



SCIENCE

Standard Six

Term I

Note to the teacher...

As we present this revised edition of the Science Textbook, we would like to express our deepest gratitude to the learners and the teaching community for their enthusiastic responses.

In science some concepts could be subject to change from time to time as new theories and principles are constantly being evolved.

We have tried to present facts and concepts of science (both concrete and abstract) in a visually appealing manner without detracting from the content.

Activity based learning is now accepted as the basis of science education. These activities should be regarded as a means for open-ended investigation rather than for verification of principles/content given in the textbook are has been designed to facilitate low cost activities and experiments using locally available materials. With a view to streamlining the activities, we have now segregated them into three groups:

- I Do - activities to be done by an individual learner.
- We Do - activities to be done by a group of learners. and
- We Observe - activities to be demonstrated by the teacher.

The third group of activities have a higher degree of difficulty or require careful handling as it may involve dealing with chemicals, electricity etc.,

The “More to know” snippets in the text represents some unusual and interesting facts or information in which the students need not be examined.

The evaluation section is nothing but another space for learning in a different manner. As the focus is on understanding, rote learning is to be discouraged thoroughly. Application of learnt ideas, problem solving skills and critical thinking is to be encouraged. There could be scope for more than one answer to a question, which should be acknowledged always.

To facilitate further reference, books and websites have been suggested at the end of each lesson. Suggestions and constructive criticism are most welcome. Valuable suggestions will be duly incorporated.

- Authors

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Science is.....



Why does the sun appear only during the daytime? Why do stars glow only at night? Why do plants grow towards the sunlight even when they are kept in a room?

All the activities we undertake to search for answers to questions like **What?** **Why?** and **How?** is known as science.

Many of the things that we use in a day from brushing our teeth in the morning till we sleep under the fan at night are the gifts of science.

Physics is the branch of science that deals with measurement, motion, sound, light, electricity, electronics etc.

Chemistry deals with the study of materials, their characteristics (metallic, non-metallic, taste, odour, acidic, basic etc.) and uses.

The study of the micro-organisms, plants and animals is called **Biology**.

The branch of Biology that deals with herbs, shrubs, climbers and trees is called **Botany** and the study of animals is known as **Zoology**.

We have learnt in history that early men were nomads, wandering and hunting for food. Several thousands of years later, they settled down in one place and learnt to cultivate food crops on their own.



Paddy field



sugarcane field

Food Plants

We cultivate many crops like paddy, millet, ragi, maize, wheat, sugarcane, coconut and vegetables for food.

What are the vegetables that we buy when we visit a vegetable shop with our parents?

Those vegetables are a part of a plant, either a leaf or a stem or an unripe fruit.



vegetable farm



millet field



coconut grove



Activity 1

We list the food items obtained from the different parts of a plant.

Food item	Ingredients required	Plant part used
Sambar	thoor dhal, drumstick, chilli, curry leaf, turmeric powder	seed, unripe fruit, leaf, stem
Pepper rasam	_____	_____
Brinjal fry	_____	_____

In addition to vegetables, cereals, pulses, fruits, oils and spices are also obtained from plants. Food-based industries depend on plants. Plants are useful to us in many ways. They are used in the preparation of food items such as chips, pickle, food powder, jam etc.

Medicinal plants:

Plants are used not only as food, but also as medicines to cure many

More to know

50,000 to 75,000 tons of mango pulp has been exported to foreign countries from Krishnagiri district of Tamilnadu every year. This gives considerable income to the farmers. It also increases the income of the nation.



diseases. These medicines are obtained from plants.

The plants that have medicinal properties are known as **herbal plants**.

Mani visited his grandma's house during holidays. There, he bathed with his grandpa in the canal. He was affected with cold the next day. He thought that his grandpa would take him to the doctor. Instead, his grandma gave him herbal medicine for three days and to his surprise, he was cured of the cold completely.



- ☛ What herbal medicine would his grandma have given to Mani? Find it out from your grandma or elders at home and write about it.
- ☛ Know from your elders and write down the simple medicinal practices done at home to cure stomachache, headache and fever.

Nowadays, medicines are preferred throughout the world. To find out the medicinal values of plants researches are done worldwide .

From ancient days, plants are being used to cure several diseases in our country.

The herbal plants grow naturally in forests, mountains and hills and some are found in the road sides.

Let us learn some of the medicinal values of herbal plants.



Our ancestors opined, “Food is medicine”. If we add sufficient plants with medicinal values with our food, we can live healthily without diseases.

Uses of Herbal plants

**Pea egg plant
(Thuthuvalai)**

cures cold, cough



**Carry me seed
(Keezhanelli)**

cures jaundice



**Neem
(Vembhu)**

germicides, regulates body temperature and destroys intestinal worms.





cures mouth ulcer,
regulates body
temperature

Gooseberry
(Nelli)

Holy basil
(Thulasi)

cures cold, cough,
fever



increases sweating,
cures cough and fever

**Country
borage**
(Karpuravalli)

Sweet flag
(Vasambu)

cures abdominal
diseases



used as germicide
and cosmetic

Turmeric
(Manjal)

Veldt grape
(Pirandai)

increases appetite,
cures digestive
problem



cures
digestive disorders

Ginger
(Inji)

Pepper
(Milagu)

cures
throat infection



Let us collect the herbs in and around in our area and organise a herbal exhibition in our class room. Let us discuss with our peer students the name of the herbs, their medicinal value and part of the plants used as medicines.



We grow plants not only for food and medicine, but also for ornamentation, as construction materials and for other purposes.

Flowers and cosmetics

We all love beautiful flowers such as rose, lily, jasmine, etc. Flowers play a key role in the preparation of cosmetics like bathing soap, talcum powder, deodorant and perfumes.



SPICES

Many a time we wonder at the pleasant odour from the food we cook. What is the reason for this ? It is because of the spices that we add to it.

Spices are obtained from many parts of plants. By adding them to the food, the food gets good smell and colour.

Spices increase the amount of food eaten and the digestion rate. Many parts of plants such as leaves, stems and flowers are used as spices.



Some spices are also used as medicines. Dry ginger, mint and fenugreek are used as medicines for common cold, fever and stomach ache. Turmeric and clove are used as antibiotics and antiseptics.

Activity 2



Discuss with your parents or elders and fill up the following.

What are the ingredients needed to prepare dry ginger coffee?

Method of preparation

Uses



Kerala is known as the Spice Garden of India

Parts of the plants used as spices

Seed



Fenugreek (Vendayam)



Fennel (Sombu)



Mustard (kadugu)

Underground stem



Dry ginger (Sukku) / Ginger



Turmeric (Manjal)

Unripe fruit

Cardamom
(Elachi)

Fruit

Pepper
(Milagu)

Bark

Cinnamon
(pattai)

Leaves

Mint
(pudina)

Flower bud

Clove
(Krambu)

Underground stem

Ginger and turmeric are the stems of the plant found under the ground.
These stems do the function of food storage.

Chapter - 1

Fibre plants

The dress, the jute and the gunny bag we use are the products of fibre plants.

Our cotton dress is the gift from the cotton plant. Coir ropes are produced from the coconut fibre. Jute fibre is obtained from the plant Jute. It is used to make gunny bags. Apart from this, fibre plants are also used in making pillow, bed, mat and mattress. Fibres are also used to weave clothes, make nets and handicrafts.

There are many kinds of fibres. Fibres are classified based on the parts of the plants from which they are obtained.

Long, thin, strong strand obtained from plants is known as fibre.

Stem fibres

Plantain fibre and Jute are obtained from the stem of their plants.



Jute

Let us know:

Nowadays Jute is cultivated not only for fibre, but also for some other purposes. It is used in the preparation of bio-plastics since it has 85% of cellulose. Bio-plastics are biodegradable.

Leaf fibres

Fibres are obtained from the leaves of Aloevera and Pineapple. These are called as leaf fibres.



Aloevera



Pineapple

External fibres

Fibres obtained from the outer region of the seed are known as external fibres.

e.g. Cotton, Coconut, Silk cotton.

Activity 3



Write any ten products made by using fibres.

Plants in construction

Wood is used in building constructions and making furniture.





Activity 4

List the things made of wood in your house and find out from which tree these are made.

S.No.	Name of the item	Name of the tree
1.		
2.		
3.		
4.		
5.		



Teak: Construction material, furniture



Jack fruit
Construction material,
Fruits



Eucalyptus tree
Oil, paper



Mango tree
construction
materials, fruits

The part of the tree that is used for various construction purposes is called wood. The dark inner region of the stem is called **heartwood** and the outer region is called as **sapwood**.

Sapwood helps to conduct water in plants. Heartwood gives strength and rigidity to the plant. It is stronger than sapwood. Mostly heartwood is not infected by fungus, termite, borers. It is hard and resistant to fungus due to the presence of gum, latex, resin and oil. It is more lustrous and is used for building purposes. Sapwood is infected by fungus and termites.

Many trees grow in and around our place. Knowing about their uses will be more useful for our life.

GIFT OF NATURE - PLANTS

Herbs, shrubs and trees are inevitable for our life. Plants fulfil the basic needs such as food, clothing and shelter. Forests are necessary for getting rainfall. Trees purify the air.

Do you understand how harmful it is to destroy trees? Let us not stop with just learning about it, but get involved in constructive activities like



Silk cotton tree
Matchstick,
matchbox,
toys, bed, pillow



Coconut tree
Thatching
construction, tender
coconut, coconut



Mulberry tree
Tennis racket and
Hockey stick



Pine tree
Railway sleepers,
ship building

- ☛ creating gardens in the backyard and
- ☛ planting trees in the school campus.

Extended activities:

1. Do you know that a small garden can be formed near the window of your kitchen? Fill the bucket with soil and sow seeds of medicinal plants, greens, coriander and tomato. Water them regularly. Thus, a small garden can be formed in your house. Now share your gardening experience in the classroom.

2. In countries like Japan, Russia and Cuba, vegetables are cultivated on the open terrace. Like this, you can also get benefited by forming garden on the open terrace of your school or house and cultivate pumpkin, snake gourd, tomato and bitter gourd.



Willow tree: Sports
materials, Cricket bat



Babul bark tree
(Karuvelam tree) Parts
of bullock cart



Sandal tree :
Sandal, craft, furniture



Discuss in small groups and collect information and uses about herbs, shrubs, and trees found in your surroundings.



Plants	Name	Uses

Fact file

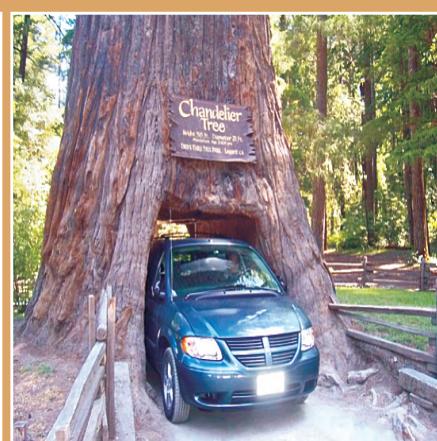
1. Thickest African tree found in Zimbabwe is **Boabab tree**.
2. Orange trees yield fruits for about 400 years.
3. **Rafflesia** produces the largest flowers. The diameter of the flower is one metre.
4. **Red wood tree** doesn't easily catch fire
5. From a watermelon, 6,00,000 watermelon plants can be produced and from them watermelon weighing 180 tonne can be obtained.



