	
• Flapping of elephant's ears	
• A stone thrown into the air at an angle	
• Movement of people in a bazaar	
• Athlete running around a track	
• Revolution of the moon around the earth	
• The movement of a ball kicked in a football match	
• Motion of a spinning top	
• Revolution of the earth around the sun	
• Swinging of a pendulum	
• Children skidding on a sliding board	
• Skidding down a playground slide	
• Wagging tail of a dog	
• Flapping of a flag in wind	
• A car driving around a curve	
• Woodcutter cutting with a saw	
• Motion of water wave	
• Motion of piston inside a syringe	
• Bouncing ball	
[add five motions you observe to this list]	

2.1.7 Speed Vs Slow ?

Take the case of the hour-hand of a clock. In one day it makes two rounds. Look at a bouncing ball. It bounces a certain number of times for a given time interval or period. Look at the water waves, in a given period that is a time interval; a fixed number of waves hit the shore.

Motion repeated in equal intervals of time is called as periodic motion.

Let us take the example of sabing swing in wind. This motion is not in uniform interval. Such Motions are called non-periodic motion.

Can you notice an interesting fact?

Do you notice that all oscillatory motions are periodic, but not all periodic are oscillatory?

Revolution of the moon around the earth is periodic but not oscillatory. However, the children playing in a swing is both periodic and oscillatory.

Look at the tall tree. When the wind is gentle, its branches are dancing slowly; but if the gentle wind becomes strong, the branches shake violently, and if the speed increases further, the branch may even break and fall. That is the motion can be slow or fast.

Can we say a motion is slow or fast without comparing anything?

Compared to walking, cycling is fast, but a bus is faster than a cycle.

The aeroplane is much faster than a bus.

So, slow or fast is a relative concept which depends upon the motions we are comparing.

Then how to we say a body moves in a particular Speed?

Average Speed.

I have travelled 160 km in Two Hours.

Taxi Driver

I have travelled 200 km in Four Hours.

Bus Driver

I have travelled 300 km in Five Hours.

Truck Driver

Can you say who travelled with highest speed?

How do we say? Let us calculate how long they travelled in One Hour?

Distance travelled by the Car in One Hour = ___80___ Km (160/2)

Distance travelled by the Bus in One Hour = _____ Km

Distance travelled by the Truck in One Hour = _____ Km

Have you found out? say now.

Fastest _____, Slowest _____

Have you noticed that saying who is fast and slow? is easy when we calculate the distance they travelled in one hour.

> The distance travelled by an object in unit time is called average speed of the object.
>
> If an object travelled a distance (d) in time (t) then its
>
> Average speed (s) is = distance travelled / time taken = d/t.

In other words, you divide the distance travelled by the time taken to get the speed.

Suppose a car travels 300 km in one hour. Then we say the speed of the car is '300 kmph' (we read it as 'three hundred kilometres per hour').

If an object travelled 10 metre in 2 seconds, then

Average speed (s)

= distance travelled (d) / time taken (t)

= 10 metre/ 2 second

= 5 metre / second

bus takes three hours to cover this distance of 180 kilometres. Then its average speed is

Average speed (s)

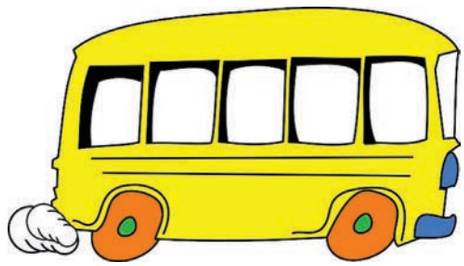
= distance travelled (d) / time taken (t)

= 180 kilometre/ 3 hour

= 60 kilometre / hour

Please note that metre/second or kilometre/hour comes next to our answer for average speed. What is it?

Observe the formula for average speed. If we denote the distance in metre and time by seconds then the unit of average speed is metre/second.



If we denote the distance in kilometre and time in hour then the unit of average speed is kilometre/hour.

Some times we use units like centimetre/second.

In science we generally use SI units. In SI units the unit of distance is metre and the unit of time is second. So, the SI unit of average speed is metre/second.

Let us Calculate

1. A cat travelled 150 metres in 10 seconds, what is its average speed?
2. Priya ride her bicycle 40 km in two hours. what is her average speed?

Our Speed...

Let us play a small game. Go to the playground with your friends. Mark 100 metre distance for a race. Conduct a friendly running race and calculate the time they taken to complete the distance by stopwatch. Now fill up the following table.

S. No	Name of the student	distance	Time taken (in seconds)	average speed = distance travelled/ time taken	average speed (m/s)
1	Murugesan	100 m	12 sec	100 metre / 12 sec	8.3 m/s
2		100 m			
3		100 m			
4		100 m			
5		100 m			

Usain Bolt crossed 100metre in 9.58 seconds and made a world record. If you have the hope to run in a speed above that speed. Then Olympic Gold Medal is waiting for you.

If you know the speed and the time taken by the object travelled, then we can compute how much distance it had travelled?

Speed = distance travelled / time taken

(s = d/t)

s = d/t or st = d

therefore the distance travelled is speed × time.

If a ship travelled at a speed of 50 kmph and it sailed for five hours, how much distance it had travelled.

s = 50 kmph; t = 5 therefore

s × t = 50 kmph × 5 h = 250 km

If we know the speed and distance travelled we can compute the time taken.

s = d/t that is t = d/s

time taken = distance travelled / speed

Suppose a bus travels at a speed of 50 kmph and has to cover a distance of 300 km. How much time will it take?

t = d/s that is 300 km/50 kmph = 6 h.

Compute the following Numerical Problems.

1. If you travel 10 kilometres in 2 hours, your speed is _____ km per hour.
2. If you travel 15 kilometres in 1/2 hour, you would travel _____ km in one hour, and your speed is _____ km per hour.
3. If you run fast at 20 kilometres per hour for 2 hours, you will cover _____ km

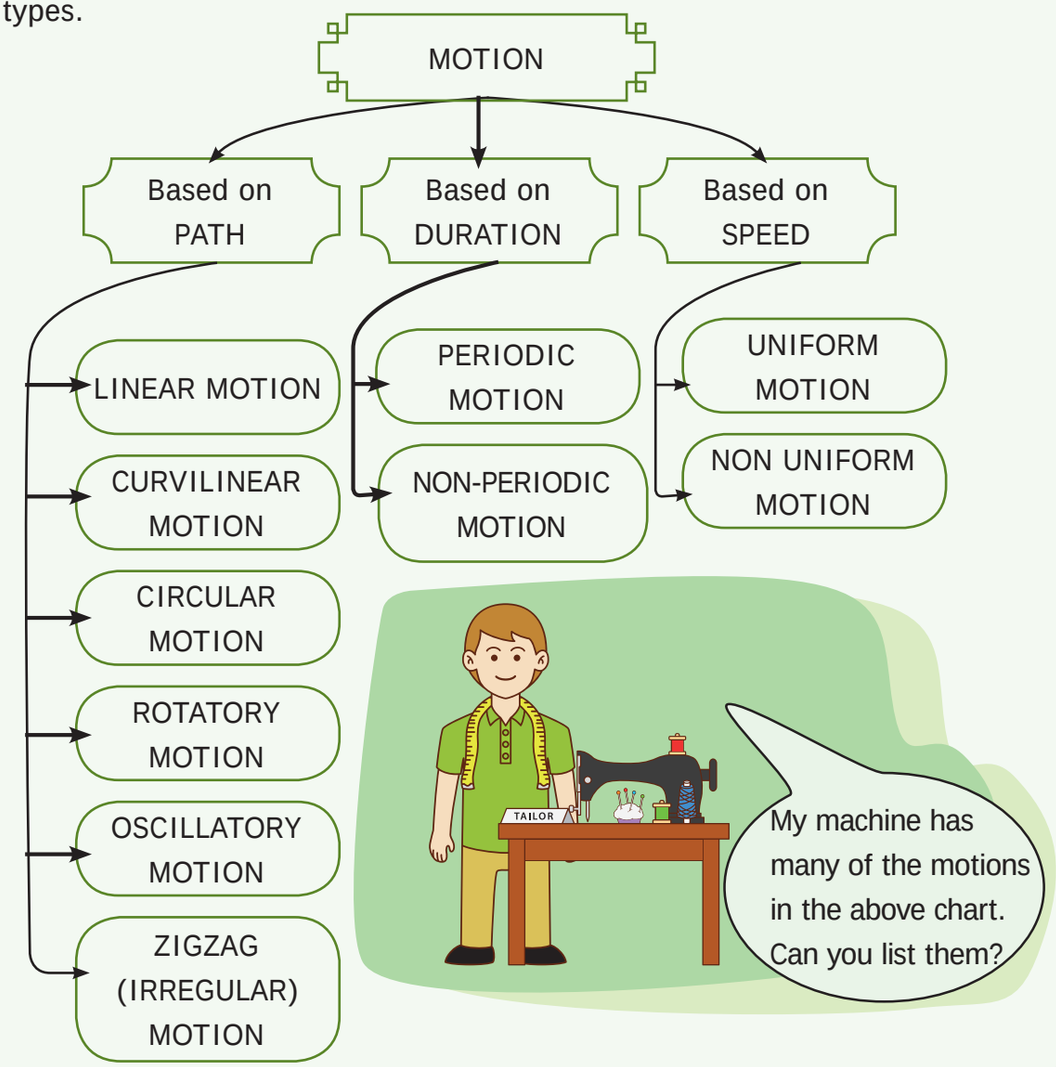
FACT FILE

A Cheetah is the fastest land animal running with an average speed of 112 km/h

2.1.8 Uniform and non-uniform motion

Suppose a train leaves Thiruchirapalli and arrives at Madurai. Is the train travelled in an uniform speed? First, the train was stationary. When the train left the station, the motion was slow and only after it left some distance that it gathered speed. After that it slowed down while crossing bridges and stop at intermediate stations for passengers. Finally, as the train approached Madurai, again, it slowed and finally came to a halt. That is the speed was not same all through the journey time. That is the speed was non-uniform. This motion is said to be non-uniform motion.

In a nutshell, we can classify the motion in terms a) path b) if it is periodic or not c) if the speed is uniform or not. However, in real life, the motions are combinations many types.



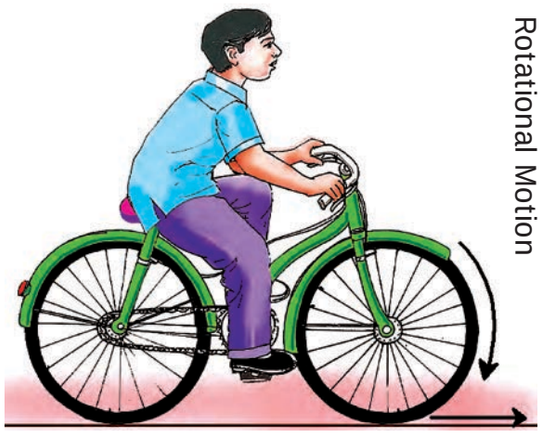
However, in between the journey, there may have a stretch where in the train might have been going at a constant speed. During that interval the train was moving at uniform speed, that is uniform motion.

If an object covers uniform distances in uniform intervals then the motion of the object is called Uniform Motion. Otherwise the Motion is called Non-Uniform Motion.

Many motions we see in our day to day life are non-uniform. We will learn more about uniform and non-uniform motion in later classes.

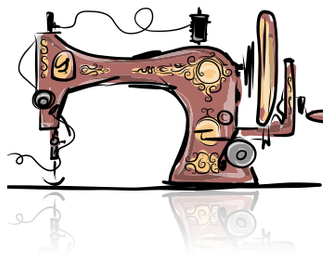
Multiple Motion

Look at the bicycle. What type of motion does the wheel perform? What type of motion does the cycle in total perform?



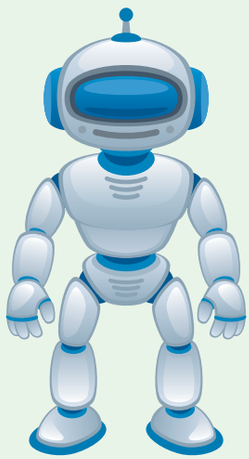
The tyres rotate and make a rotatory motion, but the cycle as such moves forward in a linear path.

Multiple Motion in a Sewing Machine



- Motion of the needle
- _____ _____
- Motion of the wheel
- _____
- Motion of footrest
- _____

2.2 Science Today - Robot



A bipedal humanoid robot.

Robots are automatic machines. Some robots can perform mechanical and repetitive jobs faster, more accurately than people. Robots can also handle dangerous

materials and explore distant planets. The term comes from a czech word, 'robota' meaning 'forced labour'. Robotics is the science and study of robots.

What Can Robots Do?

Robots can sense and respond to their surroundings. They can handle delicate objects or apply great force-for example, to perform eye operations guided by a human surgeon, or to assemble a car. With **artificial intelligence**, robots will also be able to make decisions for themselves.

How Do Robots Sense?

The quadrupedal military robot

Electronic sensors are a robot's eyes and ears. Twin video cameras give the robot a 3-D view of the world. Microphones detect sounds. Pressure sensors give the robot a sense of touch, to judge how hard to grip an egg. Heavy luggage built-in computers send and receive information with radio waves.

Artificial Intelligence

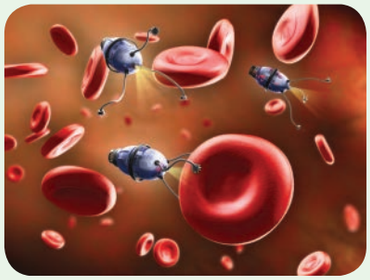
Artificial intelligence attempts to create computer programs that think like human brains. Current research has not achieved this, but some computers can be programmed to recognize faces in a crowd.

Can Robots Think?

Articulated welding robots (industrial)

Robots can think. They can play complex games, such as chess, better than human beings. But will a robot ever know that it is thinking? Humans are conscious-we know we are thinking-but we don't know how consciousness works. We don't know if Robots can ever be conscious.

Nanorobotics



Future of Nanorobotics

Nano-robots or nanobots are robots scaled down to microscopic size in order to put them into very small spaces to perform a function. Future nanobots could be placed in the blood stream to perform surgical procedures that are too delicate or too difficult for standard surgery. Imagine if a nanobot could target cancer cells and destroy them without touching healthy cells nearby.

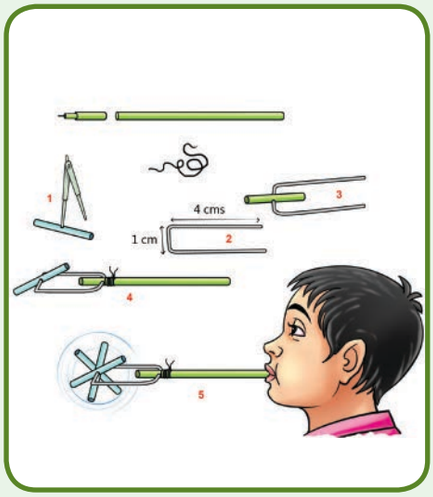
Summary

- Motion and rest are relative.
- All things that are at rest can be seen as in motion from a different point of view, and all motion can be seen as rest from a different perspective.
- Application of forces is implemented by a push or pull. Forces can be applied by animate as well as inanimate agency.
- Application of forces result in motion from rest, increase or decrease in speed, change in direction, and distortion of the shape.
- Some forces act only in contact; there are some which can even effect at a distance.
- Average speed = distance travelled / time taken (s= d/t)
- The motion can be classified according to the path, periodic or non-periodic as well as if the speed is uniform or non-uniform.
- Unit of speed is m/s.

Activity 7

Simple Spinner

Let us enjoy by making a simple spinner. Make it by the following instruction.



Cut a 2cm long piece from an old ball-pen refill and make a hole in its center with a divider point (Fig 1).

Take a thin wire of length 9cm and fold it into a U-shape (Fig 2).

Weave the refill spinner in the U-shaped wire (Fig 3).

Wrap the two ends of the wire on the plastic refill, leaving enough clearance for the spinner to rotate (Fig 4).

On blowing through the refill, the spinner rotates (Fig 5).

For obtaining maximum speed adjust the wires so that air is directed towards the ends of the spinner.

Have you enjoyed with simple spinner. Do you observe the motions in the toy. Can you answer the following question?

1. Motion of the air in tube is _____ motion.
2. Motion of the refill stick _____ motion.
3. The toy converts _____ motion into _____ motion.

Think

In simple spinner linear motion is converted in to rotatory motion. Can you make a toy which converts rotatory motion into linear motion.

You will enjoy this activity also. This will let you to understand how steam engine works.

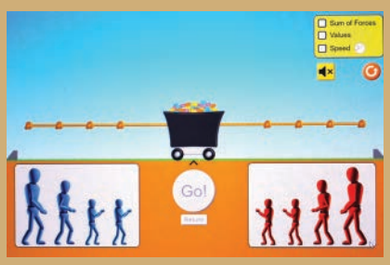
ICT CORNER

Force and motion

Play with force and motion.

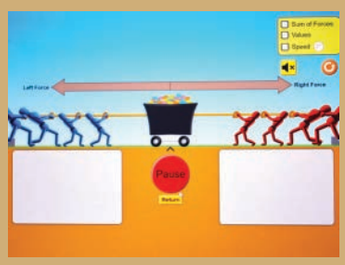
Steps:

- Lets learn force and motion on **PhET** in Google browser. Download and install.
- Drag any one side and place him in the knot portion of the rope. Now click **go**.
- If placed on the right side then the load will move in that direction. The place of the man and the number of man can be changed. The direction of force and the unit of force will display on the screen.
- If we place equal number of men on both the sides the load will not move.
- By changing the number of men the strength of force can be changed.



Step1

Step2



Step3

URL:

https://phet.colorado.edu/en/simulation/forces-and-motion-basics

Pictures are indicative only

Evaluation

I. Choose the correct answer

1. Unit of speed is

   a. m b. s c. kg d. m/s

2. Oscillatory motion among the following is

   a. Rotation of the earth about its axis

   b. Revolution of the moon about the earth

   c. To and fro movement of a vibrating string

   d. All of these.

3. The correct relation among the following is

   a. Speed = distance × time

   b. Speed = distance / time.

   c. Speed = time / distance

   d. Speed = 1 / (distance × time)

4. Gita rides with her father's bike to her uncle's house which is 40 km away from her home. She takes 40 minutes to reach there.

   Statement 1 : She travels with a speed of 1 km / minute.

   Statement 2 : She travels with a speed of 1 km/hour

   a. Statement 1 alone is correct.

   b. Statement 2 alone is correct.

   c. Both statement 1 and 2 are correct.

   d. Neither statement 1 nor statement 2 is correct.

II . Find whether the following statements are true or false. - if false give the correct answer

1. To and fro motion is called oscill tory motion.
2. Vibratory motion and rotatory motion are periodic motions.
3. Vehicles moving with varying speeds are said to be in uniform motion.
4. Robots will replace human in future.

III. Fill in the blanks

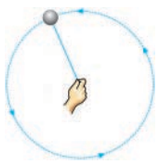
1. A bike moving on a straight road is an example of _____ motion.
2. Gravitational force is a _____ force.
3. Motion of a potter's wheel is an example of _____ motion.
4. When an object covers equal distances in equal interval of time, it is said to be in _____ motion.

IV. Match the following

1.  a. Circular motion

2.  b. oscillatory motion

3.  c. linear motion

4.  d. rotatory motion

5.  e. linear and rotatory motion

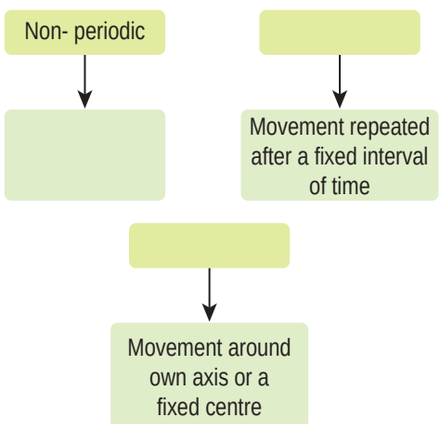
V. Analogy

1. kicking a ball : contact force :: falling of leaf : _____?
2. Distance : metre :: speed : _____ ?
3. circulatory motion :: a spinning top :: oscillatory motion : _____?

VI Given below is the distance-travelled by an elephant across a forest with uniform speed. Complete the data of the table given below with the idea of uniform speed.