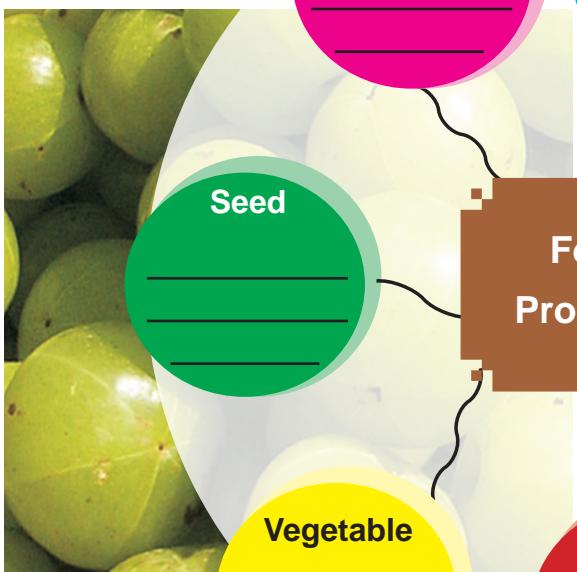
Rafflesia



Boabab tree



Redwood tree

I. Fill in the blanks:

Fruit

Leaf

Seed

Root

Vegetable

Flower

Stem

**Food
Products**



II. Rearrange the letters and find out the name of the plant.

(Eg: Ricturme-Turmeric)

1. finlagerdy's - _____
2. reeogosbry - _____
3. mutayhcrsnhem - _____
4. irragonefut - _____
5. werflouns - _____

III. Names of some useful plants are hidden in the following checker.

Find out at least ten plants and write their uses.

P	E	P	P	E	R	O	S	E	P	C	A	C	T	U	S
T	Q	M	U	L	B	E	R	R	Y	R	T	H	V	G	U
S	N	A	K	E	G	O	U	R	D	L	O	I	F	S	T
K	O	N	I	O	N	W	Z	N	0	K	M	P	I	N	E
E	U	C	A	L	Y	P	T	U	S	J	A	E	I	W	B
N	A	J	C	D	G	A	R	L	I	C	T	G	U	V	M
E	X	0	K	E	B	F	H	C	A	L	O	D	T	Q	L
E	N	P	B	R	I	N	J	A	L	P	M	A	N	G	O
M	B	K	L	M	N	0	B	A	N	A	N	A	Q	R	W
R	Z	M	A	Z	C	0	C	0	N	U	T	S	X	Y	R

IV. Choose the correct answer

1. Plants with medicinal value are called
 - a) pulses
 - b) scented plants
 - c) medicinal plants
 - d) barks
2. Of the following, which is the seed part of the plant used as food?
 - a) thoor dhal
 - b) veldt grape
 - c) banana
 - d) turmeric
3. Select the food-related industry from the following
 - a) coir making
 - b) gardening
 - c) cotton cultivation
 - d) pickle-making
4. Name the unripe fruit that we have to be consumed for blood purification.
 - a) gooseberry
 - b) neem
 - c) veldt grape
 - d) carry me seed

Chapter - 1

5. Name the tree used in paper industry.

- a) Teak b) Eucalyptus c) Coconut tree d) Sandalwood tree

V. Match the following:

Trees	Uses
Eucalyptus	Parts of bullock cart
Silk cotton	Railway sleepers
Coconut	Tennis racket and Hockey stick
Mulberry	Thatching, construction
Pine	Match box
Babul bark tree	Oil, papers

VI. State whether the following sentences are true or false. Correct the statement.

1. Purple fruited pea egg plant is used as medicine for jaundice.
2. Ginger is the root of the plant.
3. Veldt grape is a medicinal plant.
4. Clove is the seed of the plant.
5. Silk-cotton tree is used to make matchbox.

VII. Fill in the blanks

1. Carry me seed (Keezhanelli) cures _____ (Jaundice/Anaemia)
2. Pepper cures _____ (Throat infection / Stomach ache)
3. _____ are used in the preparation of cosmetics. (Flowers / Herbs)
4. _____ used as gemicide and cosmetic. (Turmeric /Neem)
5. _____ State is known as Garden of Spices of India.
(Kerala / Tamilnadu)
6. Jute fibre is obtained from the _____ of plant.
(Stem / Leaf)
7. The soft, outer region of the stem is called as _____
(Sap wood / Heart wood)
8. _____ wood is used for building purposes.
(Sap wood / Heart wood)



9. Fibres obtained from the outer region of the cotton, coconut are known as _____ (External fibres / Leaf fibres)
10. _____ cures mouth ulcer(Gooseberry/ Holy Basil)

VIII. Answer the following

- What is the reason for the scent / odour in bathing soap and perfume?
- Write about the plants and parts of the plant from which coir ropes, and gunny bags are made.
- Where do medicinal plants grow?
- Name the plants that yield cooking oil.
- Write down the benefits of adding spices in food.
- Differentiate between heartwood and sapwood.

IX. Think and answer



- How will you explain to a foreign tourist about any five medicinal plants of our country?
- "Trees should not be cut off", but we cut and use trees for our various needs. What is the solution to this contradiction?
- Only heartwood is used to make furniture. Is it correct? Give reason?

X. Project: Some places are very popular for their products, like Tanjore for Paddy, Madurai for Jasmine and Kumbakonam for Betel leaves. Refer the books and write such famous places known for their products.

FURTHER REFERENCE



Webliography:

- <http://en.wikipedia.org/wiki/food>
<http://www.moomilk.com/tour.htm>

FOOD HABITS

2

We know about the cartoon hero Popeye, don't we? In this story, Popeye, the sailor is lean and weak. But his opponent Brutus is stout and strong. Popeye is often beaten up by him.

Later on Popeye consumes spinach. It gives him immense strength and that's all, his opponent Brutus is defeated.

This cartoon story illustrates the importance of greens like spinach. It is true, that the food we consume must be nutritious.



I'm Popeye;
you can watch me
on Television cartoons,
Video games, Advertisements
and Films.

Obese person may appear stronger. But, he may not be really healthy.

Chewing Gum which contains artificial sugar and colour does not provide any nutrient.

Food items like noodles, contaminated roadside food with artificial flavour and chemicals, tinned and fast food are harmful to our health. Therefore it is good to avoid these food items.

Let us learn about healthy food items and unhealthy food items.



**Substances
that provide nutrients
for the body
are called food.**

Activity 1

List the food items that you consume in the following space provided.

Morning _____

Afternoon_____

Night_____



What are the various sources of food?

Food items obtained from plants and animals:

The root, stem, leaf, flower, vegetable, fruit and seed of the plants are used as food. Different food items like milk, egg and meat are obtained from animals.

Activity 2

List the food items obtained from plants and animals in the following table

Food items obtained from plants	Food items obtained from animals

Nutrients

The constituents of the food which are essential for the body are called nutrients. Does a food contain more than one nutrient? Do you know any food without nutrients? Why do we need nutrients?

Types of Nutrient

- Carbohydrates - Provide energy
- Proteins - Help in growth
- Fats - Provide energy
- Vitamins - Help in physiological activities
- Minerals - Act as regulators in physiological activities
- Water - Transports food, regulates body temperature.

Activity 3

Take a cucumber. Cut it into small slices. Water oozes out while cutting it! Why?

All vegetables, fruits and food items contain water in different proportion.

Chapter - 2

Water content in vegetables, fruits and food items:

Name of the food	Water content
Water melon	99%
Cucumber	95%
Mushroom	92%
Milk	87%
Potato	75%
Egg	73%
A bread slice	25%

Let us know

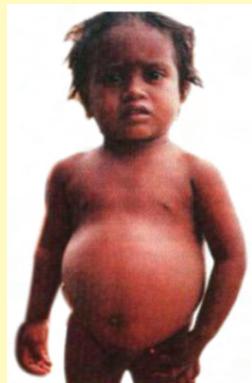
- ▶ Vitamins will be lost when vegetables and fruits are washed after cutting.
- ▶ Adequate amount of vitamins and minerals are present in the peels of fruits and vegetables.
- ▶ We lose vitamins and minerals in cereals and pulses by washing it several times.

Deficiency Diseases:

Diseases caused due to the deficiency of nutrients in food that we eat are called deficiency diseases.

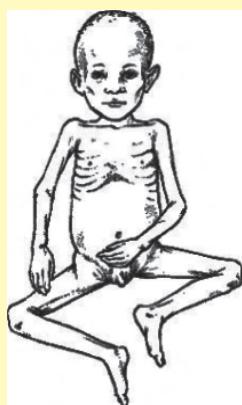
Deficiency diseases and their symptoms

Nutrient : Protein
Food source: Fish, meat, egg(albumin), milk, peas, cereals
Deficiency disease(1) : Kwashiorkar (children from 1-5 age)
Symptoms: retarded growth, potbelly, swollen limbs.



Kwashiorkar

Nutrient : Protein
Food source: Fish, meat, egg(albumin), milk, peas, cereals
Deficiency disease(2) : Marasmus
Symptoms: Thin limbs, weak appearance, enlarged head, loss of weight, retarded physical and mental growth.



Marasmus



Vitamins

Nutrient	Food source:	Deficiency disease	Symptoms
Vitamin A	Fish liver oil, egg, milk, ghee, butter, carrot, corn, yellow fruits, greens.	Night blindness	Defective vision, blindness in dim light
Vitamin B	Whole grains, pulses, unpolished rice, milk, fish, meat, peas, gram, raw vegetables	Beri-beri	Unhealthy nerve, muscle fatigue
Vitamin C	Orange, lemon, gooseberry, green chillies, tomato.	Scurvy	Bleeding gums
Vitamin D	Fish-liver oil, milk, egg. It is also synthesised by the skin with the help of sunlight.	Rickets	Weak and bow bones
Vitamin E	Vegetable oils, green vegetables, whole wheat, Mango, Apple, Greens	Infertility	Sterility and reduction of immunity
Vitamin K	Green vegetables, Tomato, Cabbage, Egg, Milk and milk products.	Haemorrhage (blood does not clot)	Loss of excessive blood even for a small wound

Minerals

Calcium	Milk, Fish, Wheat, Green Gram	Disintegration of bones and teeth	Weak bones and teeth.
Iron	Meat, Apple, Greens, Dates	Anaemia	Body fatigue, Giddiness.
Iodine	Milk, Iodized Salt, Prawn, Crab	Goitre	Inflammation in neck



Scurvy



Goitre

We can avoid diseases caused by deficiency by consuming nutritious food

Balanced Diet

A food that contains all the nutrients in the right proportion is a balanced diet. The following table shows the nutrients present in different food items.

S.No	Food category	Nutrients present
1.	Cereals: Rice, Wheat, Ragi (Finger millet) Bajra (Pearl millet), Sorghum, Corn, Barley, Rye	Carbohydrate, protein, a small amount of lipid, vitamin B, folic acid, iron, fibre.
2.	Pulses: Red gram, Black gram, Green gram, Horse gram, Bengal gram, Chick pea, Pea, Soya beans, Country beans etc.,	High protein content, a small amount of lipid, vitamin B, folic acid, iron, fibre
3.	Milk and meat products: Milk, Ghee, Curd, Yogurt, Skimmed milk,	Protein, lipid, vitamin B, calcium
	Chicken, Liver, Fish, Egg, Mutton.	Protein, lipid, vitamin B
4.	Fruits and Vegetables: Mango, Guava, Tomato, Papaya, Orange, Water melon, Sweet lime, Grapes	Carotenoid, vitamin A, vitamin C, Iron, calcium
	Gooseberry, Greens, Drumstick leaves, Coriander, Lettuce, Spring onion.	A small amount of lipid, carotenoid, vitamin B ₂ , folic acid, calcium, iron, fibre
	Carrot, Brinjal, Lady's finger, Capsicum, Country bean, Onion, Drumstick, Cauliflower.	Carotenoid, folic acid, calcium, Iron fibre.
5.	Ghee, Oils: Butter, Ghee, Vanaspathi, Cooking oils like Groundnut oil, Coconut oil, Gingelly oil.	Lipid, Essential fatty acids
6.	Sugar, Jaggery	Carbohydrate, iron.