Distance (m)	0	4		12		20
Time (s)	0	2	4		8	10

VII Complete the web chart



VIII Give one word for the following statements

1. The force which acts on an object without Physical contact with it.

   _____

2. A change in the position of an object with time.

   _____

3. The motion which repeats itself after a fixed interval of time.

   _____

4. The motion of an object travels equal distances in equal intervals of time. _____
5. A machine capable of carrying out a complex series of actions automatically. _____

IX Answer the following in a sentence or two

1. Define force.
2. Name different types of motion based on the path.
3. If you are sitting in a moving car, will you be at rest or motion with respect ur friend sitting next to you?
4. Rotation of the earth is a periodic motion. Justify.
5. Differentiate between rotational and curvilinear motion

X. Calculate

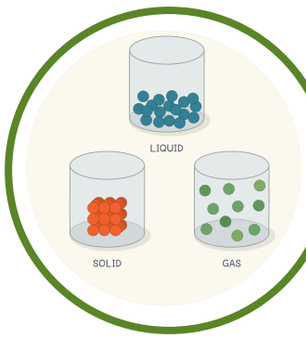
1. A vehicle covers a distance of 400km in 5 hour. Calculate its average speed.

XI. Answer in detail:

1. What is motion? Classify different types of motion with examples.

XII. Fill with examples

Linear motion	
Curvilinear motion	
Self rotatory motion	Motion of wheel in a cart
Circular motion	
Oscillatory motion	
Irregular motion	



Unit 3

Matter Around Us

B328B2

Learning Objectives

At the end of the lesson you will be able to

- Define matter and develop an understanding of the particulate nature of matter
- Sort the objects on the basis of certain properties
- Differentiate between solids, liquids and gases based on the arrangement of their particles.
- Differentiate between pure substances and mixtures
- Identify the need for separation of mixtures
- Suggest suitable methods for separating given samples of mixture
- Acquire an awareness on food adulteration and its harmful effects

Introduction

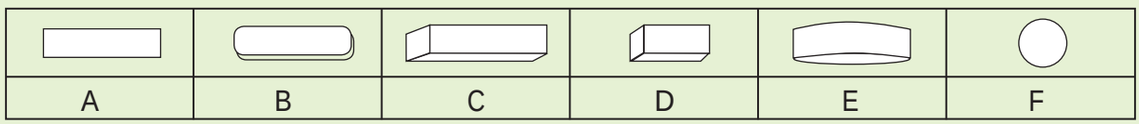
Matter is all around us. The air you are breathing is also a matter. Matter is defined as anything that has mass and takes up space. Matter is found in three major states; solid, liquid and gas. So what is matter made of? All matter is made of atoms. Atoms are the smallest particle of matter.

They are so small that you cannot see them with your eyes or even with a standard microscope. A standard sheet of paper is about millions atoms thick. Science has come up with a technology to identify structure of atoms Scanning Electron Microscope (SEM) and Tunnelling Electron Microscope (TEM) which uses electricity to map atoms. There is more about atoms in the later, but first let's learn about the three states of matter.

Silicon atoms on a surface via Scanning Tunneling Microscopy, (STM).

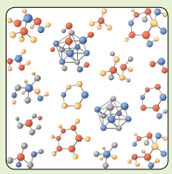
Activity - 1

Take a few crystals of sugar. Observe them carefully with the help of a magnifying lens.



Which of the shapes given above resembles a sugar crystal?

A B C D E F



Now place a few sugar crystals in a teaspoon full of water.

What happens to the sugar crystals?

Like everything else a sugar crystal is also made up of molecules. When sugar dissolves in water, the sugar crystals break down and the molecules of sugar get distributed in the water. This makes the water taste sweet. The sugar molecules are extremely small, that is why we are not able to see them. A small amount of any matter will have many million molecules. (1 million = 1000000)

Besides solids, Liquid and gases there are two more states plasma and Bose – Einstein condensates.

Plasma is not a common state of matter on Earth, but may be the most common state of matter in the universe. For example, stars including sun are covered in plasma.

Bose – Einstein condensate is a gas – like state of matter that exists at extremely cold temperatures. It was predicted around 1925 and confirmed in 1995, This is used in the field of cryogenics.

Physical Nature of Matter

Matter occupies space and has mass. But what is its nature? Ancient philosophers pondered over such questions. In India a philosopher named Kanada and in Greece a philosopher named Democritus came to somewhat similar idea.

Imagine you have a piece of thread. You cut it into two with the same piece. Take again one of the piece and cut it again into two. Repeat the above process for many times. At some point piece of the thread will be so small to see, or we may not have sharp enough knife to cut further. But this is imaginary 'thought experiment'. Therefore these are not possible practically.

Imagine if you can cut as fine as possible and are able to see even the very small things. Can we cut the rope into two without an end?

Kanada and Democritus said, No; we cannot go on endlessly. There will be a point at which we will not be able to cut the thread further. That is the point when we will reach molecules or atoms.

We will read more about molecules and atoms later. Suffice to say that all matter is made up of very small particles. Gold is made up of tiny gold particles and water is made up of tiny water particles. These tiny particles present in all matter are called as atoms or molecules.

The particles in matter are extremely small and cannot be seen even with a powerful microscope. What we can see is only group of particles.

Do you know? that a drop of water contains about 10^{21} water particles? One dot that you make with your pen has more than two lakh molecules.

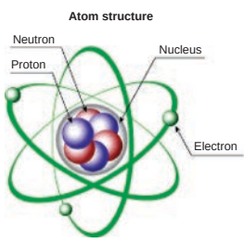
Characteristics of the particles of matter

Particles *of matter have a lot of space in between them*. In different forms of matter this spacing will be different.

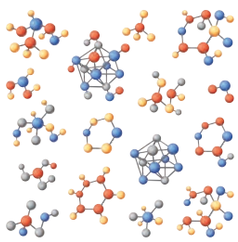
Let us add a spoon full of sugar to a glass of water.

Stir well. Sugar disappears completely. Where has it gone? Will the glass of water be now sweet?

Atom



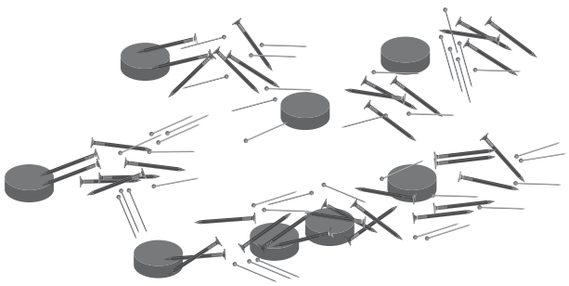
Molecule



Molecule

1. Water particles have space between them and sugar particles are now occupying those spaces.

2. *Particles of matter attract each other*. It is this attraction which keeps the particles together. This attractive force will be different for different forms of matter.



Grouping of Matter on the basis of Physical states

You already know what grouping is all about.

Matter can be grouped into Solids, Liquids and Gases based on the above characteristics. These are called the physical states of matter.

3.1 Mass, Shape and Volume of Solids, Liquids and Gases

Let us first take any solid say a stone: Answer the following questions:

- Do you need a container to know the shape of a stone ? Yes / No
- If you move the stone from the ground to a table or place it on the shelf does its shape change? Yes / No
- A solid does not need a container; it stays where it is because its particles are tightly packed into a definite shape that, ordinarily, does not change. If you take the stone from the ground place it on the table or shelf its shape and volume do not change.

Activity 2

Sit together in groups of three. Look at the following objects. All these are familiar to you. Are they all the same or different? Can you pick out a few which you think are similar and group them? On what basis did you group them? Is there only one way of doing it or more ways? Discuss with your group members and note it down. You can group them according to their uses, the materials with which they are made of or some other properties and also as living and non-living things.

For example, pencil and books are used for studying, The bucket and the comb are made of plastic while the table and ladle are made of wood. The scrub brush and broom are rough but the toy bear is soft. Light can pass through the glass of water and the spectacles but not through the apple or iron box. The cow and the bird are living things while the rest are not. Water in the glass is a liquid but air in the balloon is a gas and the rest are solids. The feather and the paper cup can float but not the apple or the piece of stone. The rubber band can be








stretched but not the comb. Thus we can see similarities and differences between things and group and sort them in many different ways.

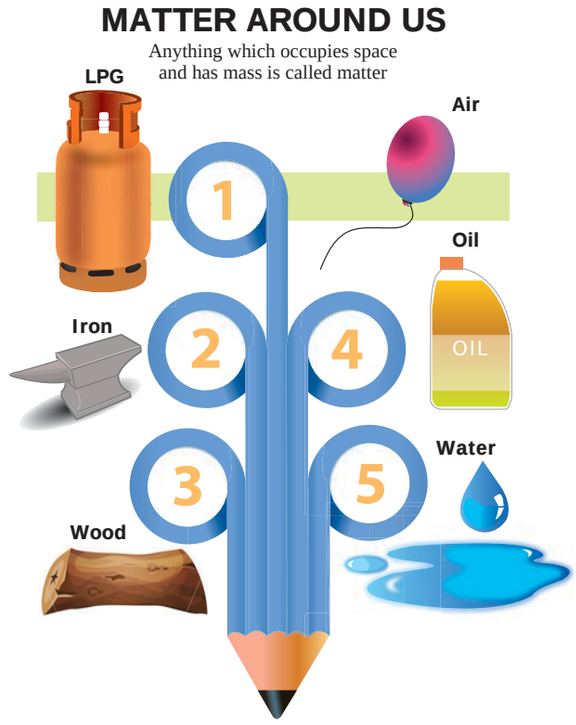
Try to fill in the following table

	Things that float	Things that sink
1.		
2.		
3.		

Try to make more such tables based on the properties discussed above.

How many tables could you make?

But one thing is common to all the above. They are all MATTER.



Activity 3

Work in a group of two. Malar was asked to group some items based on their physical states. This was the table she made. Do you agree with her? Re do the table if you do not agree and submit it to your teacher.

Chalk piece	Wind	Steam
Water	Rain	Lemon
Air in a balloon	Stone	Lemon juice
River	Air	Smoke
Brick	Table	Door

How did you classify the items of the above list as solids , liquids and gases? You should have done it based on some properties- items like brick and door which are hard comes under solids, things that flow comes under liquids and others which are very light and can flow more freely comes under gases. Well, you are right. Take a look at the figure given below. What do you observe?

3.2.Diffusion

Let us place a book on a table. Let it not be disturbed. Observe for five minutes.

Now take a glass of water and add just a drop of ink carefully at the centre. Do not shake or stir.

Now light an incense stick and keep in one corner of the room.

Let us answer the following questions.

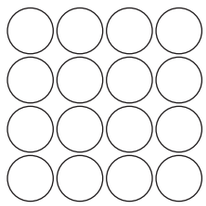
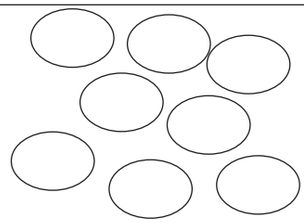
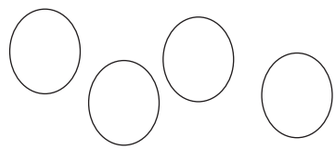
Did the book move?

Did the ink particles move and spread itself in the water? How long did it take for complete mixing?

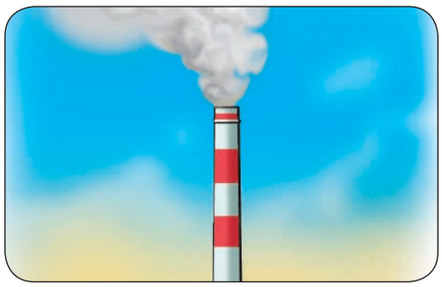
Did you get the smell of the incense stick from where you are standing?

How fast did you get the smell? How did the smell reach you?

We may conclude that the particles of gases and liquids can move and that among gases more easily. We call this movement as **diffusion**. **Diffusion** is the tendency of particles to spread out in order to occupy the available space.

Particles in a Solid	Particles in a Liquid	Particles in a Gas
		
In solid, the particles are tightly packed with very little space between them. Eg. stone	Particles in liquids are arranged in a random or irregular way and the space between the particles is greater than that in solids Eg. water	The particles in the gases are arranged far apart. They move freely. Eg. Air

Fact file

1. Liquid atoms are packed more loosely which allows things to be able to pass through it 2. Liquid is effected by gravity more than anything 3. Liquids are always moving due to gravity around it	
1. A gas atoms are spread out so far, you can walk through it without any restriction 2. Gas is not affected by gravity 3. The gas's atoms never stop moving and it never stays in place	

Movement of particles is restricted in solids and they do not diffuse like liquids or gases. In fluids the particles are under motion and hence can push ink or smoke particles here and there.

Activity 4

Lift an uninflated cycle tube. Inflate it and lift it again. Is there a change in the weight? Can we see that air has mass?

So we can say that air is also matter though we cannot see.

Let us try to know more about matter.

We saw that matter can have different properties.

Test Yourself

Name an object which is brittle and transparent.

Name an object which can be stretched.

Name two objects which can be bent.

Activity 5

Let us take two sachets of juice. In both the sachets, it is written 100ml. Let us empty two sachets and pour the juice into the following glasses.

Does its shape also change? Yes / No

Does its volume change? when it is poured into a big glass or a small one? Yes / No

How will you find out whether the volume has changed or not?

A liquid needs a container and takes the shape of a container because the particles slide past one another and keep moving. The amount of juice is the same in both glasses. The volume of a liquid remains the same whether it is kept in a large container or a small one but its shape changes.

Try to draw the shape of the liquid containers alone in your note book. What do you observe?

Think to learn

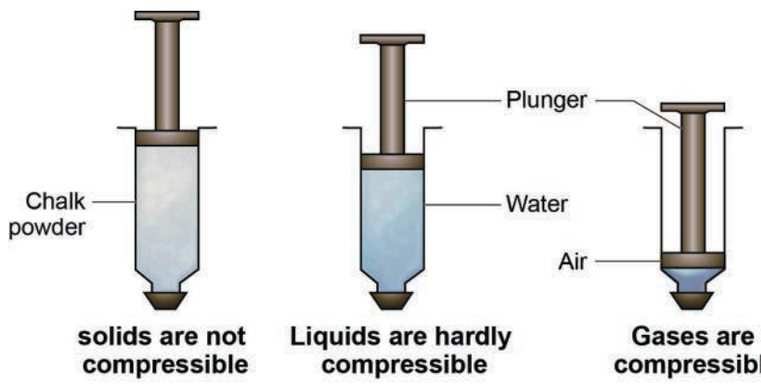
Solid ⟶ Liquid ⟶ Gas

"Liquefaction of gases" is the process by which substances in their gaseous state are converted to the liquid state. When pressure on a gas in increased, its molecules comes closer together, and its temperature is reduced, which removes enough energy to make it change from the gaseous to the liquid state.

3.3. Compressible as compared to liquids and solids

B3B4CP

- Let us take three identical syringes. Close the nozzles tightly with a cork.
- After removing the plunger first let us fill it with fine chalk powder. Now put the plunger back and try to press it down. What do you observe?



• Now let us fill the second one with water. Try pressing the plunger down. What do you observe?

• Let us now draw the piston back to suck air into the third one. Press the plunger down. What do we observe? Is it easy or hard to press?

• Record your observations and share among the group members.

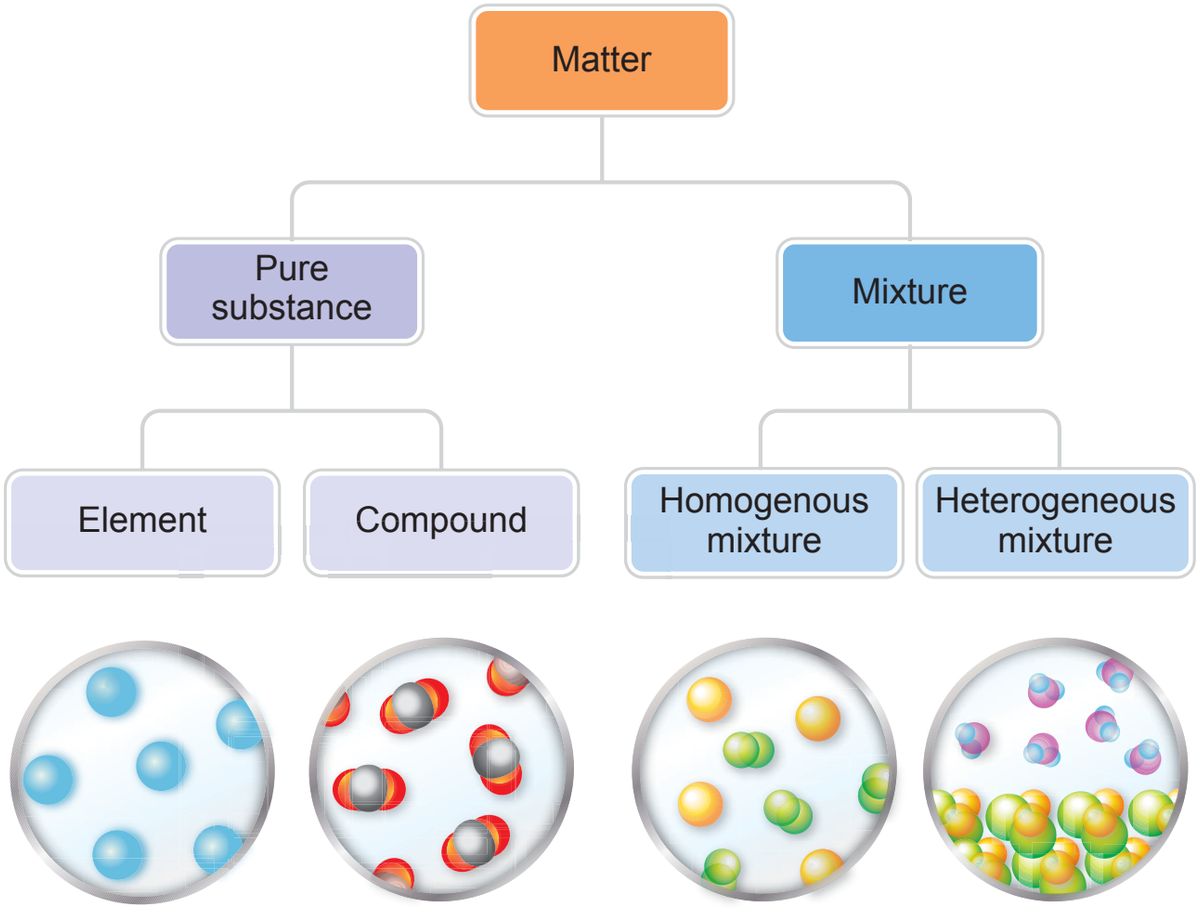
• You would have observed that the plunger moved freely when air was present and in the case of water and chalk powder it was difficult to press and the piston hardly moved.

We conclude that gases are highly compressible as compared to liquids and solids.

Strictly speaking, Glass is not a solid. It is actually a very slowmoving liquid. In church windows that are hunderds of year old. The glass at the bottom is thicker tham that at the top- proof that glass flows like a liquid if given enough time.

To sum up...

S.no.	Solid State	Liquid state	Gaseous state
1.	Definite shape and volume	No definite shape, liquids attain the shape of the vessel in which they are kept.	Gases have neither a definite shape nor a definite volume.
2.	Incompressible	Compressible to a small extent.	Highly compressible
3.	There is little space between the particles of solid	These particles have a greater space between them.	The space between gas particles is the greatest.
4.	These particles attract the each other very strongly	The force of attraction between liquid particles is less than solid particles.	The force of attraction is least between gaseous particles.
5.	Particles of solid cannot move freely.	These particles move freely.	Gaseous particles are in a continuous, random motion.