Let us know

Jaggery provides more benefits to the body than sugar

I will get a balanced diet in a meal when I consume one food item from each category of the shown table.

Activity 4

Let each student write the name of any one of the grains, pulses, fruits, vegetables, tubers and dry seeds. Then they shall be divided into small groups for discussion. Each group shall find

- ☛ the nutrients present in these substances.
- ☛ whether the food substances written by the students in the small groups, make up a balanced diet?
- ☛ whether the same quantity and same type of food be suitable for all age group?
- ☛ whether it is possible to get a balanced diet at a minimum cost?

Nutrition is the mode of intake of food

Nutrition:

How do living organisms get energy from these food substances? Ingestion, digestion, absorption and assimilation are the various stages of nutrition. Organisms consume both solid and liquid food substances by various methods.

Types of nutrition

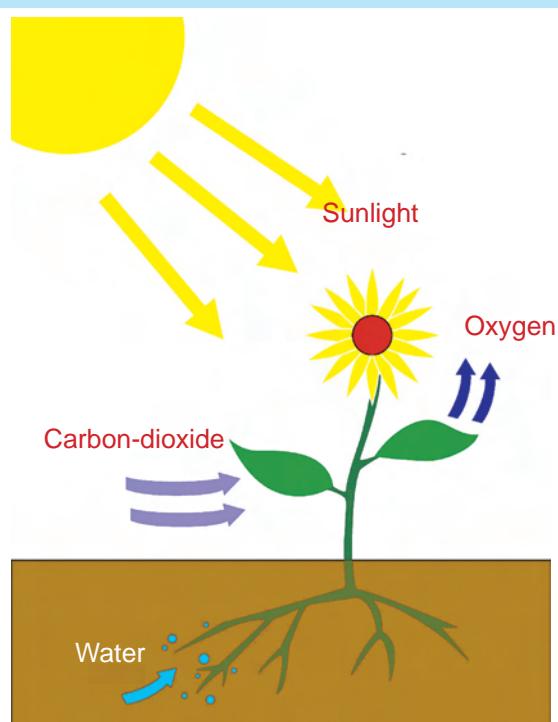
1. Autotrophic nutrition

Mode of nutrition in which an organism prepares its own food is called autotrophic nutrition. E.g.: Green plants, Euglena. They prepare their own food by photosynthesis.

2. Heterotrophic nutrition

The mode of nutrition in which an organism depends on other organisms for food as they cannot prepare their own food is called heterotrophic nutrition.

Preparation of starch (sugar) by the plants with the help of sunlight, carbon-dioxide, water and chlorophyll is photosynthesis.



Types of Heterotrophic nutrition

Parasitic nutrition:

The mode of nutrition in which an organism depends on another living organism for its food and survival is called **parasitic nutrition**.

The plant **Cuscuta** depends on other plants for food. It is an example for parasitic nutrition.



Cuscuta

Scientific Name :

Cuscuta reflexia

Local Name:

Ammaiyaar koonthal/Sadathaari/
Thanga kodi

Types of parasites:

Organisms like headlouse, leech, etc. are found attached to the outer surface of the body of other living organisms (host) and get nourishment from the host. These are called Ectoparasites.

Animals based on nutrition:

Animals that feed only on plants are called **herbivores**. e.g. goat, cattle.

Animals that feed on other animals are called **carnivores**. e.g. tiger.

Animals that feed on both plants and animals are called **omnivores**. e.g. crow.

Endoparasites:

Roundworm lives inside the intestine of animals and human beings and derives food from it. So it is an endoparasite.

Saprophytic nutrition:

In saprophytic nutrition, the organism decomposes the dead plant and animal substances and converts them into simple molecules and absorbs them through their body wall. E.g. Mushroom.

Discuss with your teacher how do the non-green plants and animals get their food.

3. Special type of nutrition

Plants like Nepenthes, Drosera, and Utricularia are green in colour and are autotrophic. They are found in nitrogen deficient soil. They trap insects and assimilate them to get nitrogen from them. So they are called insectivorous plants.



Drosera



Activity 5

Can you write the names of animals that you know under their mode of nutrition?

Herbivore	Carnivore	Omnivore
deer	lion	cockroach

Activity 6

We participate in a class discussion about the following ways to prevent heart diseases / attack.

1. To be happy.
2. To maintain the body weight according to the height of the individual.
3. To participate in games and practice proper exercises.
4. To avoid deep fried food items.
5. To avoid tobacco products in any form.
6. To eat fruits and vegetables more.

Which is a good food?

We have to maintain our organs in a good condition to lead a healthy life for a long time. It is based on the choice of food we consume.

It is important to keep our internal organs like heart, kidney, lungs, etc. healthy. Participating in games and exercises are important for this.

Junk foods and fried items should be avoided. Instead, food items

containing protein and fibre, like peas, cabbage and greens should be added daily.

Eating steamed fish items and brinjal rich in ascorbic acid, prevent heart diseases.

We have to take equal quantities of vegetables along with our food like rice, wheat, bajra(kambu), maize, ragi etc. Fruits should also be included in our diet.

Chapter - 2

Extended activity

In the given table list the food items that you like and dislike in your diet that you take everyday.

The food I like

Name of the food	Nutrients	Benefit

The food I dislike

Name of the food	Nutrients	Loss

Form small groups and discuss the content you have filled in the table

Think for a few seconds

You might have observed a variety of food items that are served in wedding feasts and parties.

- Are the people consuming all the food items or wasting them?
- Is wasting the food correct ?
- What is the reason for wasting the food items?
- What are the remedial measures you would suggest to avoid wastage of food ?

Activity 7

- I list the food items that I had been eating for the past 4 days.
- I learn about the food category present in the food items I had eaten.
- I learn about the balanced diet and make the following changes in my food habit.
 1. To avoid aerated drinks.
 2. To eat more vegetables and fruits.
 3. To eat variety of grains.

I compare my list with the ‘Balanced food chart’



Activity 8

Observe and Learn

- I learn about my Body Mass Index.(BMI)
- I measure my height in metre by using the scale drawn by the teacher on the wall of my classroom. I also measure my body weight in Kg.
- I use the formula of BMI

$$\text{BMI} = \text{Weight in Kg} / \text{Height}^2$$
- By using the BMI formula, I have calculated my Body Mass Index.
 for example = $35 / 130^2 = 20.7$

Body Mass Index table

BMI value	Remarks
Below 20	Underweight
20 - 24.9	Ideal weight
25 - 29.9	Overweight
above 30	Obesity

I compare the calculated BMI with the Table Value. I participate in a classroom discussion about the 'Right Food Habits' to maintain my ideal body weight. I have learnt about the need of maintenance of body weight (relevant) relative to my height.

"Health is Wealth"

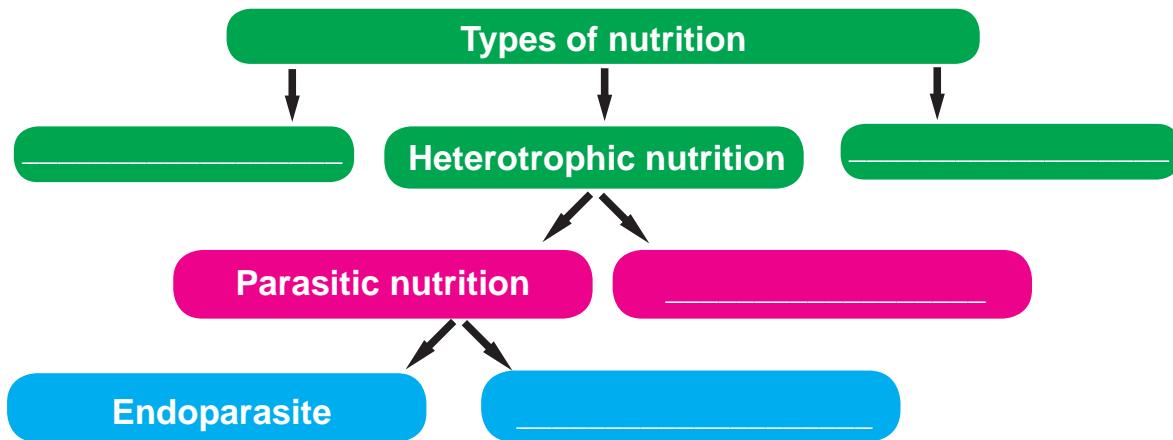
EVALUATION

I. Fill in the blanks:

1. Disease caused due to protein deficiency is _____
 (Marasmus/Night blindness)
2. Deficiency of Vitamin C causes _____ (Scurvy/Rickets)
3. _____ is an omnivore. (Crow/Goat)
4. Milk is rich in _____. (calcium/iron)
5. _____ regulate the physiological activities. (Proteins/Minerals)
6. _____ is used to strengthen the bone. (Calcium/Iron)
7. _____ is saprophytic in nutrition. (Euglena/Mushroom)
8. Anaemia is caused due to the deficiency of _____
 (iron/protein)
9. _____ is synthesized by the skin with the help of sunlight.
 (Vitamin B / Vitamin D)

10. Rickets is a _____ deficiency disease. (Vitamin A / Vitamin D)

II. Fill in the blanks:



III. Think and answer:

1. Observe the following picture.

Mahesh! You've become so fat like a bloated balloon because you drink softdrinks while watching TV.
Come... let's eat this mango and play.