3.4.Pure Substances And Mixtures

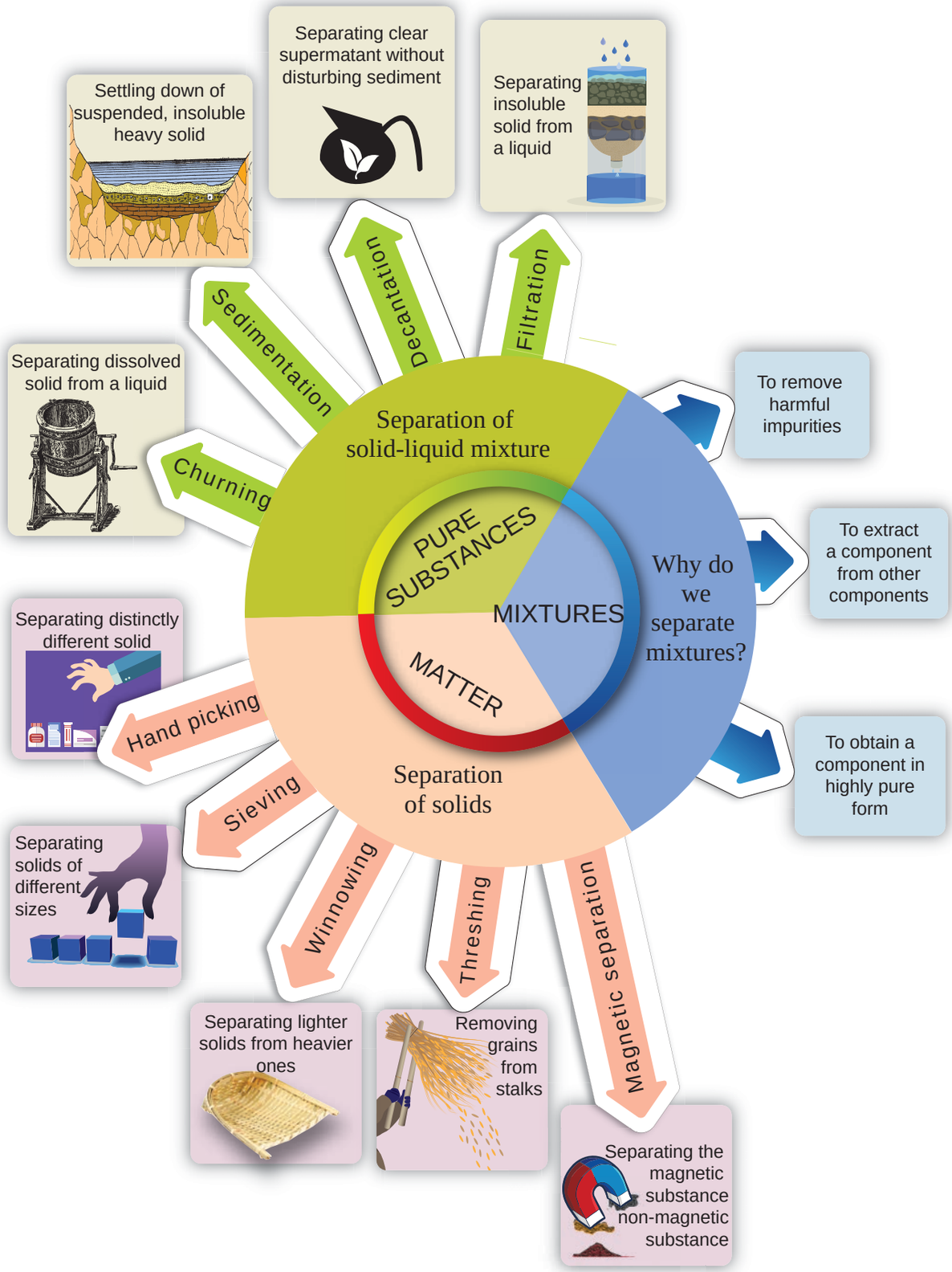
In shops, we find products which are sold as 100% pure! For common people pure means unadulterated- that which does not contain any cheap or harmful additives. Are these really pure substances as they claim to be?

For a Chemist the word 'pure' means something else!

- A pure substance is made up of only one kind of particles.
- Pure substances may be elements or compounds.
- An atom is the smallest particle that an element is made up of same kind of atoms. Molecule is the combination of two or more atom. Compound in the substance formed by the chemical combination of two or more element.

Is matter around us pure?

Fast facts



DO YOU KNOW?

Purity of gold is expressed in terms of 'carat'. 24 carat gold is considered to be gold in its purest form.

Let us consider the following examples:

We have had the snack. Can you identify and mention a few things that are present in snacks like - Mixture or fruit mixture? You are able to identify the ingredients in them from their colours, appearance or taste.

We mix rice, dal salt, chillies, pepper, ghee and other ingredients to make Pongal. Pongal is also a mixture.

Why do we call these as mixtures- because they are made up of more two or more ingredients or components that are physically separable?

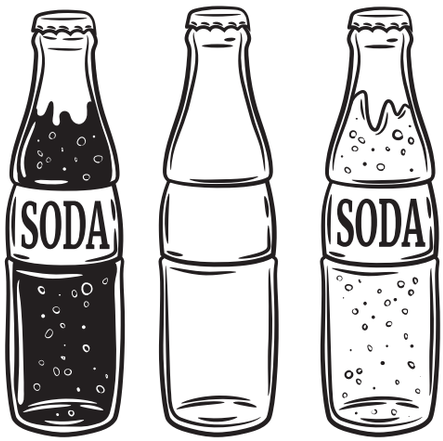
Explore

Can we always see the different components of the mixture with our naked eyes?

Let us see the two pictures given below:

Fig:1

Fig:2



In fig: we can see and physically separate the components of vegetable salad, where as in fig: we can neither see nor physically separate the components of an aerated drink- soda water.

Try it yourself: Try to identify from the list what you think may be classified as mixture. Write yes if it is a mixture, then write No, if it is not a mixture. You may also write "I do not know" and later discuss with your teacher.

Mixture	Yes / No
Borewell water	
Copper wire	
Sugar cube	
Salt Solution	

Air is a mixture because it contains Oxygen, Nitrogen, Carbon dioxide, water vapour, noble gases etc.

Milk is also a mixture of water, fat, protein etc.

Lemon juice is a mixture. Some of us like it less sweet i.e. with less sugar; while some others like it very sweet so they prefer to add more sugar. But either way, it is still lemon juice-prepared from lemon extract, water and sugar and is a mixture though the amount of sugar added is different. Same way even if we add extra water or lemons extract it will still be a mixture. A mixture need not have a fixed proportion of components.

- A Mixture is an impure substance and contains more than one kind of particles.
- In the mixture the components are mixed in any proportion.

When elements chemically combine they form compounds; whereas a mixture can be a physical combination of

a) two or more elements. Example: 22 carat gold which is composed of gold and copper / gold and cadmium,

b) two or more compounds. Example: aerated drink which is composed of carbon-di-oxide, water, sweetening and colouring agents,

c) an element and compound. Example : Tincture of iodine which is composed of Iodine in alcohol.

3.5. Separation Of Mixtures

Are all mixtures used as they are? or is there a need for separating components?

Materials we use in our day-to-day life are got from different sources and are very often combined with other substances.

Mixtures like coffee and ice cream are taken as such. There is no need for separation in these cases. Metals occur in the form of ores under the earth's crust. But if we want to use a pure metal, we need to adopt a laborious process of extraction to separate the useful metal from the ore.

So what is meant by separation ?

The process by which the components of mixture are isolated and removed from each other to get pure substance is called separation.

To get the original properties and uses of substance we need separation

When and why do we need to separate mixtures?

- when we need to remove impurities or harmful components from the mixtures (eg: stones from rice)
- when the useful component has to be separated from other components (eg: petrol from petroleum)
- when a substance has to be obtained in highly pure form (eg: gold from gold mines)

Let us visit Selvi's Family

It is 7 am and Selvi's family is busy. At home, in the kitchen, Selvi's mother is making tea for the family and her grandmother is separating butter from curds. Her father and uncle are out in the fields collecting paddy after harvesting. Selvi is helping her mother in preparing to cook rice and is separating stones from the rice. Selvi's little brother Balu is fascinated by a piece of magnet that he was given by his friend and is playing outside in the sand with it.

Can you list out in your note book, the different activities that Selvi's family is engaged in?

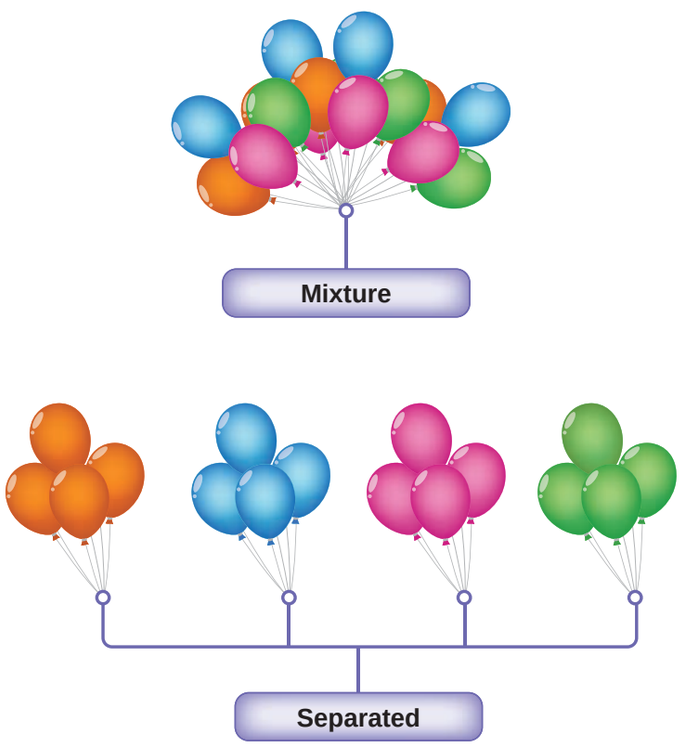
Let us explore the different separating methods involved in the above activities and also learn about a few other methods.

The choice of method of separation depends upon the properties of the components of the mixture. The separation method may be based on the particle's size, shape or physical state – they may be solids, liquids or gases.

Selvi's mother used a strainer to remove the tea leaves to get the clear liquid. Larger sized particles of tea leaves will be retained by the strainer while the clear liquid will pass through. This is called **filtering.**

Will you discard the tea leaves after straining? Can you suggest a good way of using them?

A sieve is similar to a strainer. **Sieving** is used when we have to separate solid particles of different sizes. Eg: bran from flour, sand from gravel etc.



Activity 6

Think and find out!: Is it a good idea to separate bran from flour? Write your answer in your notebook

Wire mesh as a strainer sieve is used to separate gravel from sand at a construction site.

When very fine insoluble solids have to be separated from a liquid as in butter from curds, **Churning** is performed. The mixture is churned vigorously when solid butter will be collected on the sides of the vessel. Both butter and buttermilk are obtained after churning are useful and can be consumed.

In washing machines this principle is used to squeeze out dirt from clothes and the method is called centrifugation.

Threshing

We pluck flowers from a plant? When we pluck flowers from plants, we are separating the flowers from their stalks. Can we do the same for food grains like rice and wheat which also grow on plant stalks? That would not be possible because the grains are small in size and also the quantity is very large. Farmers separate grains from their stalks by beating them so hard that the grains are separated from their stalks. This is called **Threshing.**

Activity-7

Have you seen how some farmers spread the dried grain stalks in the middle of the road? Heavy vehicles pass on them and the grains get separated from the stalks. Write down two merits and demerits of this practice.

Winnowing

Rice, wheat and other food grains are covered in husk which cannot be eaten by us. Husk is very light and gets easily blown away by a breeze or wind. This property

is made use of in **winnowing.** This is done by dropping the mixture slowly from a height in the presence of wind. Lighter solids i.e. husks will be carried by wind and will be collected in a separate heap while heavier solids i.e. grains will fall closer and form a separate heap.

Winnowing

Rice husks are the hard protecting coverings of grains of rice. In addition to protecting rice during the growing season, husks can be used as building material, fertilizer, insulation material and fuel

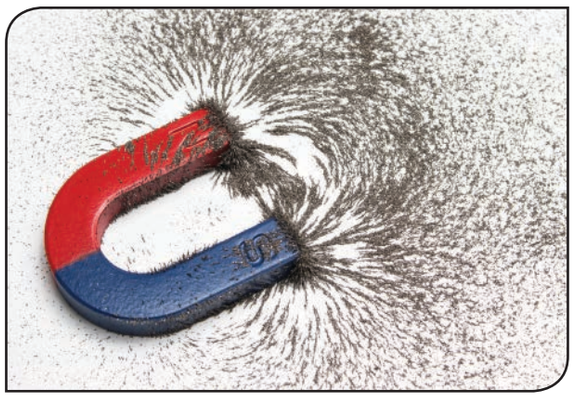
If the rice that we cook has stones in it we have to pick the stones out.

Handpicking

How do we identify a stone from a grain of rice? If the stones are visibly very different from the grain, they can be easily picked and separated by hand. This is **handpicking**. But if the stones look very similar to the rice grains it is difficult to separate.

Magnetic Separation

In a mixture containing iron, the magnetic property of iron can be used to separate it from non- magnetic substances by using a magnet. Substances that are attracted to a magnet are called magnetic. Separating solids using a magnet is called **magnetic separation.**



Sedimentation

Rice and pulses are often mixed with very fine straw, husk or dust particles which have to be removed before cooking. Are you familiar with the way this is done at home? The rice or pulses are washed in water. The lighter impurities float while heavier rice grains sink to the bottom. This is called **sedimentation**. The water with the impurities is carefully poured away leaving clean rice at the bottom. This is called **decantation.**

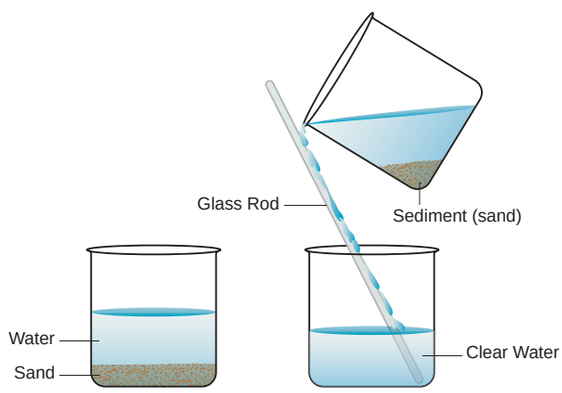
SEPARATING MUD FROM MUDDY WATER: (can be demonstrated by the teacher)

Muddy water is a mixture of very fine particles of soil in water. What will happen to a beaker of muddy water if it is left undisturbed for some time? Mud being heavy will settle down at the bottom of the beaker and will form the sediment. Water will form the top layer and is called the supernatant liquid.

The settling down of heavier component of a mixture when allowed to remain undisturbed for some time is called sedimentation.

Decantation : This process is done after sedimentation. The supernatant liquid is slowly poured out from the container without disturbing the sediment. The part that has settled down is called sediment. The water that is obtained after decantation is called the decant ate.

The process of removal of water above the sediment is called decantation. But even after decantation the water is not completely free from fine soil particles. How can we remove this? By the process of filtration. Do you think a strainer or a cloth can filter theses very fine particles? Do it and see for yourself.



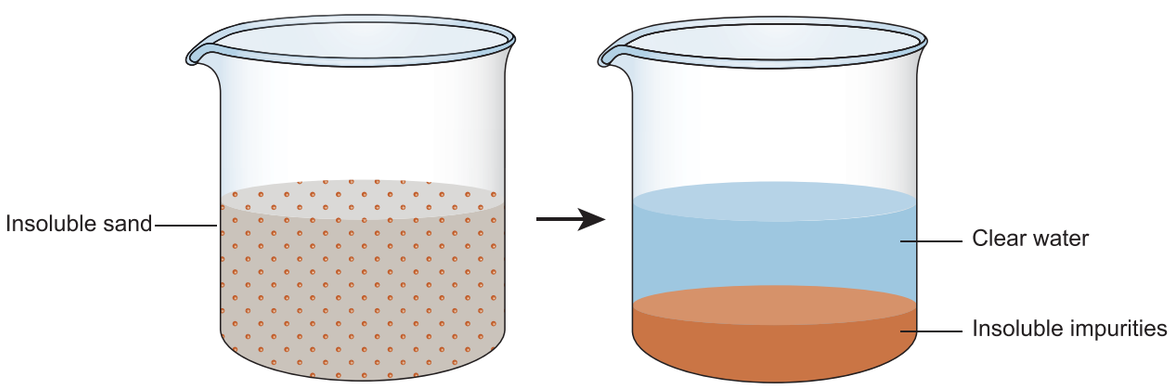
Filtration

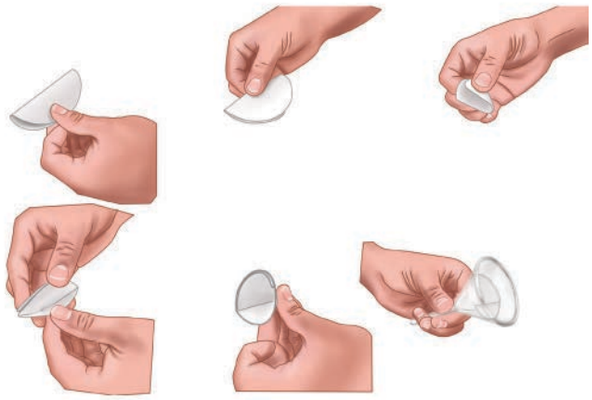
We will use filter papers to remove the finer impurities. A filter paper has very fine pores much smaller than soil particles. Let us see how to use the filter paper.

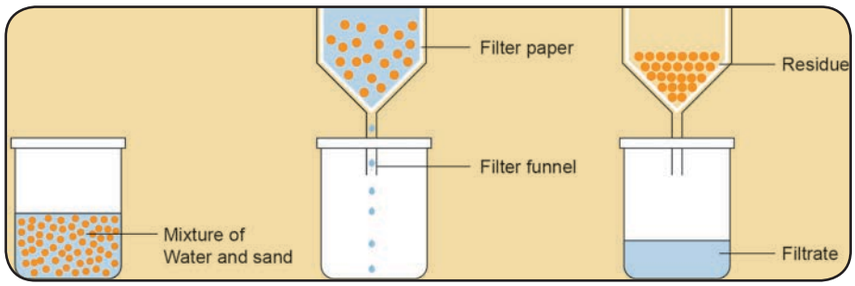
Take a piece of filter paper. Fold it to make a cone (see figure)

Slowly pour the muddy water over the filter paper. On filtration clear water

Sedimentation







(filtrate) flows down the funnel and mud settles as residue on the filter paper.

The method of separating insoluble component (sand, mud etc.) from a mixture using a filter paper is called filtration.

The liquid which passes through the filter and comes down is called filtrate and the insoluble component left behind on the filter is called residue.

More to know:

Combination of methods are used sometimes for complete separation**.**

If the mixture of sand and salt in water has to be separated several steps will be involved: Sedimentation, decantation, filtration, evaporation and condensation.

Activity 8

Group Activity – Students are divided into 4 groups

Each group should suggest a method to separate mixtures and also give reasons why they used a particular method and what property of the components forms the basis for separation. **Examples should be drawn from day-to-day life.** After the group presents its method to the rest of the class, the whole class will discuss and analyse if the suggested method will work and then make a note of it in the form given below:

Separation Method	Example	Basis For Separation

3.7. Food Adulteration

Sometimes, things that we buy in the market are mixed with harmful and unwanted substances. This process is called adulteration.

In most houses people use commercial water filter to remove not only the impurities but also to kill the harmful germs in water using UV rays.

RO – a process of removing impurities from water to make it potable.

Food can also get adulterated due to carelessness or lack of proper handling.

We must be careful about the common adulterants in our consumable goods especially in food.

Consumption of any adulterated food will be harmful and can be a health hazard.

An adulterated substance will not indicate the true properties of the original substance. For example: Used tea leaves are sometimes used as adulterants in tea. Turmeric powder is adulterated with a bright yellow chemical which is poisonous to our health.

Activity 9

Collect and share information on common adulterants and their detection in food stuff in the class. Watch the youtube video: 10 simple tricks to find adulterated food. https://www.youtube.com/watch?v=_XLi WunnudY

KEYWORDS

Matter	Particles
Volume	Mass
Compressibility	Diffusion
Fluids	Mixture
Handpicking	Threshing
Winnowing	Sieving
Magnetic separation	Sedimentation
Decantation	Filtration
Adulteration	

FAST FACTS

- Matter is anything that has mass and occupies space.
- All matter is made up of extremely small particles.
- Matter is classified into solids, liquids and gases on the basis of two important factors .
  a. The way the particles are arranged
  b. The way the particles attract each other.
- Difference between the properties of solids, liquids and gases is due to

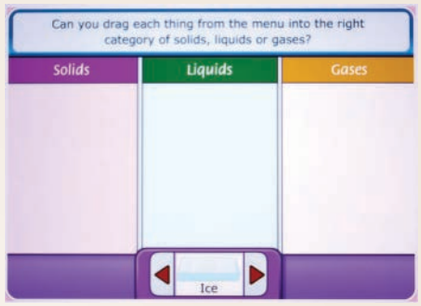
the difference in the arrangement of the particles and the nature of the attractive forces between them.