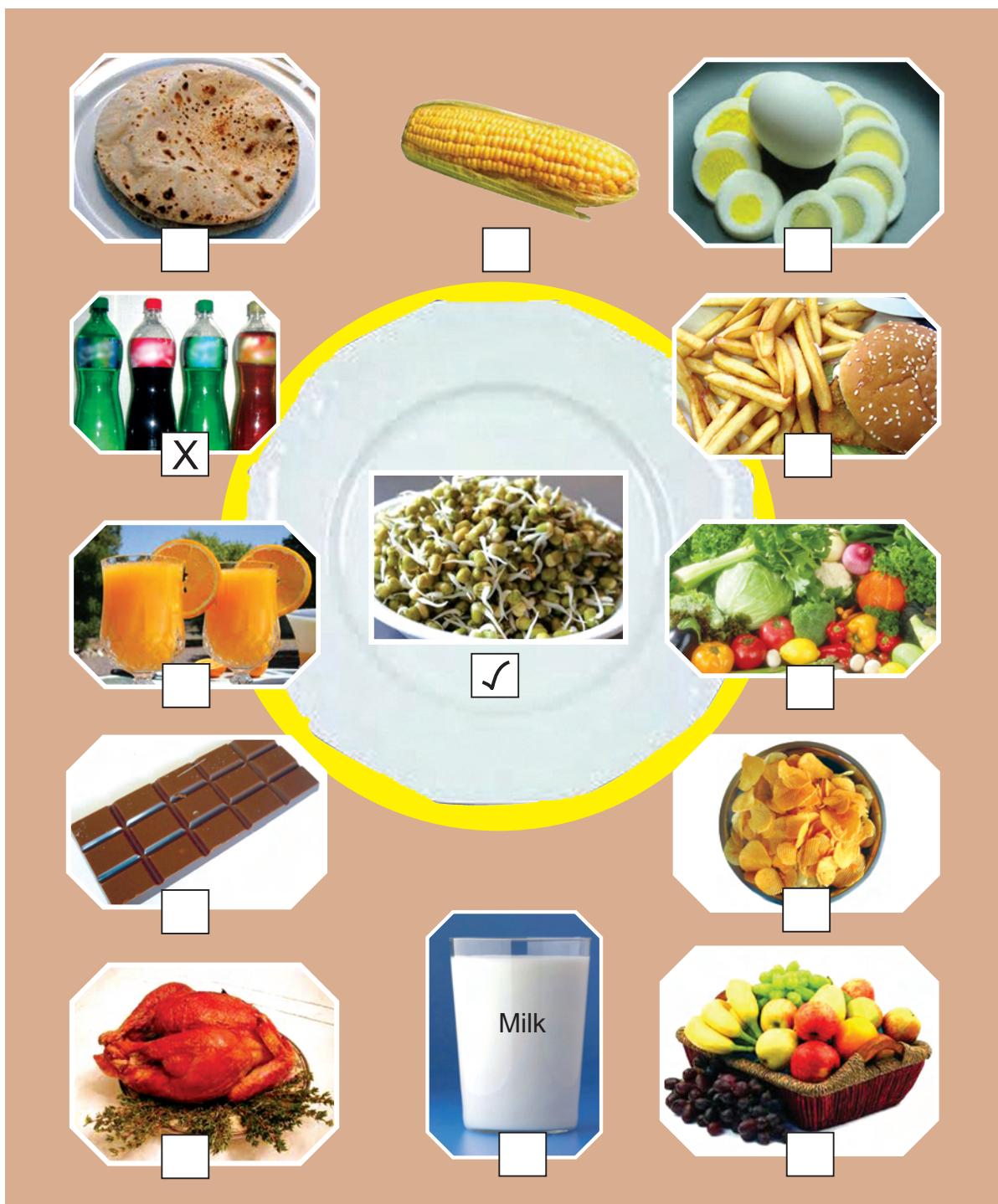
No...no..... I 'm not coming
Suresh; I don't like to play.I'll get fever if I play.



- Among the two, whose attitude is correct? Why?
- Which of the following activities will lead us to have a healthy and long life?
 - ▶ including more vegetables and fruits in the diet.
 - ▶ waking up early in the morning.
 - ▶ watching television till late night.
 - ▶ eating more fast food.
 - ▶ playing games like cricket, swimming and football.



2. Mala had inflamed and bleeding gums. Mala's mother was frightened and took her to the doctor. What would the doctor have said as a reason for this disease? What kind of food the doctor would have prescribed to Mala?
3. Should we wash the fruits and vegetables before cutting them or after cutting them? Give reasons for your answer.
4. Few food items are placed on the table. Arthy wanted to select and eat the food which is rich in nutrients and healthy. You can help her, too.



IV. Answer the following questions:

1. What are nutrients?
2. Mention the different kinds of nutrients and their functions.
3. Why do a few plants feed on insects?
4. What kind of food should be taken to prevent night blindness?
5. What is a balanced diet?

Let us know

- We should avoid intake of artificially coloured sweets like kesari and cotton candy. The chemicals added in it are harmful to us.
- When you eat food, chew and taste it. Avoid eating food while watching TV or talking as you may eat more. This leads to obesity and causes many other diseases.
- Vegetables and greens should be taken raw or half-boiled. By doing this, we can avoid the loss of nutrients in them.
- Eating leftover food preserved in the refrigerator leads to health disorders.
- Consuming bottled drinks, packed chips, fried food items, etc. sold in shops is harmful to our health.

FURTHER REFERENCE



Webliography:

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<http://www.diethealthclub.com>





Kalpana Chawla

Kalpana Chawla was the first Indian born American woman who travelled to space in the space shuttle Columbia. This is an excerpt from the interview given by her in the year 1997 when she returned from space.

Interviewer : How did you feel when you flew in the spacecraft? What were the changes you felt in your body?

Kalpana Chawla :- At first, I felt all parts of my body losing weight. When this transformation overpowered me, I could not feel any part of my body. As the spaceshuttle hurled at high speed, a kind of fear went down my spine. Before I could say, "Look at India" I was crossing it. The Gangetic Plains appeared to be a thin line, Africa looked like a desert and the river Nile appeared to be a thin vein on it. In about an hour and a half I revolved around the earth. I observed with wonder as the day

and night changed very fast. I went round the whole world within one and a half hour. The moon, moving away from me, waned and waxed and then appeared and disappeared. I felt shocked and overjoyed at the same time. All these things happened in a very short span of time.

How do you feel when you read her statements? Isn't it wonderful? The slow and natural changes that take place on earth seem to take place at a fast rate when we travel in space.

Shall we look at the changes that happen around us? That is, the seasonal changes, occurrence of day and night due to the rotation of the earth, curdling of milk, ripening of fruit, cooking of food, rusting of iron etc.

In this lesson, let us learn about the different types of changes that occur.

Chapter - 3

Look at the pictures given below and discuss in groups about the changes taking place.



Fill in the blanks with the given hints.

1. The _____ and _____ of the child have increased.
2. The _____ changes during day and night .
3. The _____ and the _____ change when a mango ripens.

(Hints: temperature, weight, taste, height, colour)

Hence changes in colour, temperature, place, shape and size of the substances are considered as changes.

Slow and Fast Changes

Activity 1

Discuss in small groups about the time duration for the changes to take place.



Changes	Duration (few hours/ days/ weeks/months/ years)
Growth of a child	_____
Rusting of iron	_____
Germination of a seed	_____
Cooking of food	_____
Curdling of milk	_____

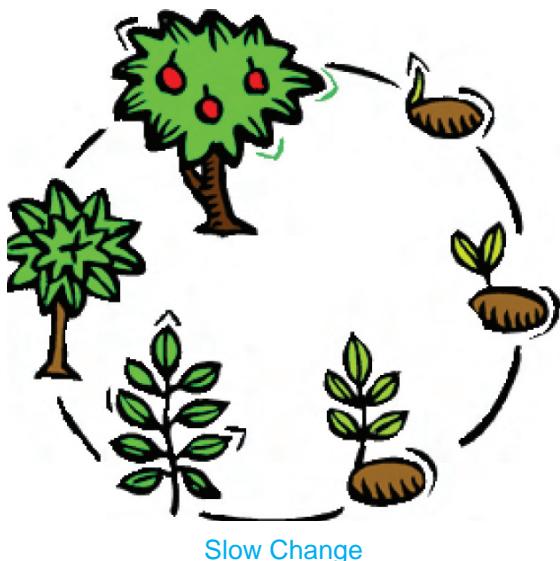
My Inference: All changes take place in _____ (the same/different) time duration.



Changes that take place in a few hours, days, months or years are called slow changes.

Burning a piece of paper, firing crackers, glowing of an electric bulb take place in a few seconds or minutes. don't they?

The changes that take place in a short duration of time are called **fast changes**.

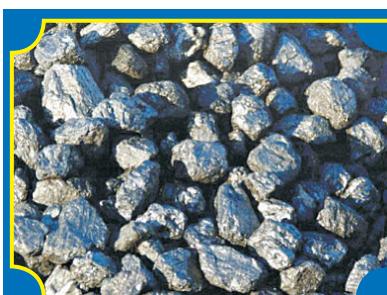


Activity 2

List some examples for fast change and slow change

Fast change _____

Slow change _____



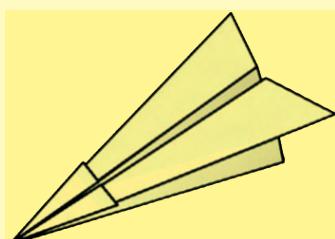
Let us know

Trees which got buried under the earth nearly 30 crore years ago had undergone many changes and turned into coal.

Reversible and Irreversible Changes

Activity 3

Take a piece of paper and make a model of rocket as shown in the picture. Shall we unfold it after playing? Can you get back the same piece of paper? What do you infer?



Activity 4

Take a balloon and inflate it by blowing air. After sometime release the air from it. Does the balloon get back its original shape?

What do you infer? _____



Inflate the same balloon and tie it using a thread. Pierce it with a pin. Can you inflate the balloon again?

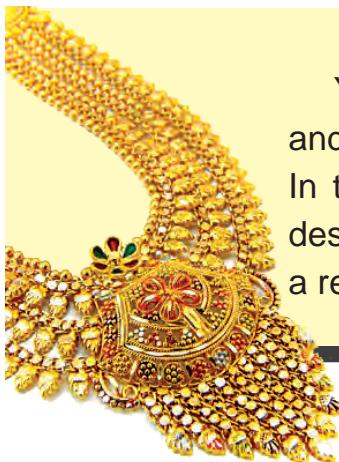
What do you infer? _____

Can we get back the green vegetables from the cooked ones? The batter from Idly or dosa? Raw rice from cooked rice?

Is it possible to get back the original substances in the above changes ?
_____. (Yes/No)

In some changes, the substance can be brought back to its original state. Such changes are called reversible change.

The change in which the substance cannot be converted back into its original form is called irreversible change.

**Let us know**

You would have seen some hard metals like gold, silver, and iron being used to make ornaments and instruments. In this process, metals are heated, melted and cast into desired shapes. On cooling they become hard. This is also a reversible change.



I have seen workers laying road using a black substance(Tar). Is melting of tar a reversible change? or an irreversible change?



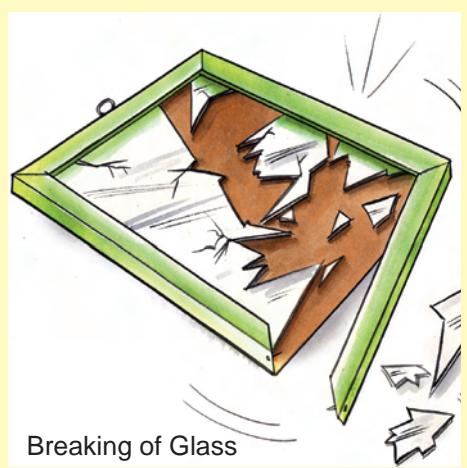
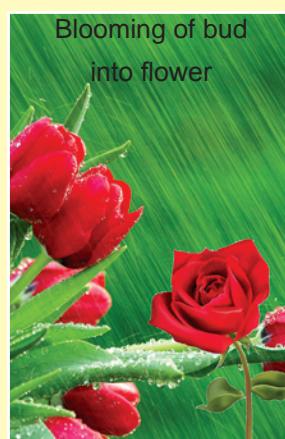


Shall we classify the following changes?

Reversible change		Irreversible change
Melting of ice	1. Curdling of milk 2. Melting of ice 3. Burning of wood 4. Batter into Idly 5. Evaporation of water 6. Greying of hair	<hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

Desirable and Undesirable Changes:

Are all changes that take place around us useful? Look at the pictures and write whether the changes are useful to us or not.



Changes like raining, ripening of fruits, blooming of flowers, etc. are useful to us. Such useful changes are called **desirable changes**. Changes like spoiling of food, eruption of volcano, rusting of iron, breaking of glass are not liked by us, as they are harmful and not useful to us. Changes which are not useful to us are called **undesirable changes**.

Periodic and Non-Periodic Changes

Look at the calendar (monthly) and complete the tabular column;



Month	New Moon (Date /Day)	Full Moon (Date /Day)

How many days are there between a new moon day and a full moon day?

Do the new moon and full moon occur at regular intervals?

We understand that the new moon and full moon occur at regular intervals. Hence the changes that occur at regular intervals are called periodic changes.

More examples for Periodic Changes

Pendulum of a clock



Phases of Moon



Day and Night



Look at the pictures given below.

Can you predict when will these changes happen?
Will they take place at regular intervals?



Eruption of volcano



Earthquake



Land slide



Accident

We cannot predict how and when the above given changes will occur. So, the changes that do not occur at regular intervals are called non-periodic changes.

Let us learn the differences between the periodic and non-periodic changes.

S.No.	Periodic changes	Non-periodic changes.
1.	Occur at regular intervals.	Do not occur at regular intervals.
2.	Can be predicted e.g. weather.	Cannot be predicted e.g. earthquake.

Exothermic and Endothermic Changes

Do the following activities and record your inference in the table.

Activity 5

- Take a small amount of detergent powder in your palm and add water to it. How do you feel?
- Take a small amount of quicklime in a beaker and add water to it. Touch the beaker. How do you feel?



Chapter - 3

3. Take a small amount of glucose in a beaker and add water to it. Now touch the beaker. How do you feel?
4. Take a small amount of water in a beaker. Add Ammonium Chloride salt and stir it. Touch the beaker. How do you feel?

Experiment No.	My inference
1.	
2.	
3.	
4.	

From the above activities we find that in some cases heat is liberated while in others heat is absorbed. Changes in which heat is liberated are called exothermic changes. E.g .burning of a matchstick, dissolution of detergent or washing soda in water.

Changes in which heat is absorbed are called endothermic changes.

E.g. Dissolution of glucose or ammonium chloride in water.



Let us know

An invention from Nature



We can create new things by closely observing the Nature .

Invention of **Velcro** by George Mestral in the year 1948 is a right example for this.

George Mestral used to go for a walk with his pet dog daily. One day he found that some seeds were hooked on his clothes and on the fur of his dog. He observed these seeds under a microscope and found some hooklike structures on them. Based on this he tried to create a new thing.

This led him to the invention of Velcro. It has tiny hooks which can attach to the objects. Today Velcro is widely used in bags, footwear and clothes.



Extended Activities

Activity 1

Using a thermometer measure the temperature of your classroom from morning till evening and record in the tabular column. Know the changes in temperature.

Day	Temperature		
	Morning	Noon	Evening
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

Activity 2

1. Mention the months during which we have summer season in our state.

2. During which months do we have winter season?

3. During which months do we have rainy season?

4. Do we get the above seasons during the same months every year?

5. Under what type of change do you classify these seasonal changes?

Activity 3

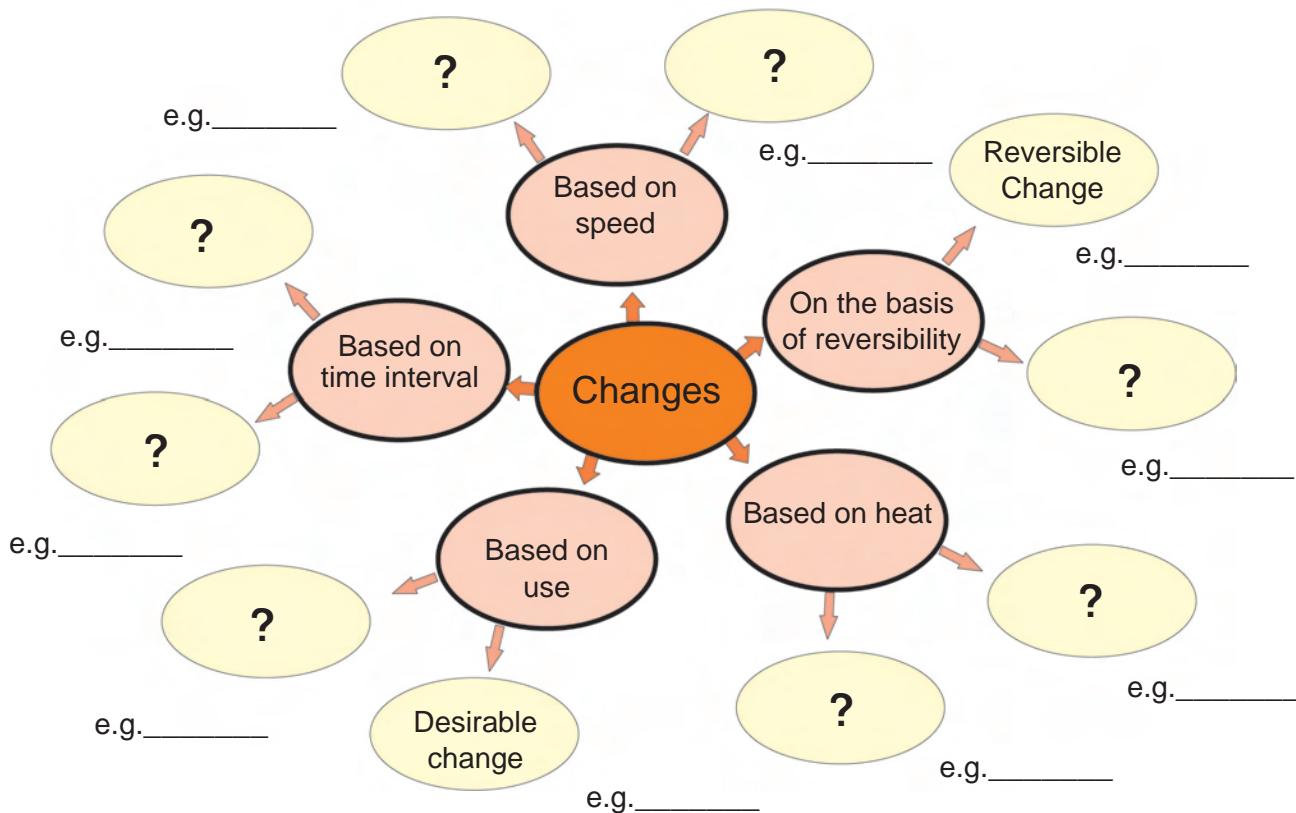
Select two students from each class of your school and record their age, height, and weight. See the changes in their height, weight with the increase in their age.

Activity 4

Have you seen potmaking? The potter is making the pot by heating wet clay. When can you get back the wet clay from the pot? (before heating / after heating) Discuss in small groups and find the changes that take place in this process.

Evaluation

I. Fill in the blanks and question marks:



II. Choose the correct answer

1. Release of the compressed spring is _____
 - a) an irreversible change
 - b) a reversible change
 - c) a non-periodic change
 - d) an undesirable change

2. Spoilage of food is _____
 - a) a reversible change
 - b) a fast change
 - c) an undesirable change
 - d) a periodic change

3. Dissolution of washing soda in water is _____
 - a) an exothermic change
 - b) an irreversible change
 - c) an undesirable change
 - d) an endothermic change

4. Which of the following changes is non-periodic?
 - a) heartbeat
 - b) earthquake
 - c) occurrence of day and night
 - d) oscillation of pendulum



III. Identify the changes in the following

- | | |
|---|-------------------|
| a) Tsunami | b) Swinging |
| c) Occurrence of New Moon and Full Moon | d) Melting of wax |

IV. Answer the following

1. Give five examples for desirable and undesirable changes.
2. What type of change is an earthquake? Why?
3. What is meant by slow change?
4. What is an irreversible change? Give example.
5. Differentiate the following
 - a. Exothermic and Endothermic change
 - b. Periodic and Non-periodic change

**V. Reason out the following questions**

1. You have broken your favourite toy. Can you mend it ? What type of change does this belong to?
2. Meena and Nisha were about to have their lunch in their school. Nisha was not able to eat her lunch as her food was stale and spoiled. So Meena shared her food with Nisha . In the above situation, what kind of change is spoilage of food?
3. Mention any five changes that take place in your kitchen. Identify the kind of changes each belong to
e.g. Preparation of chapathi - Slow change, desirable change, irreversible change.
4. The pencil and eraser that you use become smaller in size after a few days. Why? What are the different types of changes that occur?
5. Based on the changes differentiate a paper boat made by folding and a paper boat by cutting.

FURTHER REFERENCE**Webliography:**

www.simplescience.net

<http://www.bbc.co.uk/school/scienceclips/ages/10-11/rev-irrev-changes.htm>

<http://www.learnnext.com/class6/science/changes-around-us.htm>

Measurement

On a holiday Ezhil went to market with his father. First they went to a grocer's shop. Ezhil's father asked for the following.

Rice - 10 kg

Bengal gram - 500 gm

Groundnut oil - 2 litres

Ghee - 200 millilitres

The shopkeeper used a balance for measuring rice and bengal gram. He measured oil and ghee with a measuring jar.

They went to a flower shop and bought 5 cubits of garland. Then they went to a textile showroom and selected a shirt material and asked for 2 metres. The salesman measured 2 metres of the cloth with a metre scale and gave them.

Then, they went to a vegetable shop and asked for the following vegetables.

Ladies' finger - 1kg

Green chillies - 100gm

Onions - 2kg

The shopkeeper weighed the vegetables with the help of a balance.

After buying the vegetables they went to a fruit stall and asked for a dozen bananas. The shopkeeper counted and gave them 12 bananas. After getting them, they returned home.

Ezhil had a doubt and asked his father, " Whenever an item is bought why it is asked for in a different way?" His father said, " Go and prepare a list of the things that we bought and the instruments that were used to measure them. I will clear your doubts." Ezhil got ready to prepare the list. Shall we also help him?



Electronic balance



Balance



Activity 1

Item	Quantity	Measuring Instrument

Activity 2

What are the instruments used to measure the following?
Discuss in small groups and write them down.



1. Shirt material
2. Sugar
3. Cooking oil
4. Tomatoes
5. Length of your science textbook
6. Time taken to reach school
7. Kerosene
8. Duration of Maths period

From the above activities, we have learnt that measuring instruments like metre scale, balance, clock, measuring jar, etc. are necessary for measuring different items.

What is measurement?

Now, shall we measure the length of our classroom cupboard using a metre scale? Have you measured the length? If it is 2 metres then **2 is the magnitude** and **metre is the unit of length**. Metre is a known constant (accepted) quantity but the quantity 2 is to be determined. Here the length of the cupboard is two times length of 1 metre.

In the same way, can we measure the mass of your schoolbag using a balance? If it is 3 kilograms, here **3 is**

magnitude which has to be determined and **kilogram is the unit of mass**. Kilogram is a known constant quantity. That is, the mass of the bag is 3 times the mass of 1 kilogram.

Similarly, if it takes 20 minutes to reach your school from home, here **20 is the magnitude** which has to be determined and **minute is the unit of time**. Minute is a known constant quantity. That is, the time to reach the school from home is 20 times the constant time unit 1 minute.

Measurement is a process of comparison of an unknown quantity with a standard (accepted) quantity of the same kind. The known constant quantity is called **Unit**. Here metre, kilogram and minute are units.

The need for Standard Unit



Activity 3

With your friends measure the length of the table in your classroom in terms of hand span. Fill up the following table.

Name of the Student	The number of hand span measured
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____



From the above activity we observe that though the same table is measured by different students, each student gets a different value. It is because the length of hand span differs from person to person. That is why there is a difference in the measurement of the length of garland in cubit by you and the shopkeeper.