- A pure substance can be an element or a compound and is made up of only one kind of particles.
- A mixture is an impure substance containing two or more components physically mixed in any proportion.
- Separation of mixtures is done
  1) to remove harmful components
  2) to obtain the useful component
  3) to obtain a substance in a highly pure form
- Separation method to be adopted depends on the properties of the components.
- Handpicking – For smaller quantities containing particles reasonably large in size to be recognised can be picked by hand
- Winnowing – Adopted to separate lighter solids from heavier ones
- Magnetic separation – Used to separate magnetic substance from non-magnetic substance
- Sedimentation – Settling down of suspended, insoluble and heavy solid particles (used to separate solid – liquid mixtures)
- Decantation- Process of pouring out the clear supernatant liquid without disturbing the sediment
- Filtration –Process of separating insoluble solid particles (residue) from a liquid (filtrate) by using a filter paper.
- Adulteration – make impure by the addition of a foreign or inferior substance.

ICT CORNER

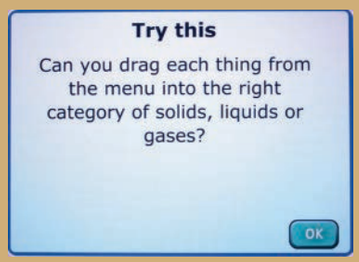
Types of matter

Lets play with Science kids



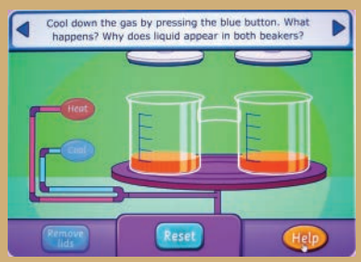
Steps:

- To learn more about the matter around us type **Science Kids** in the Google browser and select **games** Go inside and select **matter**. Now the following logo **can you drag** will appear on the screen. Then click **ok**.
- Three divided columns will appear on the screen. The first section is for solid and the second section is for liquid and the third one is for gas. Now when we press this symbol, at the bottom items will appear at the bottom. We have to drag them to their respective column.



Step1

Step2



Step3

URL:

http://www.sciencekids.co.nz/gamesactivities/gases.html

Pictures are indicative only

Evaluation

B3JZEC

I. Choose the correct answer

1. _____ is not made of matter
   a. gold ring b. iron nail
   c. light ray d. oil drop
2. 200 ml of water is poured into a bowl of 400ml capacity. The volume of water now will be
   a. 400 ml
   b. 600 ml
   c. 200ml
   d. 800ml
3. Seeds from water-melon can be removed by _____ method.
   a. hand-picking
   b. filtration
   c. magnetic separation
   d. decantation
4. Lighter impurities like dust when mixed with rice or pulses can be removed by _____
   a. filtration
   b. sedimentation
   c. decantation
   d. winnowing
5. _____ of is essential to perform winnowing activity
   a. Rain b. Soil
   c. Water d. Air
6. Filtration method is effective in separating _____mixture
   a. solid-solid b. solid-liquid
   c. liquid-liquid d. liquid-gas
7. From the following _____ is not a mixture
   a. Coffee with milk
   b. lemon juice
   c. water
   d. ice cream embedded with nuts.

II. State whether the following statements are True or False. If false give the correct statement

a. Air is not compressible.
b. Liquids have no fixed volume but have fixed shape.
c. Particles in solids are free to move.
d. When pulses are washed with water before cooking, the water is separated from them by the process of filtration
e. Strainer is a kind of sieve which is used to separate a liquid from solid
f. Grain and husk can be separated by winnowing
g. Air is a pure substance
h. Butter from curds is separated by sedimentation.

III. a) Match the following

Property	Example
Breaks easily (brittle)	Metal pan
Bends readily	Rubber band
Can be stretched easily	Cotton wool
Gets compressed easily	Mud pot
Gets heated readily	Plastic wire

b)

	A	B	C
i	Separation of visible undesirable components	water mixed with chalk powder	Magnetic Separation
ii	Separating of heavier and lighter components	sand and water	Decantation
iii	Separation of insoluble impurities	iron impurities	Filtration
iv	Separation of magnetic component from non- magnetic components	rice and stone	Hand-picking
v	Separation of solids from liquids	husk and paddy	Winnowing

IV) Fill in the blanks

1. Matter is made up of _____
2. In solids, the space between the particles is less than in _____,
3. Grains can be separated from their stalks by_____
4. Chillies are removed from 'upma' by _____ method.
5. The method employed to separate clay particles from water is _____
6. Among the following items: safety pins, pencil and rubber band, _____ will get attracted to a magnet.
7. Water obtained from tube wells is usually _____ water

V. Complete the given analogy

1. Solid: rigidity:: gas:_____
2. Large Inter-particle space: gas:: _____:solid
3. Fluidity: Fixed volume:: _____ : _____.
4. Husk-grains: winnowing:: Sawdust-Chalk piece: _____
5. Murukku from hot oil: _____: coffee powder residue from decoction
6. Iron–sulphur mixture: _____: Mustard seeds from Urad-dhal: rolling

VI. Very Short answer

1. Define the term matter.
2. How can husk or fine dust particles be separated from rice before cooking?
3. Why do we separate mixtures?
4. Give an example for mixture and justify your answer with reason.
5. Define Sedimentation.
6. Give the main difference between a pure substance and an impure substance.

VII. Short answer

1. A rubber ball changes its shape on pressing. Can it be called a solid?
2. Why do gases not have fixed shape?
3. What method will you employ to separate cheese (paneer) from milk? Explain.
4. Look at the picture given below and explain the method of separation illustrated.

5. How can you separate a mixture of a large quantity of tiny bits of paper mixed with pulses / dal?
6. What is meant by food adulteration?
7. Mr. Raghu returns home on a hot summer day and wants to have buttermilk. Mrs. Raghu has only curds. What can she do to get buttermilk? Explain

VIII. Answer in detail

1. Distinguish between properties of Solid, liquid, gas. Draw suitable diagram
2. Using suitable apparatus from your laboratory separate the mixture of chalk powder, mustard oil, water and coins. Draw a flow chart to show the separation process.

IX. Life Skills-Debate

Debate on “Food adulteration and detection”

X. Field Trip

Visit a nearby paddy field and rice mill and note down the different separating techniques used there. Is technology replacing some traditional practices?

OR

Watch you tube video in the given link

https://www.youtube.com/watch?v=9Djc5ZVUyUw

https://www.youtube.com/watch?v=DJGRJ4qL4-A

XI. Sequence Type:

Write the sequence of steps you would use for making tea.

Use the words : mixture, dissolve, filtrate and residue.

XII. Topic enrichment –Project

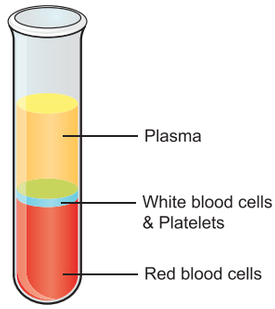
Make a fruit or vegetable salad. Give reasons why you think it is a mixture.

Connect with Environment

We learnt about different objects and their properties. Can you tell why it is better to use plates made of paper or dry leaves better than the ones made of plastics? Discuss in small groups and share with the class.

Connect with Biology

Blood constitutes about 7-8% of human body weight. Blood has the important function of transporting oxygen and nutrients to our cells and getting rid of carbon dioxide, ammonia, and other waste products, in immunity and also in regulating our body temperature. Blood is composed of more than 4,000 different kinds of components. Four of the most important ones are red cells, white cells, platelets, and



plasma. Plasma is the liquid in which the red cells, white cells and platelets are present.

Blood is not a pure substance but a mixture.

Find out details of separating its components.

Connect with sports

Air is not a pure substance. It helps us in many ways from breathing to playing. Balloon sports are a very popular sport. The basis of how the balloon works is that, hot air is lighter than cool air. which makes balloon rise up Find out more about Hot Air balloons.

HOTS

1. Malar's mother was preparing to cook dinner. She accidentally mixed ground nuts with urad-dhal. Suggest a suitable method to separate the two substances so that Malar can have ground nuts to eat.
2. In a glass containing some water, tamarind juice and sugar is added and stirred well. Is this a mixture- can you tell why? Will this solution be sweet? or sour? or both sweet and sour?
3. Justify your answer.

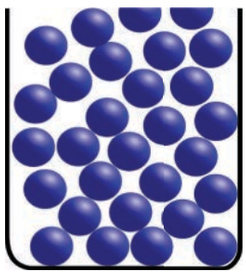
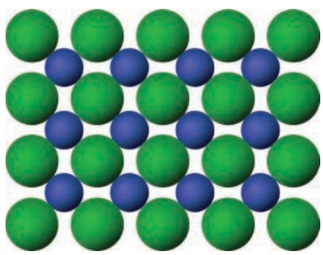
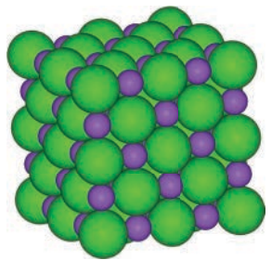
Arrangement of particles in three different phases of matter is shown above.

a) Which state is represented by fig. I?

b) In which will be the inter particle attraction maximum?

c) Which one of them cannot be contained in an open vessel?

d) Which one can take the shape of its container?

FIG 1	FIG 2	FIG 3
		

Unit 4

The Living World of Plants

B3TVFZ

Learning Objectives

- To know there are many varieties of plant.
- To know all parts of the plants and their functions.
- To know the different forms of leaves.
- To understand the food manufactured by plants is consumed by animals and human.
- To know the different types of habitats.
- To understand, plants exhibit adaptations and modifications based on the habitat
- To know life forms depend on each other.

Time to Learn

Rani and Ravi went to vegetable market with their mother. They saw variety of fresh green vegetables in attractive colours. Mother bought cauliflower, cabbage and raddish. Ravi asked his mother "Mom, do all the vegetables grow under the soil?" Mother answered, no Ravi, we get some vegetable, from stem, some from roots. Even some flowers are used for cooking. Rani and Ravi were surprised to know that vegetables are from different parts of a plant. After returning home they sorted out all vegetable, from the bag and discussed which vegetable is from stem, root and flower. Mother collected keezhanelli, curry leaves, coriander leaves from the garden and said that the purpose for using these leaves in cooking is to add medicinal value and aroma. Discuss the picture of vegetables are given below with your teacher.

Introduction

Biology is a natural science concerned with the study of life and living organisms, including their structure and functions. The living world comprises of plants and animals. Plants can prepare food itself, grow in size, and reproduce. Various parts of the plants are used as food, medicine, wood, and shelter.

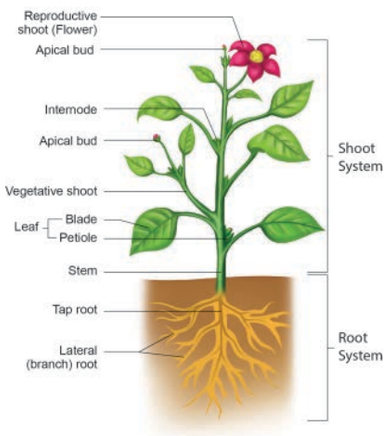
4.1 Plant forms and functions:

Our body is made up of many organs. Similarly the plant body is also made up of several organs such as root, **stem leaves** and **flowers**. Plants are of many forms and many colours, yet they are alike in some manner. That is, they all have stems and leaves above the ground which we can see easily and roots below the ground.

As shown in the picture, a flowering plant consists of two main parts. They are,

1. Root system.
2. Shoot system

Let us learn about these in detail.



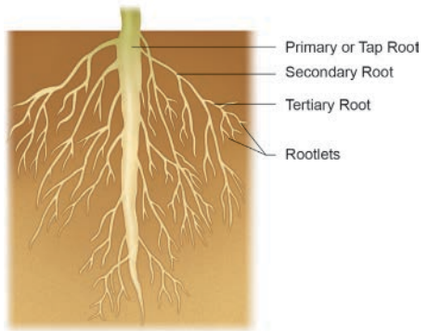
1.Root system

Root

The underground part of the main axis of a plant is known as **root**. It lies below the surface of the soil. Root has no nodes and internodes. It has a root cap at the tip. A tuft of root hairs is found just above the root tip. Roots are positively geotropic in nature. Plants root system is classified into two types.

1. **Tap root system**
2. **Fibrous root system**

1. Tap root system



It consists of a single root, called **taproot**, which grows straight down into the ground. Smaller roots, called lateral roots arise from the taproot. They are seen in dicotyledonous plants.

Example: Bean, Mango, Neem.

2. Fibrous root system

It consists of a cluster of roots arising from the base of the stem. They are thin and uniform in size.

It is generally seen in monocotyledonous plants. Example: Grass, Paddy, Maize.

Functions of the Root

- Fixes the plant to the soil.
- Absorbs water and minerals from the soil.

Fibrous Root of Grass

- Stores food in some plants like Carrot and beet root.

Think it

Ginger

Is it a Root or stem?

Activity 1

Water absorption by Root

Aim:- To observe absorption of water by root

What you need? A carrot, a glass of water and blue ink.

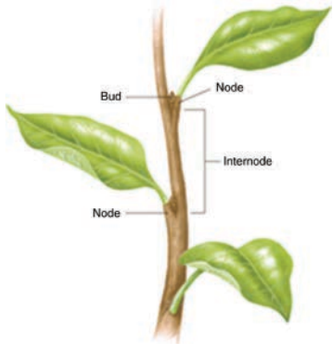
What to do? Place a carrot in a glass of water with a few drops of blue ink. Leave the carrot in water for two to three days. Then cut the carrot into half length wise and observe.

What do you learn? Blue colour appears in carrot which indicates water moves up wards in the carrot showing that root conducts water.

2. Shoot system

Stem

The aerial part of the plant body above the ground is known as the **shoot system**. Main axis of the shoot system is called the **stem**. The shoot system consists of stem, leaves, flowers and fruits. Stem grows above the soil, and it grows towards the sunlight. It has nodes and internodes. **Nodes** are the parts of stem, where leaf arises. The part of the stem between two successive nodes is called internode. The bud at the tip of the stem is known as apical or **terminal bud**, and the buds at the axils of the leaves are called **auxiliary buds**.



Activity 2

Conduction of water

Aim:-To observe conduction of water by stem.

What you need? A small twig of balsam plant, a glass of water and a few drops of red ink

What to do? Place the small twig in the water with red ink.

What do you see? The stem becomes reddish.

What do you learn? This is because red coloured water is being taken by the stem upwards.

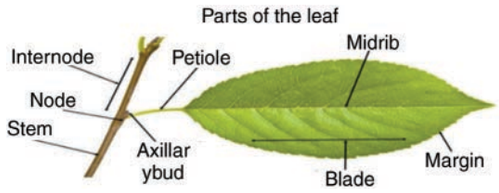
Functions of the stem

The stem,

- supports the branches, leaves, flowers and fruits.
- transports water and minerals from roots to upper aerial plant parts.
- transports the prepared food from leaves to other parts through stem.
- stores food as in the case of sugarcane.

Structure of a leaf

The leaf is a green, flat expanded structure borne on the stem at the node.



A leaf has a stalk called **petiole**. The flat portion of the leaf is called leaf lamina or leaf blade. On the lamina, there is a main vein called **midrib**. Other veins are branchout from mid rib. The portion of the leaf connected in the nodal region of the stem is known as the **leaf base**. Leaves of some plants possess a pair of lateral outgrowth on the base, on either side of auxiliary bud. These are called **stipules**.

The green colour of the leaf is due to the presence of green coloured pigment called **chlorophyll**. On the lower side of the leaf there are tiny pores or openings known as **stomata**.

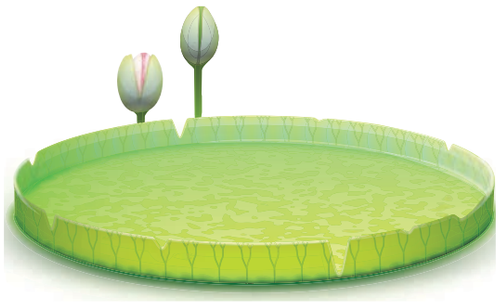
Functions of the leaf

The green leaves

- Prepare food by the process of photosynthesis.
- Helps in respiration.
- Carry out transpiration.

DO YOU KNOW?

Victoria amazonica, the leaves of this plant grow up to 3 metres across. A mature Victoria leaf can support an evenly distributed Load of 45 Kilograms or apparently young person.



4.2. Habitat

Think to learn

How do we classify the plants?

1. Based on flower: Plants can be classified into two main groups. Flowering plants and Non-flowering plants.

Sun Flower - Flowering plant

Riccia-Non-flowering plant

2. Based on position of sead: Plants can be divided into two groups. Angiosperms. and Gymnosperms

Mango-Angiosperm

Cycas-Gymnosperm

Activity 3

The teacher will divide students into four groups. Each group leader will pull a plant part from a "hat" (roots, stems, leaves, and flower). The teacher will take students around campus to search for their assigned plant parts. They have to locate different types of plants discussed in the class room. The learner will return to the class, follow a process sheet given to create a poster with their group and identify correctly each type of root, stem, or leaf observed. The flower group will create a poster by identifying correctly each part of the flower. Each group will share their posters within the class.

Activity 4

Read the following story along with your friend

Once, I was a happy monkey. I lived in a beautiful thick forest with my mother and two brothers. We ran and played in the lush grass. On one hot day, I fell fast asleep in the cool shade of a tree. Suddenly the bright sun woke me up. I opened my eyes and could not believe what I saw everything has changed. Everything had been destroyed. I stood

and looked at the stumps that used to be trees. Nothing was left apart from hard dry ground and only streets and building

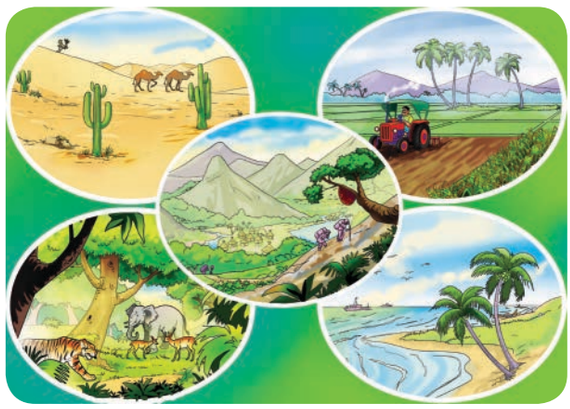
I saw a deer that looked very sad, “where have all the trees gone and where are all the other animals?” I asked her. She explained how humans had chopped down all the trees, but had not planted new ones to replace them. After a while, I said good bye to deer. My home had gone. I didn’t know where my family was, and I was starting to feel hungry and thirsty, day and night. I walked in search for water, food and safe place to sleep. Whenever I stopped, to rest humans drove me away with sticks and angry voices. I could feel my body getting weak and tired. One day when I had almost given all the hope, I came across a cool and dark forest. As I walked through it, I found plenty of food and water. The forest felt safe for me. There were no signs of human visiting it.

- Why did the monkey feel sad?
- Who chopped the trees?
- Which is the safest place for monkey to live?
- What is a habitat?

Each and every organism needs a place to live and reproduce. Such a dwelling place is called habitat. From the depths of the ocean to the top of the highest mountain, habitats are places where plants and animals live.

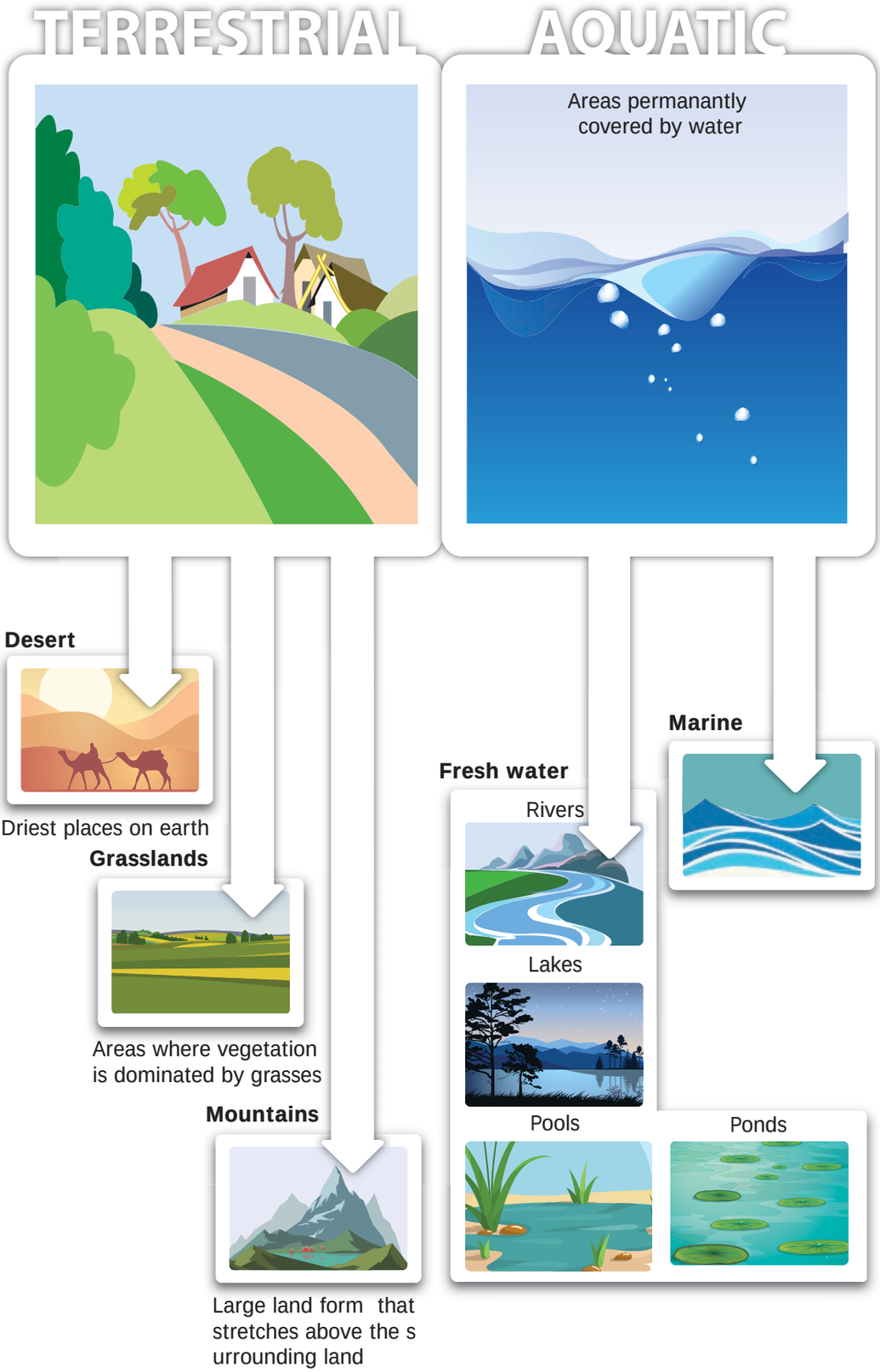
4.2.1 Types of Habitat

Let us study the two major types of habitat with the help of following:



I. **Aquatic habitat:-** When we visit a pond, we see some plants appear to float on water. One of the common plants is the lotus plant. Its leaves float on the water. There is a small frog sitting on a leaf. It is ready to

Types of habitat



catch the insects flying/fluttering around the flowers. The stem of the plant is seen to be inside (submerged) the water. Its roots are found within the muddy floor of the pond. As this plant grows in water, shall we call it an **aquatic plant**?

Aquatic habitat includes areas that are permanently covered by water and surrounding areas that are occasionally covered by water. There are two types namely Fresh water habitat and Marine water habitat.

DO YOU KNOW?

- Nile is the longest river in the world. It is 6650 Km long. The Longest river in India is Ganges River. It is 2525 Km long.

I. a. Fresh water Habitat :-

Rivers, lakes, ponds and pools are the fresh water habitat. Water hyacinth, water lily and lotus are seen in the fresh water habitat. In these plants roots are very much reduced in size. Stem and leaves have air chambers that allow aquatic plants to float in water.

DO YOU KNOW?

Air spaces in stems and petioles of lotus are useful for floating in water

b. Marine water habitat:- From outer space earth looks like an awesome blue marble, That's because most of earth's surface, more than 70% is covered by oceans. Oceans also support the growth of plants. Marine plants perform about 40% of all photosynthesis that occurs on the planet.

Example: Marine Algae, Sea grasses, Marsh grass, Phytoplanktons.

II. Terrestrial habitat: Terrestrial habitats are the ones that are found on land like forest, grassland and desert. It also includes man-made habitats like farms, towns and cities. They can be as big as a continent or as small as an island. They make up about 28% of the entire world habitat.

Example : Rubber tree, teak tree and Neem tree.

The first land plants appeared around 470 million years ago. They were mosses and liverworts.

The Amazon Rain Forest in South America produces half of the world's oxygen supply.

Terrestrial habitat is classified into three types such as

a. Desert b. Grassland c. Forest

a. Desert habitat

A habitat without much water is called **deserts**. Deserts are the driest place on earth, They get fewer than 25cm of rainfall annually. Deserts cover atleast 20% of the earth. The plants which grows in this habitat have thick leaves that store water and minerals. The plants like cactus store water in their stem and the leaves are reduced to spines. They have long roots that go very deep in the soil in the search of water.

Types: (i) Hot dry deserts, (ii) Semi arid deserts, (iii) Coastal deserts, (iv) Cold deserts. Example: Cactus, Agave, Aloe, Bryophyllum

Fact file

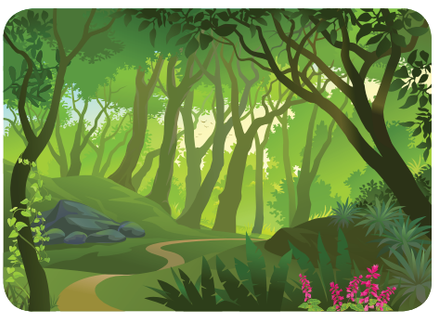
Thar Desert, also called Great Indian Desert, is an arid region of rolling sand hills on the Indian subcontinent. It is located partly in Rajasthan state, north-western India, and partly in Punjab and **Sindh** (**Sind**) provinces, eastern **Pakistan**.

b. Grassland habitat

Grassland is an area where the Vegetation is dominated by grasses. Grasses ranges from short to tall. eg. Savanna Grassland

c. Forest habitat

Forest is a large area dominated by trees. There are three types of forests and are:- tropical forests, temperate forests and mountain forest. Annual rain fall ranges from 25-200 cm.



Activity 5

Visit a nearby nursery. Choose any ten varieties of plants and place them under the appropriate habitats.

World habitat day is observed on 1st Monday of October.

4.2.2. Plant Adaptations and Modifications.

Adaptations are special features in plants which help them to survive in the habitats they live in over a long period. Plants in a specific environment have developed special features which help them to grow and live in that particular habitat. In this chapter, Let us study some adaptations like tendril, twiners and thorns. These adaptations are seen in plants which live in terrestrial and desert habitat.

1. **Tendril Climber:-** Tendril is a twining climbing organ of some weak stemmed plants like peas and bitter gourd. Tendril coils round a support and help the plant to climb. Example:

1. Sweet Peas ⟶ Leaflets are modified into tendrils.
2. Bitter Gourd ⟶ Axillary buds are modified into tendril which helps the plant to climb.

Lathyrus

Bamboo is one of the fast growing plants, during active growth phase.

2. **Twiners:-** Some plants have weak stems. They cannot stand straight on their own. They must climb on any support to survive.

Example: Clitoria and Jasmine

Clitoria

3. **Thorns:-** Leaves of some plants become wholly or partially modified into sharp pointed structures called “thorns or spines” for defensive purpose.

   Example:

   1. Agave - the leaf apex and margins are modified into thorns
   2. Opuntia - the leaves are modified into spines.
   3. bougainvillea – the stem has sharp thorns.

1. Agave

2. Opuntia

Activity 6

Field Investigation

Name of the student

Date

Location

Plant types to be observed

1. A tendril climber
2. A twiner
3. A plant with thorn

Tabulate the modification that you have observed in these plants

HOTS

Cactus plant is green in colour and performs photosynthesis. Which part of the plant does photosynthesis?

KEYWORDS

- Tap root: A primary root that grows vertically downward and gives off small lateral roots.
- Fibrous root: Cluster of roots.
- Habitat – The area where a particular organism actually lives.
- Aquatic – Plants whose natural habitat is water.
- Terrestrial – Plants whose natural habitat is land.
- Adaptation – Changes in the structure or behaviour of an organism that helps the plants to survive in a particular habitat.
- Modification – a change in organism caused by environmental factors.
- Tendril climber: A slender organ of a modification of stem
- Twiner: Plants which climb up trees and other objects.
- Thorn: A sharp and stiff part of a modification of stem

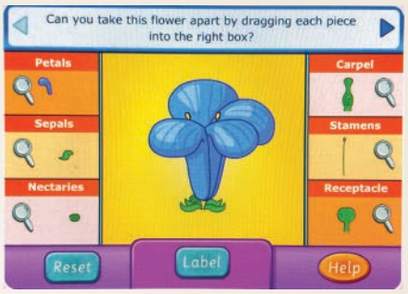
Points to Remember

- The plant body of flowering plant consists of two main parts. They are
  1. Root system
  2. Shoot system
- Root fix the plants to the soil. Roots absorb water and minerals from the soil
- Stem is the ascending part of the plant axis. It has nodes and internodes.
- Leaves perform three major functions such as
  1. Photosynthesis.
  2. Respiration.
  3. Transpiration
- The surroundings where plant live is called their habitat
- The two major habitats.
  1. Aquatic habitat
  2. Terrestrial habitat
- Adaptations are special features in plants which help them to survive in their habitat.
- Tendril is a climbing organ of some weak stemmed plants
- Twiner have weak stem and they can't stand straight on their own

ICT CORNER

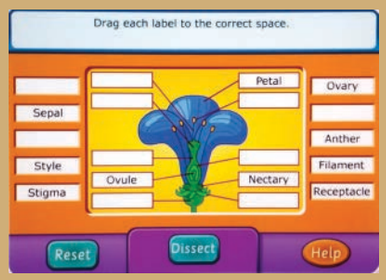
Life cycle of plants

Lets learn parts of the flower.

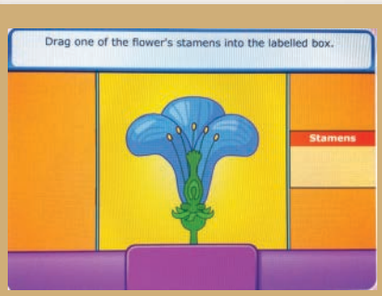


Steps:

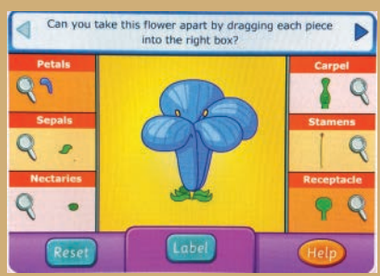
- To learn more about the parts of the flower type **science kids** in the google / browser and select **games**. Then select **life cycle of plants** in the screen a flower with its part appear **drag one of the flower's stamen into labelled box**. Now drag the part of the flower and place it in the labelled box. It's a trial
- Instructions will appear on the screen. When click **ok** next step will appear. Then we have to drag each and every part of the flower into the relevant box.
- When we click the magnifying glass symbol, uses of the floral parts will appear. Then click **ok** button. Next an image of flower with its parts appears. It's an evolutionary exercise.



Step1



Step2



Step3

URL:

http://www.sciencekids.co.nz/gamesactivities/lifecycles.html

Pictures are indicative only

Evaluation

B43RHM

I. Multiple Choice Questions

1. Pond is an example of _____.
   a) Marine Habitat b) Freshwater habitat
   c) Deserts d) Mountain
2. The important function of stomata is _____.
   a) Conduction b) Transpiration
   c) Photosynthesis d) Absorption
3. Organs of absorption
   a) Root b) Stem
   c) Leaf d) Flower
4. The habitat of water hyacinth
   a) Aquatic b) Terrestrial
   c) Desert d) Mountain

II. True or False – If False give the correct answer

1. Plants can live without water.
2. All plants have chlorophyll.
3. Plants have three parts: the root, the stem and leaves.
4. Mountain is an example for freshwater habitat.
5. Root is modified into spines.
6. Green plants need sunlight.

III. Fill in the Blanks

1. Earth's surface is covered by _____ % of water.
2. The driest places on earth are _____.
3. Fixation and absorption are the main functions of _____.
4. Primary organs of photosynthesis are _____.
5. Tap root system present in plants.

IV. Match the following

1. Mountain	-	Monocot
2. Desert	-	Branches
3. Stem	-	Dry place
4. Photosynthesis	-	Himalayas
5. Fibrous Root	-	Leaves

V. Arrange in correct sequence

1. Leaf – Stem – Root – Flower
2. Transpiration – Conduction - Absorption – Fixation

VI. Very short answer

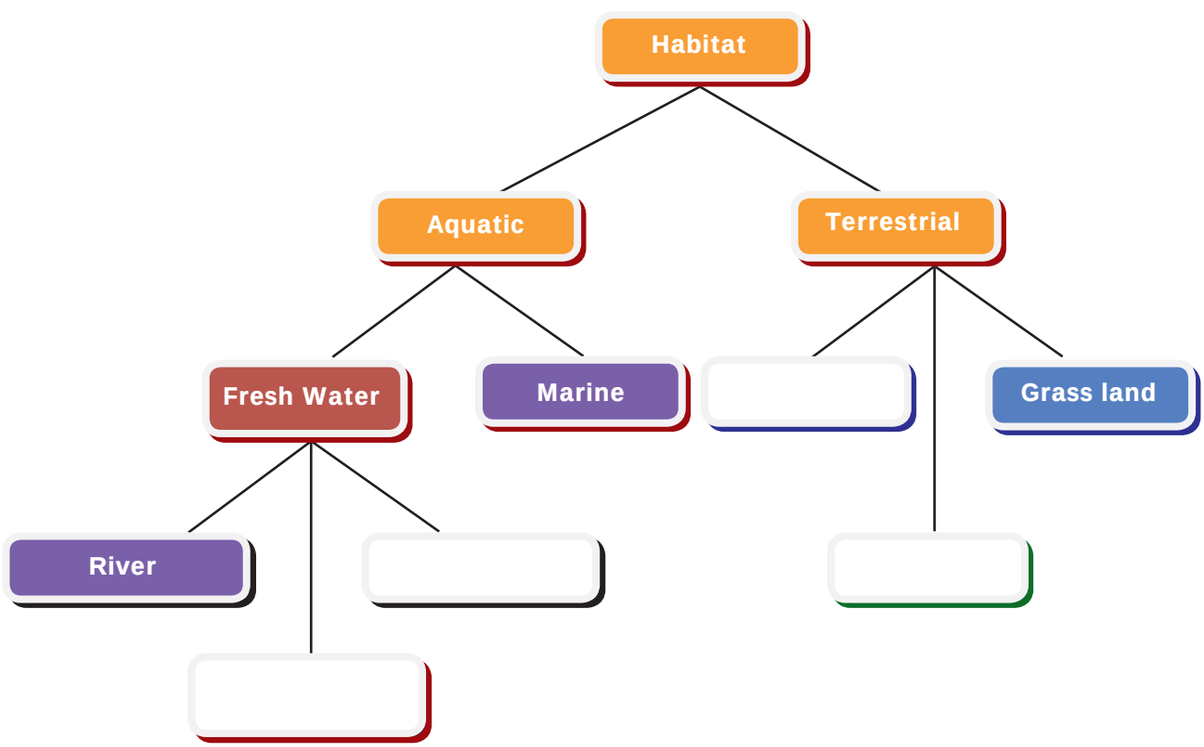
1. Classify the plants on the basis of their habitat.
2. Identify the desert plants from the following - Cactus, Hydrilla, Mango and Rose.
3. Define the term habitat.
4. Relate the terms leaves and photosynthesis.

VII. Short Answer

1. Why do you call jasmine plants, a twiner ?
2. Compare the tap root and fibrous root systems.
3. Distinguish between terrestrial and aquatic habitats.
4. List out the plants present in your school garden.

VIII. Answer in detail

1. Make a list of the functions of root and stem.
2. Study the given concept map. Connect them correcting by drawing arrow marks. Complete the map by filling in the blanks.



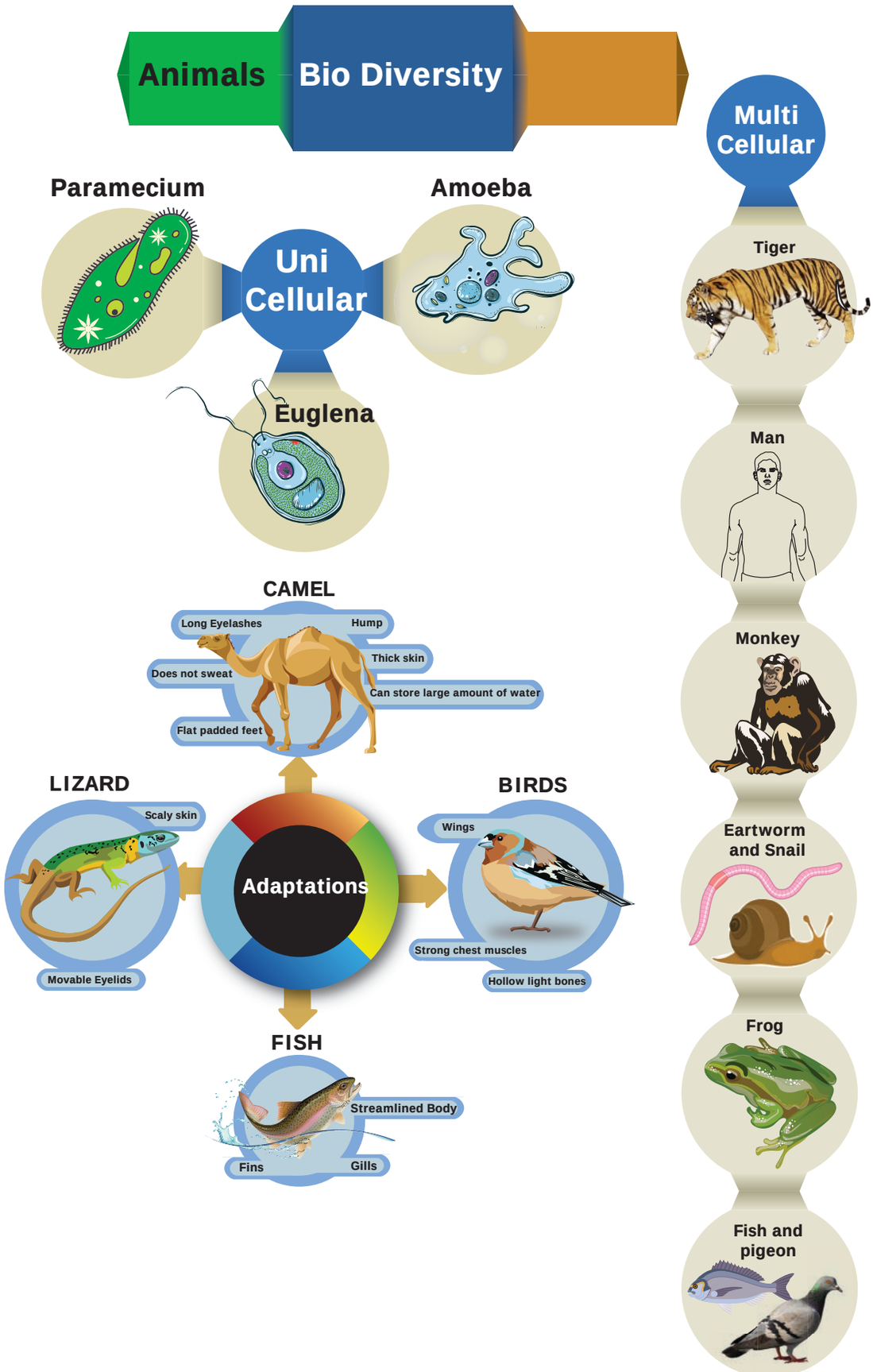
Unit 5

Living World of Animals

B4CMJA

Learning Objectives

- To know there are many kinds of animals.
- Diversity is seen both in animals and plants.
- Living organisms may be unicellular and multicellular.
- Based on the habitat where they live there are variations in forms.
- Based on the habitat animals exhibit adaptations.
- Life form depends on each other.