Shall we individually measure the length of the same table by a metre scale? All of us get the same value. What do we infer from this?

Any measurement that gives the same value for all is called **Standard measurement**. The units which are used in **Standard measurement** are called **Standard units**. Therefore, we infer that cubit, hand span, etc. are not standard units. **Metre, kilogram and second are standard units**. Now shall we learn about fundamental quantities?



Fundamental quantities

Length, Mass and Time are called **fundamental quantities**, because they can not be expressed in terms of any other physical quantity. The units which are used to measure the fundamental quantities are called **fundamental units**.

SI Units

(System International Units)

In different parts of the world different system of units for measuring length, mass and time were in use. A few systems of units are

1. **FPS system**(Foot, Pound, Second)
2. **CGS system**(Centimetre, Gram, Second)
3. **MKS system**(Metre, Kilogram, Second)

In order to overcome the difficulties of using different systems of units, an International system was adopted in

1960. This was accepted by scientists all over the world.

This system is called SI units. Shall we know the SI units of length, mass and time?

Physical quantity	SI Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s

Measurement of length

Draw a straight line in your notebook. Plot two points A and B on the line.

Measure the distance between the two points using a scale. What you have measured now is length. **The distance between two points is called length.** The SI unit of length is metre. To measure length we use measuring tape, metre scale etc.



Activity 4

We shall measure the length of the following and write them with appropriate units.

Length of your pencil _____

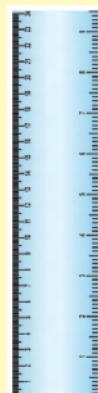
Length of your thumb _____

Length of your eraser _____

Length of a leaf _____

Length of your pen nib _____

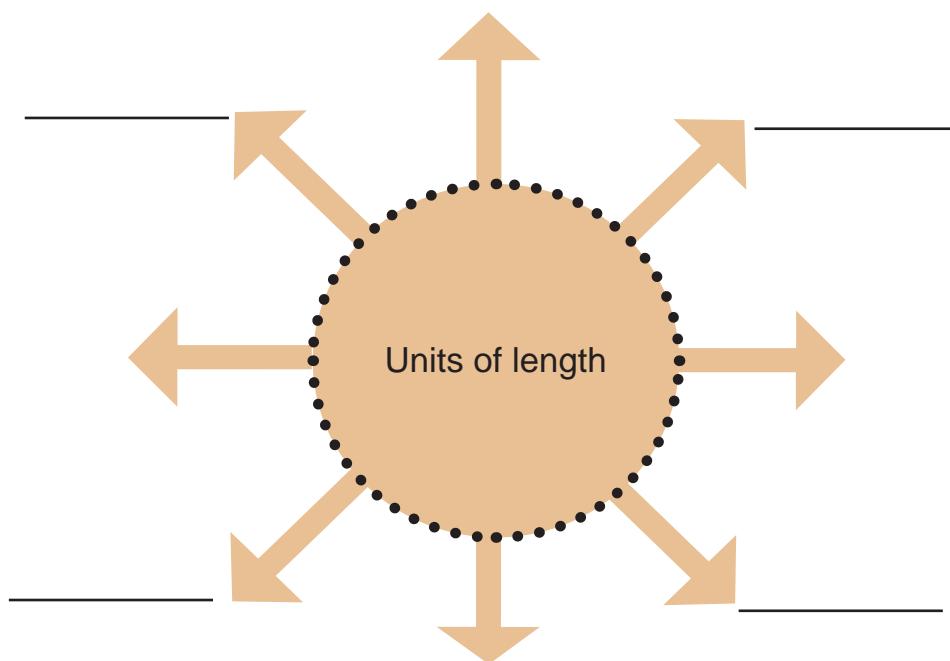
Length of the nail of your little finger _____



Know yourself

- Length of cloth required for stitching your shirt _____.
- Distance between your home and school _____.
- Distance of your neighbouring town from your home _____.
- Distance between Chennai and New Delhi _____.

Shall we write down the different units of length used in the above activity?



Multiples and submultiples of length

In the above activity, larger distances such as the distance between two places are expressed in **kilometre**. This is called multiple of length. We express smaller lengths such as length of a pencil, pen nib etc. in **centimetre** and **millimetre**. These are called submultiples.

Physical quantity	SI unit	Multiples	Submultiples
Length	metre	kilometre	millimetre, centimetre

Measurement of mass

Activity 5

Have you ever been to a market? How do the merchants measure rice, pulses, vegetables etc.? What instrument do they use to measure? In what units do they measure? Why do they not use the units millimetre and centimetre in measuring rice, pulses, vegetables etc.? Discuss with your friends and find out the answer.



$$1 \text{ metre} = 1000 \text{ millimetres}$$

$$1 \text{ metre} = 100 \text{ centimetres}$$

$$1 \text{ kilometre} = 1000 \text{ metres}$$



From the above activity we have learnt that all quantities are not measured by the same unit. Different units are used for measuring different quantities.

Activity 6

Among the three, a handful of rice, a handful of sand and a handful of cotton, which one is the heaviest?

Sand is the heaviest because the amount of matter contained in sand is more than the amount of matter contained in rice and cotton.

The mass of a body is the amount of matter contained in it. The SI unit of mass is kilogram. We use beam balance, physical balance and electronic balance for measuring mass.

Multiples and submultiples of mass

We use units quintal and metric tonne to measure larger quantities of sugarcane bundles, cotton bales, etc. Similarly, we use units gram and milligram to measure smaller quantities of gold, silver, spices, etc. These are called multiples and submultiples of mass.



Physical balance

Activity 7

Carefully observe the wrapper of the following items and write down masses mentioned on it.

Mass of toilet soap _____

Mass of a packet of tea _____

Mass of a biscuit packet _____



Know yourself

The quantity of rice purchased per month at home_____.

The quantity of vegetables used at home per day _____.

Physical quantity	SI unit	Multiples	Submultiples
Mass	kilogram	quintal, metric tonne	gram, milligram

1 gram	=	1000 milligrams
1 kilogram	=	1000 grams
1 quintal	=	100 kilograms
1 metric tonne	=	1000 kilograms



Measurement of time

We perform many activities in our daily life and many events also take place but the duration of each event / activity differs from one another.

Activity 8

Look at the following activities. Discuss in small groups and tabulate the events / activities according to their duration.



1. Time taken for bathing
2. Duration of sleep
3. Working hours of your school
4. Time taken to blink your eyes
5. Time taken for ripening of fruits
6. Time taken for a plant to grow into a tree
7. Time taken for curdling of milk
8. Time taken to weave a saree
9. Time interval between a new moon and a full moon
10. Duration between sowing the paddy until harvesting
11. Duration between the first term and the second term examination
12. Time of fall of a coconut from the tree



Events/activities occurring in seconds	Events/activities occurring in minutes	Events/activities occurring in hours	Events/activities occurring in days / months	Events/activities occurring in years



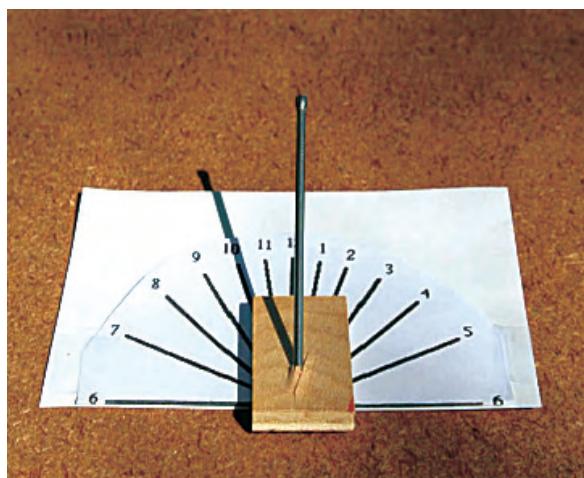
From the above events / activities, we have learnt that we use different units for measuring time.

Time is the interval between two events. The SI unit of time is **second**.

For measuring time we use pendulum clock, wristwatch, wall clock, stop clock etc. In olden days people used sundial, sand clock, water clock etc. For measuring time accurately we use atomic clock.

Multiples and submultiples of time

Larger time intervals are expressed in **minute, hour, day, week, month, year** etc. These are called multiples of time. Any time interval less than 1 second is expressed in **millisecond, microsecond** etc. These are called submultiples of time.



Physical quantity	SI unit	multiples	submultiples
Time	second	minute, hour, day, week, month, year	millisecond, microsecond



1 minute	= 60 seconds
1 hour	= 60 minutes
1 day	= 24 hours
1 year	= 365 1/4 days
1 second	= 1000 milliseconds
1 second	= 1000000 microseconds



Evaluation

I. Choose the correct answer.

1. SI unit of length is _____
 a) centimetre b) millimetre c) metre d) kilometre
2. The symbol for SI unit of mass is _____
 a) g b) kg c) mg d) cg
3. 1 metric tonne is equal to _____
 a) 1000 kilograms b) 100 kilograms c) 1 kilogram d) 10 kilograms
4. SI unit of time is _____
 a) second b) minute c) week d) day
5. 1 hour = _____ seconds.
 a) 60 b) 3600 c) 24 d) 1000

II. Fill in the blanks.

1. One metre = _____ centimetre
2. One kilometre = _____ metre
3. One quintal = _____ kilogram
4. One minute = _____ second

III. Match the following with the correct units

- | | | |
|-----------------------------------|---|------------|
| 1. Thickness of a five rupee coin | - | kilometre |
| 2. Breadth of a classroom | - | centimetre |
| 3. Distance between two places | - | millimetre |
| 4. Height of your friend | - | metre |

IV. Fill in the blanks with the correct answer.

1. The mass of gold is measured by the unit _____ (gram/metre)
2. Rice, sugar etc are measured by the unit _____ (milligram/kilogram)
3. Generally sugarcane is weighed by the unit _____ (tonne/gram)
4. The mass of the chemicals present in a tablet are expressed in the unit _____ (milligram/kilogram)



V. Arrange the following units in ascending order.

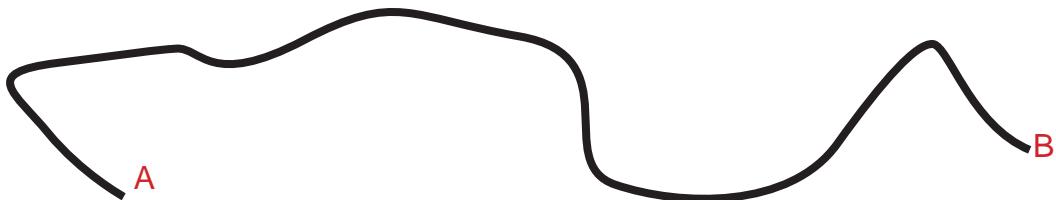
year, second, month, microsecond, hour, minute, week, millisecond.

VI. Find the answer



- 1) Ravi took 90 minutes to draw a picture. Kumar took 1 hour to draw the same picture. Who took more time to draw? How much more time did he take ?

2) Thread and metre scale are provided to you, using them try to measure the length of the given curved line AB.



VII. Answer the following questions

1. Define measurement and unit.
 2. What is the significance of standard units?
 3. What are fundamental quantities? Why are they called so?
 4. What are the SI units of length, mass, and time? Mention their symbols.
 5. Expand the following
 - (i) FPS
 - (ii) CGS
 - (iii) MKS
 - (iv) SI

Project

1. Measure the length and breadth of your classroom and write them in foot, hand span, centimetre and metre.
 2. Make a model of a sand clock using two ink bottles. With the model of the sand clock you have made,
 - a) using a clock find the time taken for the sand to completely flow down.
 - b) find your pulse rate with reference to your model.