Introduction

The National School, Nallur, organised a field trip to a nearby village called Anaikkadu. The Students were so happy to see a village with ponds, streams, green fields and coconut trees. With the help of the teacher students were allowed to go around. One of them saw two birds building a nest. Where do the birds build a nest and why?

Children saw a number of butterflies fluttering near the flowers. The air was so fresh, so calm, so quiet and so relaxing. They came across a pond in the distance. It had some water. Floating on the water were dark green lotus leaves. A green frog was leaping from one lotus leaf to another making a croaking sound. A girl spotted a rabbit with a short tail. Can you make a list of the animals seen by the children? Were they all similar? In what way they were similar?

5.1 Biodiversity

In the living world, a lot of diversity is seen both in animals and plants. Every plant and animal is unique. The term biodiversity refers to the totality of species, populations, communities and ecosystems, both wild and domestic. It may also be defined as the variety and variability among living organisms and the habitats in which they live.

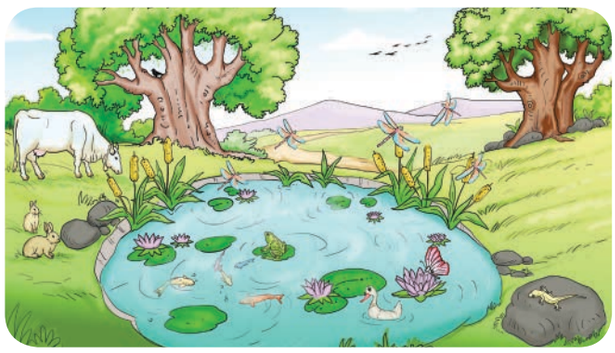
Biodiversity includes a variety of ecosystems such as those that occur in deserts, forests, mountains, lakes, rivers and agricultural fields. In each ecosystem, living creatures, including humans, form a community interacting with one another and with other animals, plants, air, water and soil around them. The living things form biotic community and non-living things form abiotic community.

5.1.1 Habitat

Fishes and crabs grow only in water while many animals like elephants, tigers and camels live on land. The geographical features and environmental conditions on earth differ from one place to another. Though camel can live anywhere it is able to live in deserts more comfortably. Polar Bear and Penguins dwell in cold regions. Living in such harsh conditions requires special features in these animals which help these organisms to live, breed and excel well in that particular place. Living or dwelling place of an organism is known as **habitat**.

Activity 1

Collect the pictures of various ecosystems like lake, pond, forest, desert, mountains, and Polar regions and prepare a chart of animals in these places.



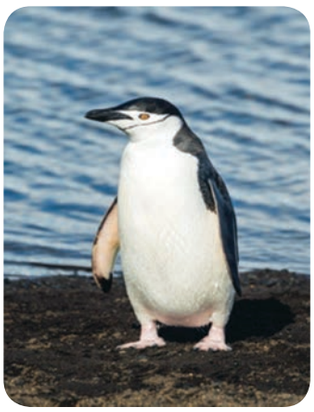
Activity 2

Look at the below picture and prepare a chart for the following interpretation.

- How does the climate differ in these habitats?
- Name some animals that exist in these habitats.
- Can an animal survive if it is shifted from one habitat to another contrasting habitat?

DO YOU KNOW?

In Jurong Birds Park, Singapore, Penguins are kept in a big glass case with ice bergs and temperature is maintained at 0° C and below.



Penguin

5.2 Unicellular and Multicellular Organisms

Living things are made of small units called cells. All the functions and processes in the body of living things are brought about with the help of these microscopic cells.

Some organisms are made up of a single cell and these are called **unicellular organisms**, whereas, the organisms that are made of many cells are called **multicellular organisms**.

Amoeba, Paramecium and Euglena are unicellular while, fish, frog, lizard, bird and man are multicellular.

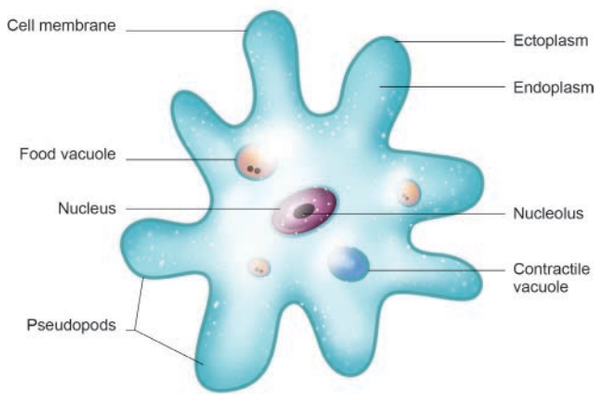
Unicellular organism

Unicellular organisms are small, usually microscopic, cannot be seen with naked eye. They are aquatic, simplest and most primitive of all animals. They perform all their physiological activities by the special structures present inside the body called organelles.

We know Amoeba is an unicellular organism It does all the activities like digestion, locomotion, respiration and reproduction.

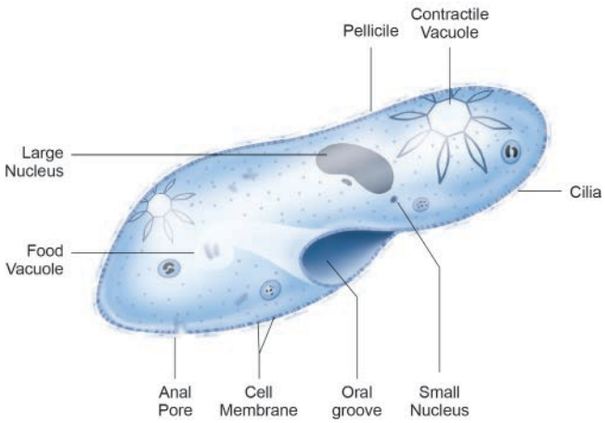
It swallows food from the water and the food is digested in the food vacuole. Contractile vacuoles help in excretion. Respiration is by simple diffusion through the body surface. They have finger-like structures called Pseudopodia, (false foot) which help in movement or locomotion.

Amoeba



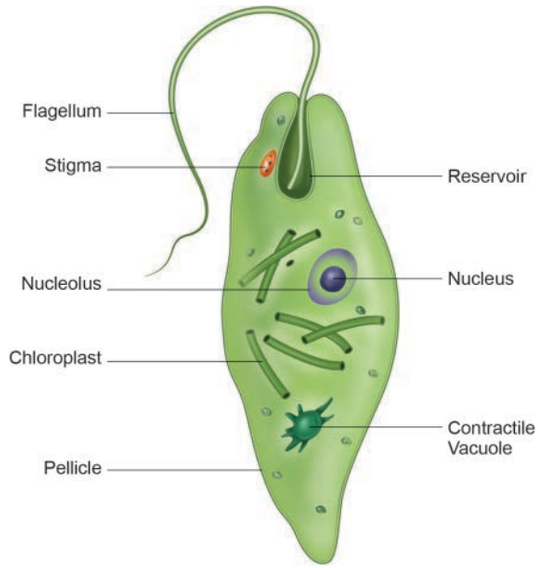
Paramecium is also a unicellular organism which lives in water and move with the help of cilia.

Paramecium



Euglena is an unicellular animal which moves with a flagellum.

Euglena



Multicellular organisms:

Majority of organisms we see around us, including animals are multicellular. In such organisms, different functions are

B4LIKX

Table 2.2 The Differences between Unicellular and Multicellular Organisms.

Unicellular Organisms	Multicellular Organisms
• They are made up of single cell. • The single cell of the organism can perform all the functions of life. • These organisms are generally very small (microscopic) in size. • They lack tissues, organs and organ systems. • Growth occurs by an increase in the size of the cell. eg. Amoeba, Paramecium and Euglena.	• They are organisms are made up of many cells. • Division of labour exists among cells. Different cells are specialized to perform different functions. • They are mostly large in size. • They are composed of tissues, organs and organ systems. • Growth occurs by an increase in the number of cells by cell division. eg. Earthworms, Fish, Frogs, Lizard and human beings.

carried out by different groups of cells or organs in their body. E.g. Jelly fish, Earth worm, snails, fish, frog, snakes, pigeon, tiger, monkey and man.

5.3 Adatptation in Animals

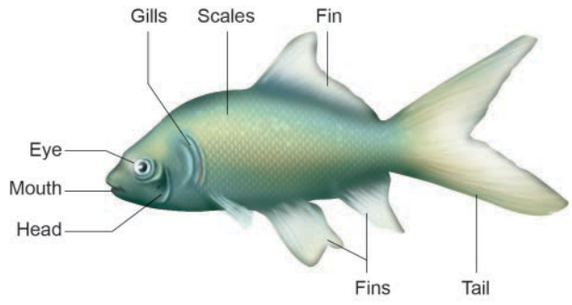
Animals vary in size, shape and behaviour

A Living thing can survive in a particular habitat if its body is adapted to the conditions of that habitat. Plants and animals develop special characteristics or features in their body in order to survive in their habitat (the surroundings). The presence of specific body features for certain habits which enable a plant or an animal to live in a particular habitat is called adaptation.

The fish lives in either freshwater or marine water. Let us analyse the adaptations seen in a fish for its aquatic life.

Fish

1. The head, trunk and tail of a fish merge to form a streamlined shape. The streamlined body shape helps the fish to move through the water easily.
2. The fish has special organs called “Gills” which is a respiratory organ helps to absorb oxygen dissolved in water for breathing. It is adapted to breathe in water.
3. Most of the fishes have slippery scales all over the body which protect the body.
4. The fish has fins for swimming.
5. The fish has strong tail which acts as rudder to change direction and keep its body balance in water.



Lizard

1. Lizards are scaly-skinned reptiles that are usually distinguished from snakes by the possession of legs, movable eyelids, and external ear openings.
2. They mostly inhabit warm regions. Most lizards are quadripedal (walk with four legs) and have a powerful limb.
3. Some lizards have the capacity to rotate the head around the head joint.
4. They breathe through lungs. Some lizards are able to run bipedally with two legs. In this the tail is held out

backward and upward and acts as a counterweight.

5 Most lizards eat a variety of insects like mosquitoes and Cockroaches with sharp, tricuspid, teeth adapted for grabbing and holding

6 Some lizards (Dinosaurs) have web in the toes, and few lizards are able to glide or parachute the air and make soft landings.

Birds

1. They have streamlined body covered with feathers.
2 This body shape provides minimum resistance to air.
3 They have beak instead of mouth.
4. They breathe through lungs. They have a pair of wings that are modified forelimbs.
5. They have hollow and light bones.
6. Usually we see birds fly, however they can also hop, move, run, etc., on the ground and they perch well on the branches of tree with the help of a pair of clawed feet.
7. The tail of the bird helps it to control the direction of the movements.
8. They have strong chest muscles which help them withstand the pressure of the air while flapping their wings during flight.
9. At a time, birds can see one object with one eye and another object with the other eye. (Binocular vision)

When an animal moves its location as the season changes it is said to be **Migration**. In Tamil Nadu Bird Sanctuaries are

located at Vedanthangal, Kodiyakkarai and Koondhankulam. There are many birds from foreign countries like Siberia and Russia migrate to our Vedanthaangal. Likewise during summer and drought conditions birds from our country migrate to foreign countries. These birds are called **Migratory Birds**.

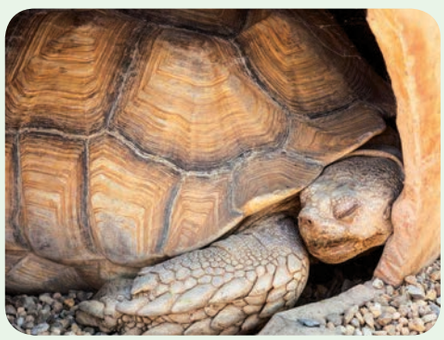
Adaptation in Camel:

Camel lives in hot desert where water is scarce. The body structure of a camel helps it to survive in desert because of its following special features which are listed below:

1. The camel has long legs which help it to keep its body away from the hot sand in the desert.
2. A camel can drink large amount of water (when it is available) and store it in the body.
3. A camel's body is adapted to save water in the dry desert as follows: A Camel passes small amount of urine; its dung is dry and it does not sweat. Since a camel loses very little water from its body, it can live for many days without drinking water.
4. A camel's hump has fat stored in it. In case of emergency a camel can break down stored fat for nourshment.
5. A camel has large and flat padded feet which help it to walk easily on soft sand. Thus it is called "The ship of the desert".
6. Camel has long eye lashes and hairs to protect its eyes and ears from the blowing dust.
7. It can keep its nostrils closed to avoid dust.

Info Bits

- Spending winters in a dormant condition is called **Hibernation**. eg. Turtle
- On the other hand, spending the hot and dry period in an inactive state is known as **Aestivation**. eg. Snail



Kangaroo rat does not drink water at all. Whatever food it eats and oxygen it gets from air combine together to form water inside the body.

Table: 2 Adaptive Features of Animals from different Habitats

Sl.No.	Name of the Animal	Habitat	Adaptive features
1.	Polar Bear	Polar region	Thick skin for protection, white fur
2.	Penguin	Polar region	Paddle to swim, walk with two legs
3.	Mountain Goat	Mountains	Strong hooves for running, long hair to protect from cold
4.	Lion	Forest	Strong and fast runner has sharp claws to catch prey.

Polar Bear

Mountain Goat

Lion

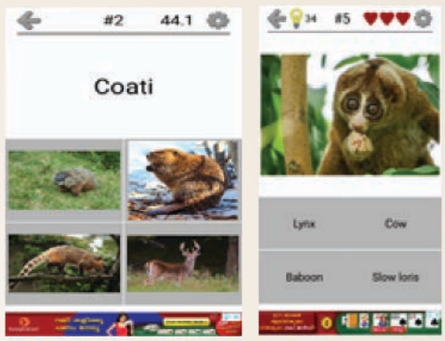
Penguins

The mountain goat namely Nilgri Tahr can find small spaces on rock to climb with ease and keep its balance as it feeds.

ICT CORNER

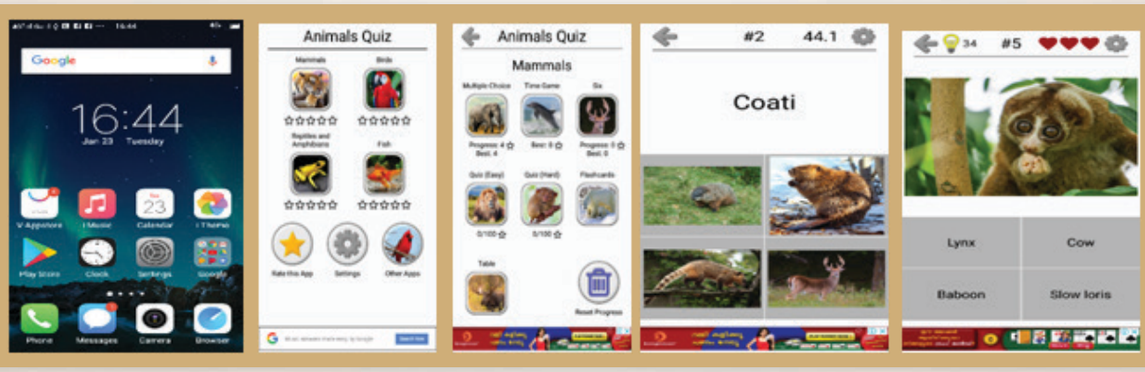
Bio diversity

Lets play animal quiz



Steps:

- Go to Google / browser and type “animal quiz” to know more about the types of animals and their habitation.
- When you get the app, press install button for installing. Then click open and start your game.
- Many options will be displayed on the screen. From that, you select the option of your choice.
- When the choice is selected and the game is started for each animal four options will come. When the correct answer is given it will automatically go to next animal. When the whole episode is over you can go to the starting phase and start the next play.



URL:

https://play.google.com/store/apps/details?id=com.asmolgam.animals

Pictures are indicative only

Evaluation

I Choose the correct answers

1. The study of living things or organisms is called
   a. Psychology
   b. Biology
   c. Zoology
   d. Botany

2. Which of the following are characteristics of living beings?
   (i) Respiration
   (ii) Reproduction
   (iii) Adaptation
   (iv) Excretion

   Choose the correct sequence
   a. (i), (ii), and iv only
   b. (i), (ii) only
   c. (ii) and (iv)only
   d. (i), (ii), (iii) and (iv)

3. Lizards breathe through their
   a. Skin b. Gills
   c. Lungs d. Trachea

4. All animals need
   a. Food and water only
   b. Water only
   c. Air, food and water
   d. Food only

5. Which animal has the special organs of breathing called gills
   a. Earthworm b. Fox
   c. Fish d. frog

6. Choose the set that represents only biotic components of a habitat
   a. Tiger, Deer, Grass, Soil
   b. Rocks, Soil, Plants, Air
   c. Sand, Turtle, Crab, Rocks
   d. Aquatic plant, Fish, Frog, Insects

7. Which of the following cannot be called as a habitat?
   a. A desert with camels
   b. A pond with fish and snails
   c. Cultivated land with grazing cattle
   d. A jungle with wild animals

8. Birds fly in the air with the help of
   a. heavy and strong Bones
   b. Soft and thick Bones
   c. Hollow and light Bones
   d. Flat and thick Bones

9. Paramecium moves from one place to other with the help of
   a. Pseudopodia
   b. Flagella
   c. Foot
   d. Cilia

10. Kangaroo rat lives in
    a. Aquatic habitat
    b. Desert habitat
    c. Grass land habitat
    d. Mountain habitat

II. Multiple choice questions

Complete the following with appropriate word(s).

1. Aquatic, deserts, mountains are called _____.

2. Based on the number of cells present animals are classified into _____ and _____
3. Tail of a bird acts as a rudder which helps to _____.
4. Amoeba moves with the help of _____.

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

1. Habitat is a living or dwelling place of organism.
2. The geographical features and environmental conditions on earth remain same from one place to other.
3. Amoeba is a unicellular organism and moves with pseudopodia.
4. Birds can see only one object at a time.
5. Paramoecium is a multicelluar organism.

IV. Complete the following

1. Tropical rain forests, grasslands and desserts are known as _____.
2. Some living things are made of a single cell, they are called _____ organism.
3. The breathing organ of a fish is known as _____
4. The lizard _____ on the ground with its claw on its feet.
5. Camel stores _____ in its hump.

V. Very short answer questions.

1. How do the birds catch their prey?
2. Where can we see Camels in India?
3. Name the locomotory organ of an Amoeba.
4. What are the body parts of a snake?
5. Which structure helps the bird to change its direction while flying in air?

VI. Short answer type questions.

1. Differentiate between Unicellular and Multicellular organisms.
2. Write the adaptive features of Polar bear and Penguin.
3. Mention the feature that help a bird to fly is the air?
4. What are the different types of invertebrates?