Let us know

- The length of the largest sea animal, blue whale measures 30metres approximately.
 - Mass of the sun = 1.99×10^{30} kilograms
 - Mass of the earth = 5.98×10^{24} kilograms
(mass of the sun is 3,20,000 times heavier than the earth)

Motion

We observe many objects in our daily life. Some of them move from one place to another and some of them remain stationary.

Activity 1



On your way to school, observe your surroundings and classify the objects under

Objects in motion

Objects at rest

From the above activity we have learnt that some objects move and some remain stationary.

Can we find out whether an object is at rest or in motion only by observing them directly?

Activity 2



Do the earth, air etc. move ? If they move, how do we know it?
We may get more information through a small group discussion.

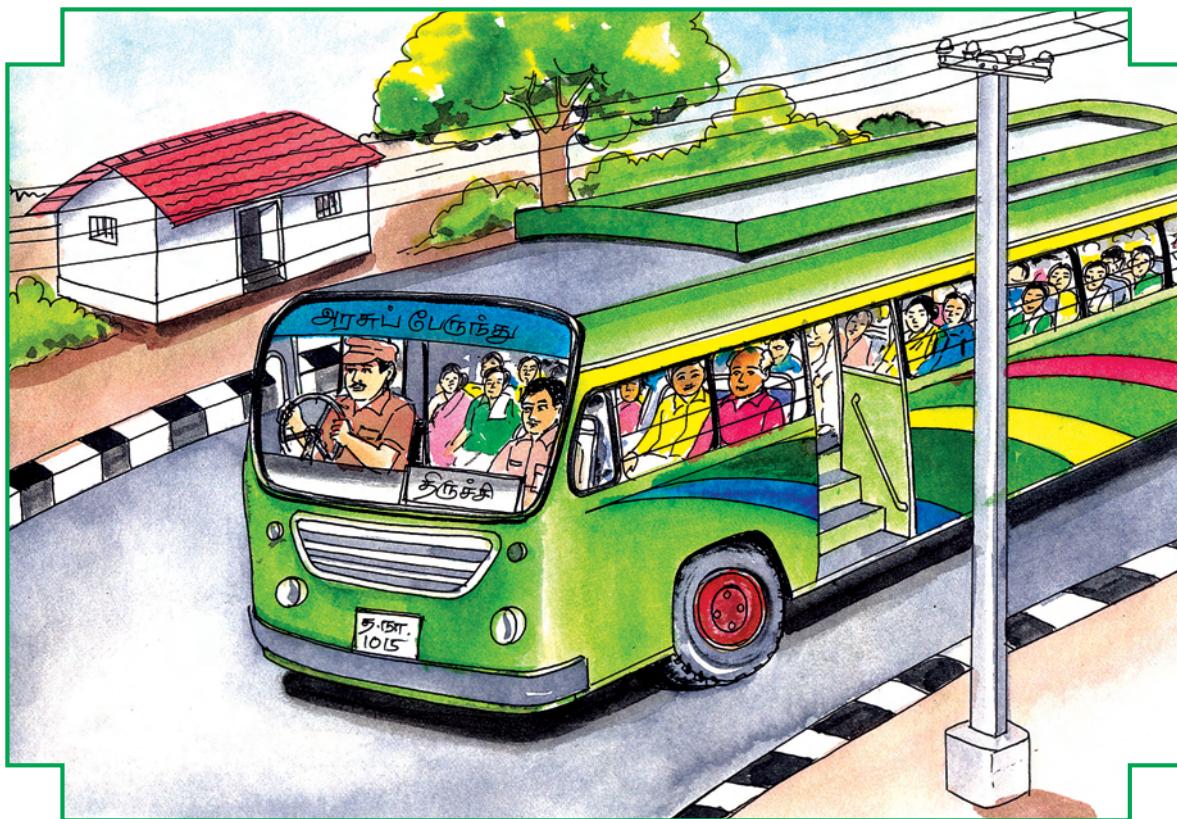
From the above discussion, we can actually observe that some objects change their position with time. In some cases, though we can not see the objects change their position, we come to know their motion from the effects they make.

If an object does not change its position with respect to time, it is said to be stationary or at rest.

If the object changes its position with respect to time then it is said to be in motion. Hence **motion is defined as the change of position of an object with respect to time.**



How do we differentiate rest and motion?



Have you travelled in a bus? When you look out from a moving bus, do the trees, houses, lamp posts appear to be stationary or in motion? Share your experience in small groups.

Akilan had two friends, Mugilan and Selvam. Akilan invited his friends to his town for a circus show. The three friends went to the circus and enjoyed themselves. Akilan returned home. His friends reached the bus terminus and got into a bus. The bus passed by Akilan's house. As Akilan was in the sit-out, he waved to his friends.

The next day when Akilan met his friends in school, he said, "When I was in the sit-out, I saw you in the moving bus".

Mukilan and Selvam said, "Yes, we both saw you sitting and waving. From the moving bus both you and your house appeared to be moving backwards".

What do we learn from this?

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**.

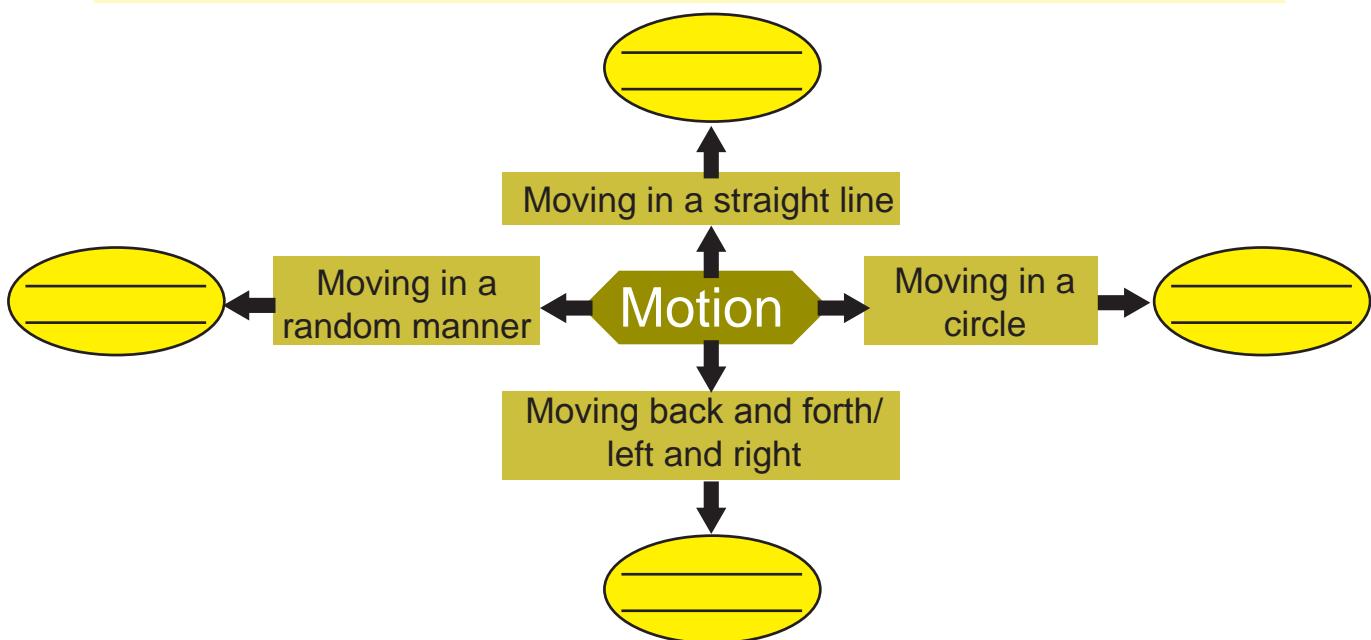
We have learnt about rest and motion. Now discuss in small groups and do this activity.

Activity 3

Are the following motions same or different type? Discuss in small groups and classify.

1. A sprinter running a 100 m race
2. A coconut falling from a tree
3. Marching of soldiers
4. The tip of hands of a clock
5. Movement of your hand when you write on a notebook
6. Revolution of the moon around the earth
7. The movement of a ball in a football match
8. Revolution of the earth around the sun
9. Children playing on a sliding board

10. Wagging tail of a dog
11. Children playing in a playground
12. Motion of flies and mosquitoes
13. Children playing in a swing
14. Flapping of elephant's ears
15. Movement of people in a bazaar
16. Motion of people on a carnival day
17. Motion of a spinning top
18. Motion of opening and closing of a draw



From the above activity, we have come to know that there are different types of motion.

Types of motion**Linear motion**

Did you observe the vehicle moving along a straight road and a coconut



falling from a tree? What type of path did they take during their motion? Likewise, **When an object moves along a straight line, it is said to be in**

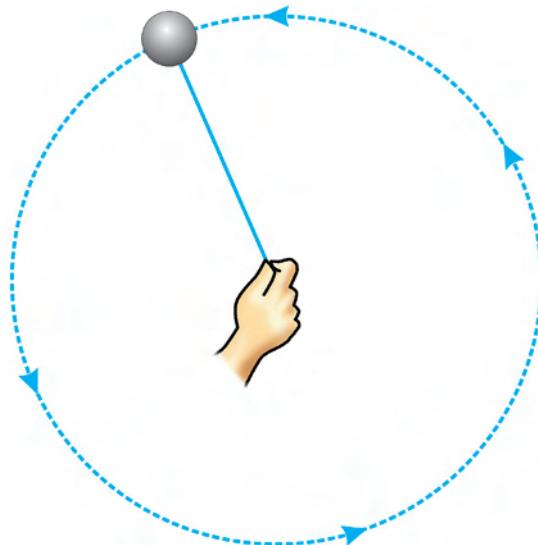


linear motion. Motion of a freely falling body and motion of a lift are examples for linear motion.

Circular motion

Take a stone, tie a thread to it and whirl it with your hand and observe the motion of the stone. The stone is moving along a circular path, isn't it? In this motion we can see, in any point in the circular path the distance of the stone from the centre of the circle (hand) remains the same, doesn't it?

Similarly, let us observe the motion of a child in the merry-go-round. Here also, the distance between the child and the centre of the merry-go-round



remains the same at any point of the circular path.

From this, it is clear that if an object moves along a circular path, it is said to be in **circular motion**. Motion of the tip of hands of a clock and a point marked on the blade of the fan are some more examples for circular motion.

Rotational Motion

If a body revolves about an axis, it is said to be in **rotational motion**.

Eg. Spinning top

Motion of a fan

Motion of a merry-go-round



Periodic motion

If an object repeats the same type of motion at regular intervals of time it is said to be in periodic motion.



Eg.

- ▶ Motion of a child in a swing.
- ▶ Motion of the pendulum in a wall clock.
- ▶ Motion of the string of veena while plucking
- ▶ Motion of the moon revolving around the earth
- ▶ Motion of the earth revolving around the sun



Random Motion

When an object moves at different speeds and in different directions, it is said to be in random motion.