VII. Answer in detail

1. Describe the various features which help Camel dwell well in the desert.

Unit 6

Health and Hygiene

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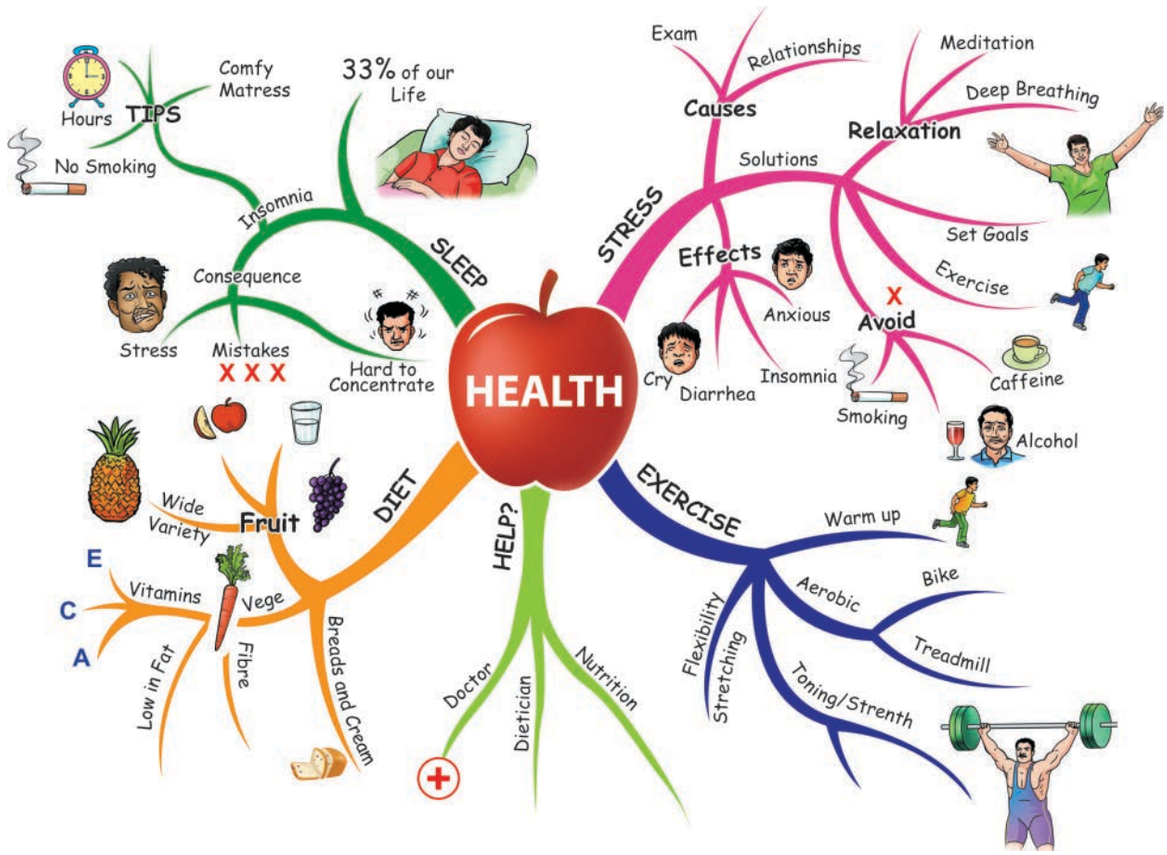


Learning Objectives

- To Classify the different components of Food.
- To Evaluate the importance of nutrients present in our food.
- To Enrich the knowledge about Balanced diet.
- To List out the deficiency diseases.
- To Describe on personal hygiene.
- To Differentiate the diseases caused by Bacteria and Virus.

Introduction

The word "health" refers to a state of complete emotional and physical well-being. Healthcare exists to help people maintain this optimal state of health.

As defined by World Health Organization (WHO), it is a "State of complete physical, mental, and social well being, and not merely the absence of disease or infirmity." Health is a dynamic condition resulting from a body's constant adjustment and adaptation in response to stresses and changes in the environment for maintaining an inner equilibrium called homeostasis.

Hygiene is a science of the establishment and maintenance of health conditions or practices (as of cleanliness) conducive to health has poor personal hygiene. Brushing your teeth regularly is an important part of good oral hygiene. Hygiene is the practice of keeping yourself and your surroundings clean, especially in order to prevent illness or the spread of diseases.

Deepa's family was preparing their monthly provision list

When Deepa saw the list, she had some questions to ask her parents, Why do we eat, comparatively more amount of rice and wheat? Why do we consume less amount of oil and ghee? Discuss the given list with your teacher.

Provision List

Raw rice	25 Kg
Wheat	5 Kg
pigeon pea	2 Kg
Green gram	1 Kg
Black gram	2 Kg
Cooking oil	2 lt
Ghee	500 gm

Activity 1

Read the following food items and *Classify the following table*

Brinjal

Chocolate

Lady's finger

French fries

Grains

Orange

Guava

Spinach

Moringa Leaves

Goose berry

Burger

Pearl millet

Food which I like to eat	Food which I don't like to eat	Food which I have never seen before
1.		
2.		

1. Do your favorite foods make you healthy?

2. Do you choose your food by taste or by its nutritive value?

6.1. Components of Food

The Chemical constituents of food which give us energy, help to build our body and protect us from diseases are called Nutrients.

1. Carbohydrate
2. Proteins
3. Fats
4. Vitamins
5. Minerals
6. Water.

Activity 2

Collect as many food items as you can and classify them according to the major nutrient content in it.

6.1.1. Carbohydrates

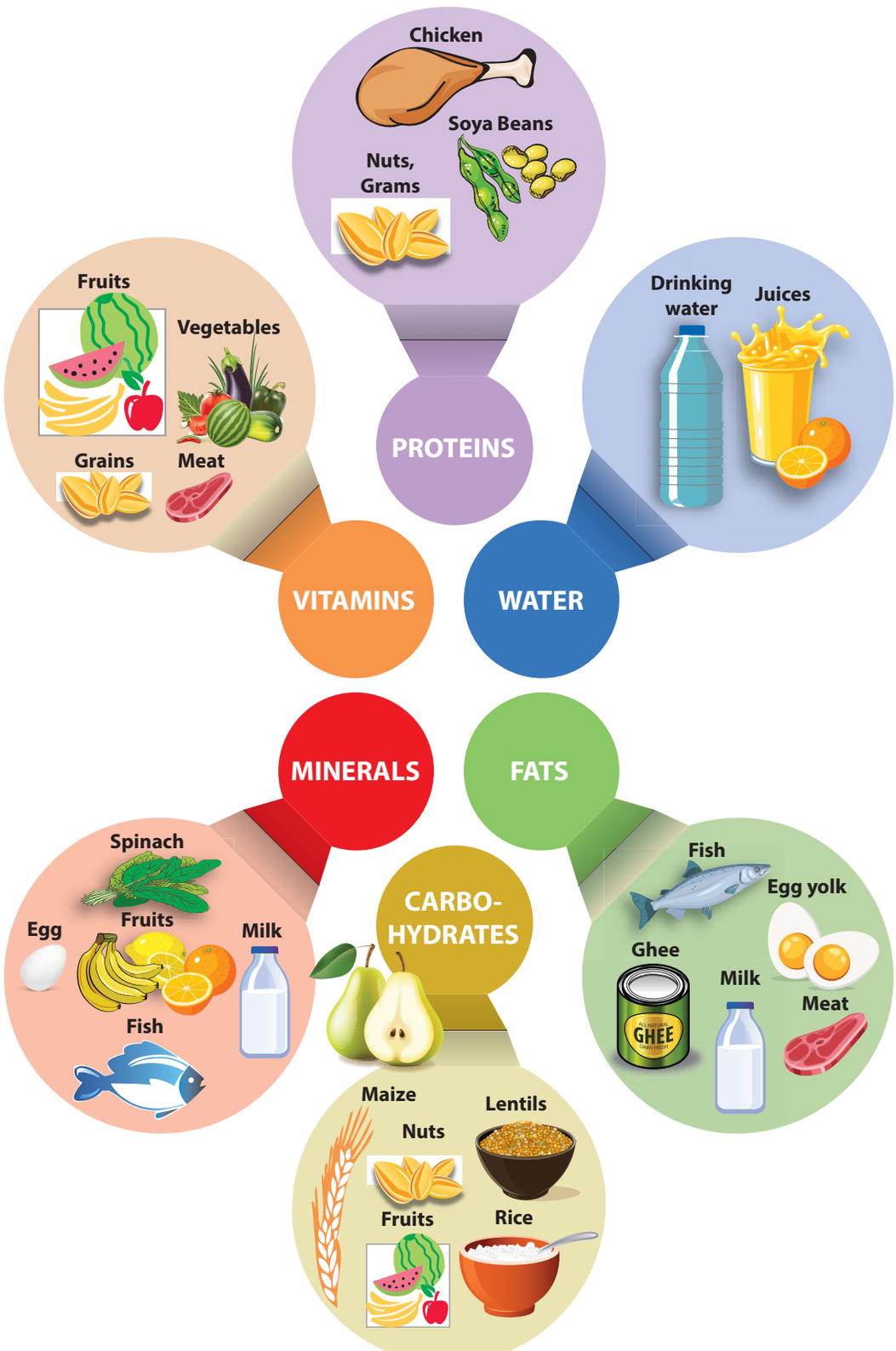
Carbohydrates are energy giving component of the food.

Table 1

S.No.	Form of Carbohydrates	Sources
1	Sugar	Fruits, Honey, Cane Sugar, Sugar Beet
2	Starch	Rice, Wheat, Maize, Potato, etc.
3	Dietary fibre	Whole grain, nuts,etc.

We can obtain carbohydrates in the form of Sugar, starch and dietary fibres

NUTRIENTS



WHOLE GRAINS

Activity 3

Aim:

To test the presence of Carbohydrate as Starch in the given food item.

What do you need?

Boiled potato, dropper and dilute Iodine solution

How to do:

Smash the boiled potato.

Add two or three drops of dilute Iodine solution on the Sample

What do you see?

The potato turns blue-black in colour.

What do you learn?

Iodine reacts with Starch to form Starch-Iodine complex which is blue-black in colour. Thus, the appearance of blue-black colour confirms the presence of Starch in the food item

6.1.2. Fats

Fat is also an energy-giving food and provides more energy than Carbohydrates. Some important sources of fats are butter, ghee, milk, cheese, paneer, nuts, meat, fish, egg yolk etc. Apart from giving energy, they insulate our body and protect the cells.

Activity 4

Aim:

To test the presence of Fat in the given food item.

What do you need?

Coconut Oil, groundnut oil, and any Paper.

How to do:

Pour few drops of oil onto the paper and rub it gently with your finger.

In case of ground nut, crush the groundnut and place it on a paper

Now rub the groundnut on the paper

What do you see?

The paper turns translucent and becomes greasy .

What do you learn?

The given food sample contains fat

6.1.3. PROTEIN

Body Building Foods

Proteins are necessary for our growth and repair, as well as for regulating various body functions such as digestion. The sources of proteins are pulses, eggs, fish, milk, chicken, soya bean, nut, grams etc, Proteins are body building foods.

Soyabean is the highly rich source of protein.

Activity 5

Aim:

To test the presence of Protein in the given food item.

What do you need?

egg white, Copper sulphate solution, Sodium hydroxide , Test tube and Bunsen burner.

How to do:

Take a small amount of the food sample (egg white) and put in the test tube.

Add some water to the test tube and shake it.

Next, heat the test tube for about one minute. After the test tube has cooled down, and two drops each of Copper sulphate solution and Sodium hydroxide to it.

What do you see?

The food sample turns purple or violet.

What do you learn?

Change in colour of the given food sample turns purple or violet confirms the presence of Protein.

6.1.4. Vitamins

Vitamins are required for carrying out various biochemical reactions in our body. Fruits, vegetables, grains, meat products are good sources of **vitamins.** Vitamins are called as protective food. There are six major vitamins A, B, C, D, E and K. Vitamins B and Vitamins C are water soluble, Vitamins A, D, E and K are fat soluble.

VITAMINS

Types, Functions and deficiency diseases

Vitamin A

Healthy vision and skin

Found abundantly in

Fish oil

egg , milk,

ghee, carrot,

corn,
yellow fruits,

greens

Disease we get if deficiency in this

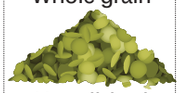
Night blindness

Vitamin B

Healthy nervous system formation of RBC

Found abundantly in

Whole grain



Unpolished rice

milk, fish

peas, lentils

green vegetables

Disease we get if deficiency in this

Beri Beri

Vitamin C

Protects gums helps immune system

Found abundantly in

Oranges

gooseberry

green chilli, tomato

Disease we get if deficiency in this

Scurvy

Vitamin D

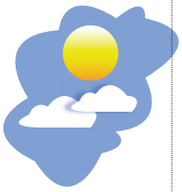
Calcium absorbtion and strong bones

Found abundantly in

Fish oil

egg , milk,

It is also made in our skin using sunlight



Disease we get if deficiency in this

Rickets

Vitamin E

Fertility

Found abundantly in

Vegetable oil, Whole wheat

green vegetables, greens

apple, mango

Disease we get if deficiency in this

nervous weakness, dimming of eyesight

Vitamin K

Clotting of blood

Found abundantly in

green vegetables

tomato

cabbage

eggs

milk products

Disease we get if deficiency in this

weakness of the bones, teeth etc.

Table 2

Vitamin	Found abundantly in	Disease we get if deficient in this	Symptoms
Vitamin A	Fish oil, egg, milk, ghee, carrot, corn, yellow fruits, greens	Night blindness	Poor vision, difficulty in seeing in dim light
Vitamin B	Whole grain, unpolished rice, milk, fish, meat, peas, lentils Green vegetables	Beriberi	Nervous weakness, fatigue.
Vitamin C	Oranges, Gooseberry, Greenchilly, Tomato	Scurvy	Bleeding gums
Vitamin D	Fish oil, milk and eggs. It is also made in our skin using sunlight	Rickets	Weak, flexible bones
Vitamin E	Vegetable oils, Green vegetables, whole wheat, Mango, apple, greens	Nervous weakness, dimming of eyesight	Childlessness, lack of resistance power to illnesses
Vitamin K	Green vegetables, Tomato, cabbage, eggs, milk products.	Weakness of the bones, teeth etc.	Even a small cut bleeds profusely.

Just Think

A medical camp was conducted in School. Most of the children were healthy. Some of the students had some health issues

Priya had bleeding gums.

Raja could not see clearly in dim light.

Arun had bent legs .

Can you guess what could be the reasons?

Fact File

Sun screen lotion reduces your skin's ability to produce Vitamin D by up to 95% which may lead to Vitamin D deficiency.

Activity 6

Make your food little healthier.

What do you need?

A small cup of green gram seeds, Water and thin cloth.

How to do:

Soak the green gram seeds inwaterover.

Takeout the seeds and strain the water.

Wrap the seeds in wet thin cloth.

Keep it for a day or two.

Sprinkle some water whenever it is dry.

What do you see?

You can see white sprouts coming out of the seeds.

What do you learn?

green gram sprouts are low in calories, have fibre and Vitamin B. It has comparatively high amount of vitamin C and vitamin K

Gooseberries contains nearly 20 times the vitamin C than Orange.

6.1.5 Minerals

Minerals are required for growth as well as for the regulation of normal body function.Green leafy vegetables like spinach, pulses, eggs, milk, fish and fruits are important sources of minerals in our diet. Minerals are also a protective foods.

Table 3

Minerals	Functions
Calcium	Strong bones and teeth, clotting of blood
Phosphorus	Strong bones and teeth
Iodine	Synthesis of thyroid hormone
Iron	Formation of haemoglobin and brain development

80% of the world production of Moringa Leaves is in India. The Major countries which import Moringa Leaves are China, US, Germany, Canada, South Korea and European countries.

Fact File

Moringa leaves are rich in

Vitamin A,

Vitamin C,

Potassium,

Calcium,

Iron and

Protein.

It also contains

Powerful anti oxidants

6.1.6. Water

Our body needs an adequate supply of water is order to maintain good health. Any human being should take minimum eight tumblers (2 Litres) of water every day.

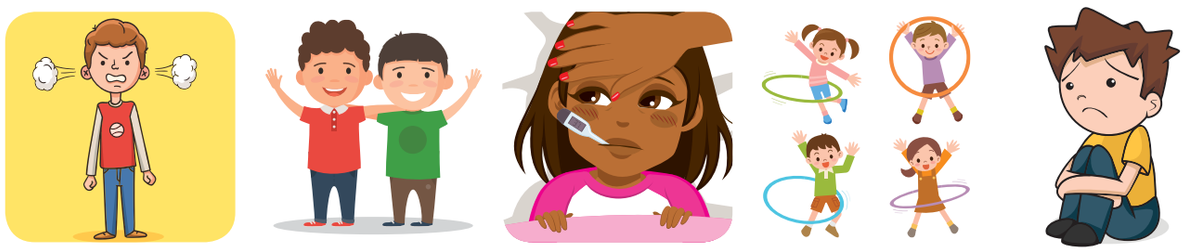
Complete the following Table 4

S.No.	Nutrients	Sources	Functions
1	Carbohydrates	Rice,Wheat,Potato	
2	Fats		Give us energy
3	Proteins		
4	Vitamins	Fruits, Vegetables, Grains, Meat and dairy products	
5	Minerals		Regulation of growth and normal body function

6.2. Health and Nutrients

Look at the pictures Given below

Mark ✓ for healthy persons and mark ✗ for unhealthy persons.



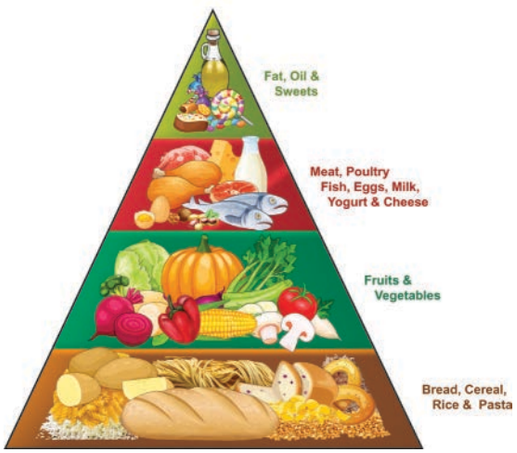
6.2.1. Health

Health is a state of complete physical, mental and social well-being and not merely absence of diseases. Eating a healthy diet keeps you physically and mentally fit. When you are physically healthy, you feel confident you are more outgoing and have a greater capacity for enjoying life.

Unhealthy food choices lead to obesity and illness, preventing you from socializing with friends and family. So choose your diet carefully.

6.2.2 Balanced Diet

A diet should contain adequate amount of all the necessary nutrients required for healthy growth and activity.



Food Pyramid

- An increased capacity to work
- Good physical and mental health
- Increased capacity to resist diseases.
- Help in proper growth of the body.

A balanced diet contains sufficient amount of various nutrients to ensure good health. Food should also provide the appropriate amount of energy and adequate amount of water.

Activity 7

WHY DO WE NEED A BALANCED DIET ?

Prepare a diet chart to provide balanced diet to a 12 year old child. The diet chart should include food item which are not expensive and are commonly available in your area.

6.2.3. Malnutrition

When your diet is not a balanced, what would be the consequences?

Observe the below picture carefully

Do these children look normal?

Guess what would be the reason?

The children are in this condition due to **malnutrition**.

Malnutrition: Malnutrition occurs when all the nutrients that the body needs are not obtained in the proper proportions from the diet. The word malnutrition refers to the condition that results when a person does not take a balanced diet. Malnutrition leads to deficiency disease. The diseases that are caused due to lack of Nutrients in the diet are called **Deficiency Diseases.**

India has the second highest number of obese children in the world after China, according to a study that has found that 14.4 million children in the country have excess weight.

Activity 8

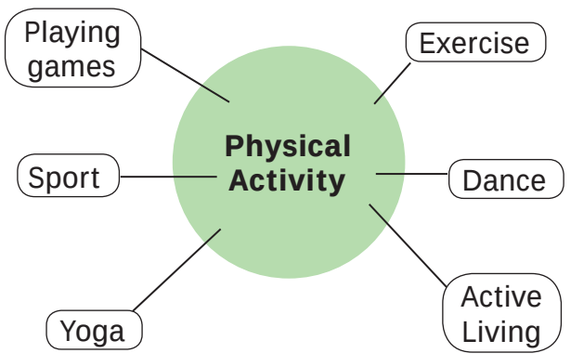
Visit a nearby Anganwadi centre and find the steps taken by the government to overcome malnutrition and ensure health in the age group 0-5 years

Table 5 Protein And Mineral Deficiency Diseases

Protein Diseases	Symptoms
Kwashiorkar	Stunted growth, Swelling of face and limbs, Diarrhoea.
Marasmus	Skinny appearance, Slow body growth.

Mineral	Deficiency Disease
Calcium	Rickets.
Phosphorus	Osteomalatia
Iodine	Cretinism (in Child) Goitre (in adult)
Iron	Anaemia

6.2.4. Physical Exercise and Rest



Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness. It is performed for various reasons, including

- increase in growth and development,
- strengthening muscles and the cardiovascular system,

- developing athletic skills, weight loss or maintenance, and enjoyment.

Physical exercise may help to decrease some of the effects of childhood and adult obesity.

Deep sleep seems to be one of the most critical time for body repair.

REST

Proper amount of rest is essential for physical and mental health. Rest is as important as nutrition and physical activity for growth and development and good health.

Discuss with Friends

" Early to bed and early to rise make a man healthy, wealthy and wise"

Benjamin Franklin

6.2.5. Personal Cleanliness

Hygiene is a set of practices performed to preserve health. According to the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases."

B5E6QV

Personal hygiene involves those practices performed by an individual to care for one's bodily health and well being, through cleanliness. It includes such personal habit choices as how frequently to bathe, wash hands, trim fingernails, and change clothing. It also includes attention to keep surfaces in the home and workplace, including bathroom facilities, clean and pathogen-free.

Activity 9

One day Rahim, a class six boy vomited three times. He was looking tired and dehydrated. His mother who was a nurse prepared a solution and gave it to him drink. He felt better after sometime and asked his mother what the solution was. His mother said it was Oral Rehydration Solution – ORS. Shall we see what an ORS is?

Vomiting or loose motions result in loss of water and cause salt imbalance in the body. Loss of water (dehydration) can lead to serious problems. This can be prevented by consuming ORS at short intervals.

Follow the steps to make ORS at home:

- Take a litre of boiled water. Cool it.
- Add half a teaspoon of salt and six teaspoons of sugar to it.
- You can also add a few drops of lemon juice to it. Stir it and give it to the person suffering from vomiting, loose motions or dehydration.

Table 6

Components	*Recommended frequency of cleaning*
Eye hygiene	Daily every morning and whenever the face is dirty
Hair hygiene	weekly twice preferably once every other day
Body hygiene	Once or twice a day
Oral hygiene	Brushing twice a day; rinsing after each meal
Feet hygiene	Every day
Hand hygiene	Every time after touching contaminated surfaces; every time before eating and touching clean surfaces
Clothes hygiene	Once or twice a day

6.3. Introduction of Microbes

When you neglect personal hygiene, you are increasing the risk of falling sick.

Let us name some of the diseases or conditions caused by microorganism due to the negligence of personal hygiene.

1. Diarrhoea
2. Tooth decay
3. Athlete's foot(Madurai's foot)
4. Dandruff.

Do you believe that there are some organisms which you cannot see with your naked eye?

Yes. microbes can not be seen without the help of a microscope.

Most of the microbes belong to four major groups:

- Bacteria
- Virus
- Protozoa
- fungi

6.3.1.Bacteria

Bacteria are very small prokaryotic microorganisms.

Bacterial cells do not have nucleus and do not usually have membrane bound organelles.

- Bacteria can exist either as independent organisms or as parasites
- They invade tissues
- They produce pus or harmful wastes

Table 7 Bacterial Diseases

S.No	Bacterial diseases	Mode of transmission
1	Cholera	contaminated water
2	Pneumonia	inhalation of airborne droplets from a sneeze or cough.
3	Tetanus	contamination of wounds with the bacteria
4	Tuberculosis	inhalation of airborne droplets from a sneeze or cough.
5	Typhoid	contaminated food or water

DO YOU KNOW?

Disease

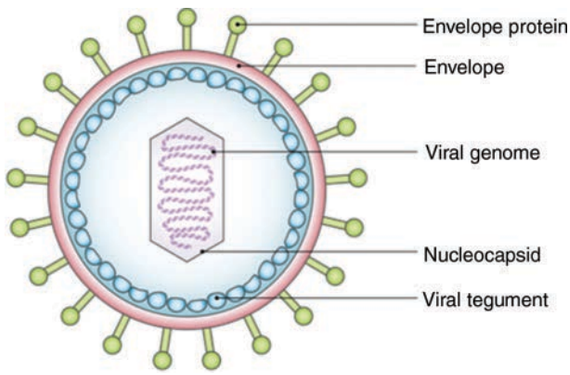
Disease is a definite pathological process having a characteristic set of signs and symptoms.

Disorder

Disorder is a derangement or abnormality of function.

6.3.2. Virus

Virus is an acellular agent that replicates only inside the cells of other living organisms. Virus can infect all types of life forms plant, animals and microorganisms. They invade living normal cells and use their cell machinery to multiply. They can kill damage or change the cells and make you sick.



Diseases Caused By Virus

1. Common cold
2. Influenza
3. Hepatitis
4. Polio
5. Smallpox
6. Chicken pox
7. Measles

Discuss in your class room

"Is virus a living thing or non living thing?"

Microscopes help to study the structure of the microorganisms

Points to remember

- There are six major nutrients
  - Carbohydrate
  - Fats
  - Protein
  - Vitamins
  - Minerals
  - Water
- Kwashiorkor and Marasmus are protein deficiency diseases.
- Night blindness, scurvy, Rickets and Beriberi are vitamin deficiency diseases.
- Bacteria is a Prokaryotic microorganism.
- Cholera, Typhoid and Pneumonia are bacterial diseases
- Influenza, common cold and chicken pox are viral diseases.

Suggested project

Get a Vaccination schedule from a nearby doctor or a hospital. From the list, identify the bacterial diseases and the viral diseases for which vaccination is given

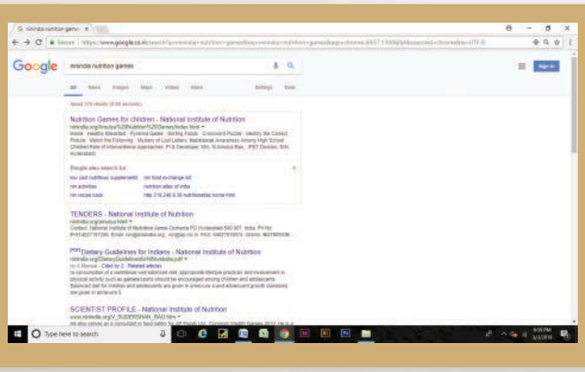
ICT CORNER

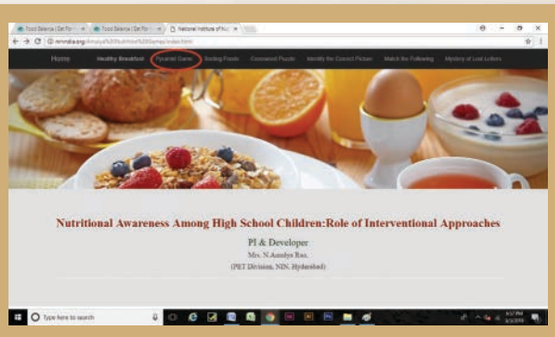
Balanced food

Play with pyramid game

Steps:

- To learn and know more about balanced food, Go to google or browser and type ninindia nutrition games
- When the homepage opens click pyramid game
- drag and drop the each foodmitem in the pyramid.





URL:

http://ninindia.org/Amulya%20Nutrition%20Games/index.html

Pictures are indicative only

Evaluation

B5N2SI

I Choose the correct answer

1. Our body needs _____ for muscle-building
   a) carbohydrate b) fat
   c) Protein d) Water
2. Scurvy is caused due to the deficiency of_____.
   a) Vitamin A b) Vitamin B
   c) Vitamin C d) Vitamin D
3. Calcium is an example of a
   a) carbohydrate b) fat
   c) Protein d) minerals
4. We should include fruits and vegetables in our diet, because_____.
   a) They are the best source of Carbohydrates
   b) They are the best source of Proteins
   c) They are rich in minerals and Vitamins
   d) They have high water content
5. Bacteria are very small _____ microorganism.
   a) Prokaryotic b) Eukaryotic
   c) Protozoa d) Acellular

II True or False

6. There are three main nutrients present in food.
7. Fats are used as an energy store by our body
8. All bacteria have flagella.
9. Iron helps in the formation of haemoglobin.
10. Virus can grow and multiply outside host.

III Fill in the Blanks

11. Malnutrition leads to _____
12. Iodine deficiency leads to _____ in adults.
13. Vitamin D deficiency causes _____.
14. Typhoid is transmitted due to contamination of _____ and water.
15. Influenza is a _____ disease.

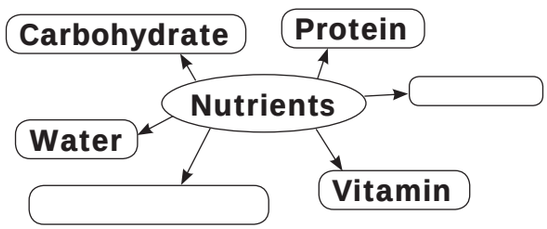
IV. Complete the Analogy

16. Rice: Carbohydrate :: Pulses:_____.
17. Vitamin D : Rickets :: Vitamin C: _____.
18. Iodine: Goitre :: Iron:_____.
19. Cholera: Bacteria :: Smallpox:_____

V Match the Following

20.	Vitamin A	Rickets
21.	Vitamin B	Night blindness
22.	Vitamin C	Sterility
23.	Vitamin D	Beri beri
24.	Vitamin E	Scurvy

VI Complete the Diagram



VII. Write Short Answer

25. Write two examples for each of the following .
    a) Food items rich in fat.
    b) Vitamin deficiency diseases.

26. Differentiate between carbohydrate and protein
27. Define the term " Balanced diet".
28. Why should the fruits and vegetables not to be washed after cutting?
29. Write any two viral diseases
30. What is the main feature of a microorganism?

VIII. Long Answer

31. Tabulate the vitamins and their corresponding deficiency diseases.

Unit 7 Computer-An Introduction

B5WXU6






Learning Outcomes

- To know about the computer.
- To know the history of computer.
- To understand the growth and development of computer.
- To understand the generations of computer.
- To understand the types of computer.
- To apply the knowledge of computer in various fields in our day today life.

(Boys and girls of standard VI were playing in the playground).

Siva: Hey Salim, I saw your dad coming with a big parcel yesterday. I guess you could have bought a new television, Am I right?

Salim: It's not a TV Siva. We bought a new computer.

Malar: Oh, I see. computer! I had seen it in Textile shop used for billing.

Selvi: Malar, not only in textile shops, but also it's used in Railway stations,

Banks, ATM's and in many places. It is used even in our local post offices.

Nancy: Hey! I had seen it in my school.

Salim: Is it only in your school? Nancy, I think your father is also having a computer.

Nancy: Is my father having a computer?! Without my knowledge? I'm sure that my father doesn't have computer. He has only a mobile phone.

Salim: That's what I say your father's mobile phone is also like a computer.

Nancy: Oh no Salim? What do you mean? How can a mobile phone compared with a computer?

Salim: Nancy, we usually think that computer should be like a big TV and a box attached with it, But computers are available in different shapes. The works which are done with a computer can also be done using a smart phone. There may be difference in their speed, but their operations remain the same. The big computers are shrunk into small smart phones nowadays because of the technological development. Most of us think that smart phones are only to make calls because of its' handy look But it isn't so.

Selvi: What about laptops and tablets? Are they same like the computers we usually think of?

Salim: Yes, They are all the same. These are different types of computers. But their performance vary according to their capacity.

Siva: That's ok Salim, why do you need a computer in your home? What will you do in that?

Salim: I can use it to draw, paint, play games and I can learn and develop my general knowledge.

Selvi: Salim, you know more about computers!

Salim: I know very less about computers. As my dad uses computer in his office, he knows much about it. I shared very little of what I have learnt from my dad.

(All the children stood up when the teacher came and stood near them)

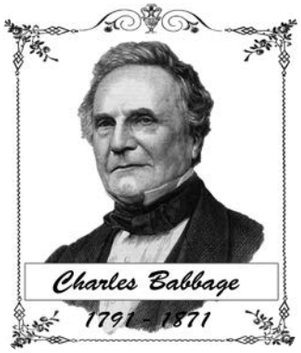
Teacher: What is going on?

Children: We are discussing about the computer sir.

Teacher: Oh, I see, that's nice. I will explain you in detail. Firstly I will explain you about what is a computer? Computer is an electronic device that process the data and Information according to our needs. We can save the data and convert it into information. Computers are used in many ways.

Malar: We are eager to know who has invented the computer?

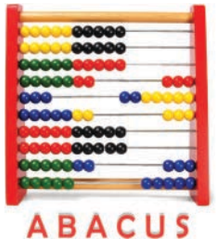
Teacher: In the beginning of 19th century, Charles Babbage, a professor in Mathematics has designed an analogue computer. He is known as the father of computer.



The basic structure designed by him is being used in all computers. Similarly, Augusta Ada Lovelace is admired as the first programmer as she developed essential commands for the mathematical operations.

Nancy: Sir, can you tell us which device was used before the invention of computer?

Teacher: In the early stage, there was no computer. Initially the people used a tool called abacus for calculations.



Later, they started using a device called calculator for calculation.

Selvi: Wow! It's really interesting sir, then when did computers come into use Sir?

Teacher: Good question Selvi. Computer didn't come directly from abacus. The computers that we use today belongs to fifth generation.

Nancy: Oh! was there four more generations previous to this?

Teacher: Yes, Nancy you are correct.

Siva: Sir! Can you explain us about the five generations?

Teacher: In First generation computers, they used Vacuum tube

In Second generation computer, they used Transistor

In Third generation computer, they used Integrated Circuit

In Fourth generation computer, they used Micro processor

In Fifth generation computer - Now they use Artificial Intelligence

Selvi: Sir, we are eager to know more about the present computers which we use sir?

Teacher: Data and information are the two important elements in computers.

Malar: Sir, What is meant by data?

Siva: Then, what is application software?

Generations of Computer

Teacher: Data is the information that has to be processed. It cannot be used directly by us. Generally, they are in the form of numbers, alphabet and images.

Siva: Sir... then what is information?

ENIAC (Electronic Numerical Integrator and Computer) was the first Computer introduced in the year 1946. This is the first General purpose computer.

Teacher: Information is a form of processed data.

Siva: What is software and hardware, Sir?

Teacher: The commands or programs that are used in computer are called Software. This software can be divided into two types.

1. Operating software
2. Application software.

Nancy: What is Operating Software?

Teacher: Software that is used to operate the computer is called operating software. I think you are familiar with Windows and Linux

Teacher: Application software is a software that is used to run a particular program. For example, the software used for painting, playing games in computer.

Nancy: Oh! I have learnt much information about computers today sir!.

Malar: Ok Sir, then what is hardware?

Teacher: The parts that are available in the computer that helps the software to works is a hardware.

Salim: Sir, please tell us more about it

Teacher: Yes, sure I will. Whatever we want to send to a computer is sent through a device called input device. For example, the keyboard, mouse and other input devices.

The data or information that has been sent to the computer are displayed out or reproduced through some devices these are called as output devices. For example, printer, monitor and so on.

Nancy: Ok Sir, then what is CPU?

Teacher: It is the central processing unit. You will learn and understand more about CPU in your higher classes.

All Children together: Thank you so much, Sir. Today we have learnt and understood more information about

GLOSSARY

B66TVT

computers.

1.	Abacus (அபாகஸ்)	-	மணிச் சட்டம்
2.	Computer (கம்ப்யூட்டர்)	-	கணினி
3.	Architecture	-	கட்டமைப்பு, வடிவமைப்பு
4.	Command	-	கட்டளை
5.	Calculator	-	கணிப்பான், கணக்கிடும் கருவி
6.	Cell Phone, Mobile (செல்போன்)	-	கைபேசி, அலைபேசி
7.	Tablet (டேப்லட்)	-	கைக்கணினி, வரைப்பட்டிகை
8.	Data	-	தரவு, முறைப்படுத்தபட வேண்டிய விவரங்கள்
9.	Information	-	தகவல், முறைப்படுத்தப்பட்ட விவரங்கள்
10.	Electronic Machine	-	மின்னணுஇயந்திரம், மின்சாரத்தால் இயங்கும் இயந்திரம்
11.	Analog Computer (அனலாக் கம்ப்யூட்டர்)	-	குறியீட்டுஎண்களைப் பயன்படுத்தி கணக்கிடும் கருவி
12.	Smart Phone (ஸ்மார்ட் போன்)	-	திறன் பேசி
13.	Post Office	-	தபால் நிலையம்
14.	Automated Teller Machine (ATM)	-	தானியங்கி பண எந்திரம்
15.	keyboard	-	விசைப்பலகை
16.	Software	-	மென்பொருள்
17.	Hardware	-	வன்பொருள்
18.	Printer	-	அச்சுப் பொறி
19.	Mouse	-	சுட்டி
20.	Program	-	நிரல்
21.	Programmer	-	நிரலர்

Evaluation

I. Choose the Correct answer:

1. Who is the father of computer?
   a. Martin Luther King
   b. Graham Bell
   c. Charlie Chaplin
   d. Charles Babbage
2. Which of the following is another form of computer?
   a. Blackboard b. Mobile
   c. Radio d. Book
3. When was the first computer introduced?
   a. 1980 b. 1947 c. 1946 d. 1985
4. Who is the computer's first programmer?
   a. Lady Wellington
   b. Augusta ado Lovelace
   c. Mary Curie
   d. Mary Comb
5. Pick out the odd one.
   a. Calculator b. Abacus
   c. Flash card d. Laptop

II. Fill in the blanks:

1. Data is _____ information.
2. World's first general purpose computer is _____
3. Information is _____ data.
4. Fifth generation computer has _____ intelligence
5. _____ is the device that uses Index number.

III. State True or False:

1. Computer is an Electronic device.
2. Sir Isaac Newton invented Computer.
3. Computer can do calculations fast.

IV. Match the following:

First generation Computer	-	Artificial Intelligence
Second generation Computer	-	Integrated Circuit
Third generation Computer	-	Vacuum tubes
Fourth generation Computer	-	Transistor
Fifth generation computer	-	Micro processor

V. Answer the following:

1. What is a Computer?
2. Who are the pioneers/ forerunners of computer?
3. Write a short note on Data.
4. Name any four input devices.
5. Differentiate Hardware and Software.

VI. Answer in detail:

1. Explain in detail the Applications of computer.

B6FPXG

Scientific Terms

Measuring Tape	-	அளவு நாடா
Stop clock	-	நிறுத்துக் கடிகாரம்
Measuring Jar	-	அளவுசாடி
Unit	-	அலகு
Parallax Error	-	இடமாறு தோற்றப்பிழை
Mass	-	நிறை
Weight	-	எடை
Animate Factors	-	உயிருள்ள காரணி
Inanimate Factors	-	உயிரற்ற காரணி
Contact Forces	-	தொடு விசைகள்
Non-Contact Forces	-	தொடா விசைகள்
Linear Motion	-	நேர்கோட்டு இயக்கம்
Curvilinear Motion	-	வளைவுப்பாதை இயக்கம்
Circular Motion	-	வட்டப்பாதை இயக்கம்
Rotatory Motion	-	சுழற்சி இயக்கம்
Oscillatory Motion	-	அலைவு இயக்கம்
Zigzag (Irregular) Motion	-	ஒழுங்கற்ற இயக்கம்
Average Speed	-	சராசரி வேகம்
Periodic Motion	-	கால ஒழுங்கு இயக்கம்
Non-Periodic Motion	-	கால ஒழுங்கற்ற இயக்கம்
Uniform Motion	-	சீரான இயக்கம்
Non-Uniform Motion	-	சீரற்ற இயக்கம்
Artificial Intelligence	-	செயற்கை நுண்ணறிவு
Nano robotics	-	நானோஎந்திரனியல்
Diffusion	-	விரவுதல், பரவுதல்
Liquefaction	-	நீர்ம்மாக்கல்
Compressible	-	அழுத்தப்படக்கூடிய
Unadulterated	-	கலப்படம் அற்ற
Components	-	பகுதிப்பொருட்கள்
Proportion	-	விகிதம்
Extraction	-	பிரித்தெடுத்தல்
Strainer	-	வடிகட்டி
Churning	-	கடைதல்
Threshing	-	கதிரடித்தல்
Winnowing	-	தூற்றுதல்
Sedimentation	-	படியவைத்தல்
Decantation	-	தெளியவைத்து இறுத்தல்
Filtrate	-	வடிநீர்
Reaction	-	மீள் வினை
Non-Reaction	-	மீளா வினை
Dissolution	-	கரைத்தல்
Sublimation	-	பதங்கமாதல்
Melting	-	உருகுதல்
Vaporization	-	ஆவியாக்குதல்
Condensation	-	ஆவி சுருங்கல்
Freezing	-	உறைதல்
Terminal bud	-	நுனி மொட்டு
Auxiliary buds	-	கோண மொட்டு
Nodes	-	இலைக் கணு
Tendril	-	கொடிகளின்தளிரிழை, பற்றுக்கம்பி
Twiners	-	தழுவுகொடி
Thorns	-	முள்
Adaptation	-	தகவமைப்பு
Bio diversity	-	பல்லுயிர்மை
Eco system	-	சூழியல் மண்டலம்
Migration	-	இடப்பெயர்வு
Abiotic community	-	உயிருள்ள சமூகம்
Biotic community	-	உயிரைச் சார்ந்தசமூகம்
Malnutrition	-	ஊட்டச்சத்து குறைவு
Deficiency diseases	-	குறைப்பாட்டு நோய்கள்
Hygiene	-	சுகாதாரம்
Personal Hygiene	-	தன் சுத்தம்

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