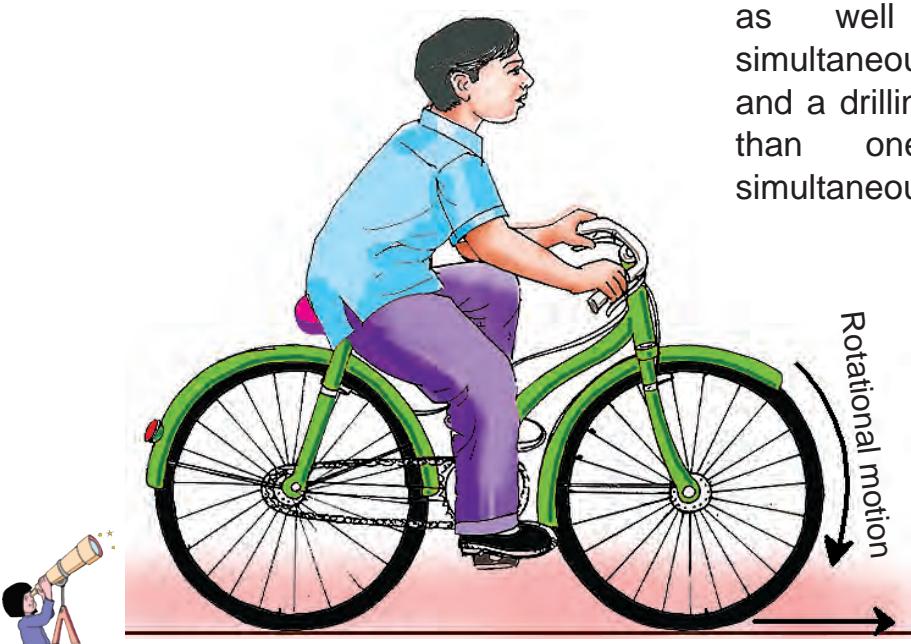
Eg. A fish swimming in a tank

The movement of a football during a game

Multiple Motion

Can a body perform more than one type of motion at a time? We ride a bicycle. What type of motion does the wheel perform? What type of forward motion does the cycle perform?

The motion of the wheels of a bicycle is rotational, whereas the motion of the bicycle is linear. The wheels of a bicycle perform rotational as well as linear motion simultaneously. Similarly, a rolling ball and a drilling machine perform more than one type of motion simultaneously.



Can you think of any other object performing more than one type of motion simultaneously? Explain.

Science Today

Robot

Issac Asimov invented robot. It is he who named the machine as robot (derived from Philippines language). Robot is a human machine. We programme (electronic signals) the robot to do the work we want it to do.

The machinery parts of robot follow and implement the commands already programmed. Robots are run by heavy batteries. Robot's brain is nothing but an electronic chip. The movements of robot are controlled by electronic chip or computer. Nowadays well designed robots are used for complicated and minute clinical surgeries. Very soon we may have robots in our homes to do household work.



Robot

How nice would it be to have a robot to do our homework?

Imagine and draw the various activities, a robot can do in your school.

EVALUATION

I. Choose the correct answer.

1. Movement of a branch of a tree in air is an example for _____
 a) Linear Motion b) Circular Motion
 c) Periodic Motion d) Rotational Motion
2. The motion of a rolling ball is _____ motion
 a) Circular b) Linear
 c) Rotational d) Multiple
3. When a bicycle is in motion, the mouth which is used to fill the air will perform _____
 a) Random motion b) Periodic motion
 c) Circular motion d) All of these

Chapter - 4

II. Look at the pictures and answer the following .



1. From the given pictures, identify objects which are,

In Motion 1. _____ 2. _____ 3. _____

At Rest 1. _____ 2. _____ 3. _____

2. Classify the following pictures based on the kind of motion. Among them identify the pictures which work on more than one kind of motion.



III. Fill in the blanks .

1. The movement of the needle in a sewing machine is _____
(linear motion, random motion)
2. The rotation of an object about an axis is _____
(linear, rotational motion)
3. Motion is defined as the change of _____ of an object with respect to time. (position, mass)

IV. Give reasons for the following.

1. Name the organ in your body which works in periodic motion.

2. Is there any difference between a child who rides on a merry-go-round and a child who takes part in a 50m race?



3. Name the types of motion possessed by children playing in a playground. Give reasons.
4. What is the name of the instrument in the given picture? Specify its uses. What type of motion does it perform while in operation?
5. You are given a thread with a spherical bob attached to its one end. How many different kinds of motion could you demonstrate with this?

V. Answer the following.

1. When do you say that an object is in motion?
2. Distinguish between linear motion and circular motion.
3. What is rotational motion? Give example.
4. What is periodic motion? Give example.



Do it yourself

Spread a large sheet of white paper on the ground and keep a little sugar on it. Ants are likely to be attracted to the sugar and you will find many ants crawling on the sheet of paper soon. For any one ant, try and make a small mark with a pencil near its position when it has just crawled on to the sheet of paper. Keep marking its position often a few seconds as it moves along on the sheet of paper. After some time, shake the paper free of the sugar and the ants, and connect the different points you have marked with arrows to show the direction in which the ant was moving. Each point you have marked shows where the ant moved to, in intervals of a few seconds.



Motion seems to be some kind of a change in the position of an object with time, isn't it?

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MAGNETISM

5

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



Why do the pins stick to the pin holder placed on headmaster's / headmistress's table?



Why does the door of the refrigerator get stuck automatically when it is very close to the refrigerator.



Because the magnets are attached to the pin-holder and the refrigerator.

Already we know that magnet attracts pins, iron pieces and iron particles in sand. Cranes are used to lift heavy iron loads. Powerful magnets are used in cranes.

Powerful electromagnets are used to operate electromagnetic trains, lifts and escalators.



How magnets were discovered? It is an interesting story.

There was a region called Asia Minor, where there was a town called Magnesia. It was full of mountains, rocks and plateaus. The only occupation for the people was grazing the cattle. There was a shepherd named **Magnes**. In those days there was no school in the town. So he went along with others to graze the cattle.



After leaving the cattle to graze in the plains, he used to sit and take rest on a big rock with his grazing stick. One day, as he was sitting on the rock he dozed off.

When he woke up, he found the iron-clad stick standing erect without any support. His nail-studded shoes were sticking to the rock. Magne thought that the rock was God. The whole town looked at this scene with wonder.

The people witnessed that the rock attracted not only his stick but also their iron-clad sticks. People came to know that there were many rocks with attracting property in several

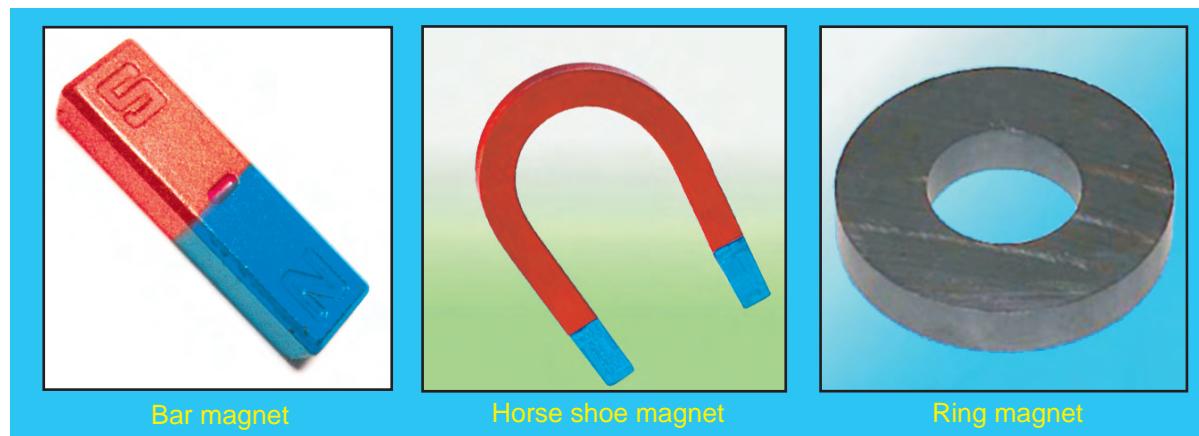
regions of the world. Even before that the Chinese made compass for their navigators by using these rocks with attractive property. As it was discovered by Magne, they called it Magnet and also Magnetite. Magnetite was the ore with attracting property found in that region.

Magnetites are **natural magnets**. They are called magnetic stones.

Natural magnets do not have a definite shape. When a magnet is freely suspended, it always comes to rest in north-south direction. That is why they are called **leading stones or lode stones**.

After learning the method of changing the piece of iron into magnet (magnetization) we have been making and using several kinds of magnet.

Such man-made magnets are called **artificial magnets**. Here some of the shapes of artificial magnets that we use in our daily life .



What type of substances are attracted by magnets?

Shall we find out whether pen cap, plain pins, pencil, blade, nail, chalk piece, iron ball, plastic scale, wooden scale and coin are attracted by magnet or not? Shall we discuss in small groups and list them?

Substances attracted by magnets	Substances not attracted by magnets

We understand that magnet attracts certain substances and do not attract some other substances.

Substances that are attracted by magnet are called **magnetic substances**.

Iron, cobalt, nickel are magnetic substances.

Substances that do not get attracted by magnet are called **non-magnetic substances**.

Paper, plastic are called non- magnetic substances.

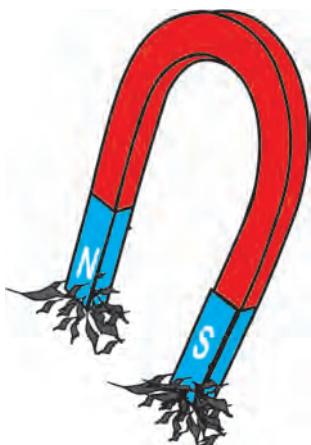
Does magnet have poles?

Of course, it is an interesting question. It is better to find it out by ourselves. To perform a simple experiment, it is sufficient to have iron filings and a magnet.

When some iron filings are spread on a sheet of paper and a bar magnet is placed over it, all the filings do not stick to the bar magnet uniformly, but we find more iron filings sticking to both ends of the magnet. Likewise,



more iron filings will stick to both ends of a horseshoe magnet.



The ends of a magnet have the strongest magnetic force. So most of the iron filings cling to the ends of the magnet. They are called **poles** of the magnet.

Which is north pole? Which is south pole?

The poles of a magnet are easily found by freely suspending the magnet as shown in the diagram.



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

North seeking pole is called north pole. South seeking pole is called south pole.

The **Magnetic compass** has been designed by using this directive property of the magnet.

Magnetic compass



A magnetic compass is a circular disc on which a small needle is pivoted at its centre. Different directions (North, South, East, and west) are marked on the compass. This needle can rotate freely and always point in the **north-south direction**.

The magnetic needle always rests in north-south direction. By using this magnetic compass we can find out different directions

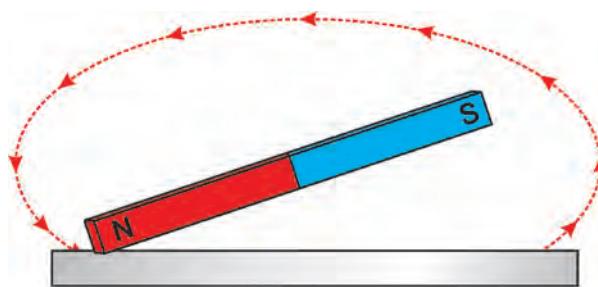
Shall we make our own magnet?

There are several methods of making artificial magnets. Let us learn the simplest one.

Take a nail / a piece of Iron and place it on a table.

Now take a bar magnet and place one of its poles near one edge of the nail / piece of Iron and rub from one end to another end without changing the direction of the pole of the magnet.

Repeat the process for 30 to 40 times.



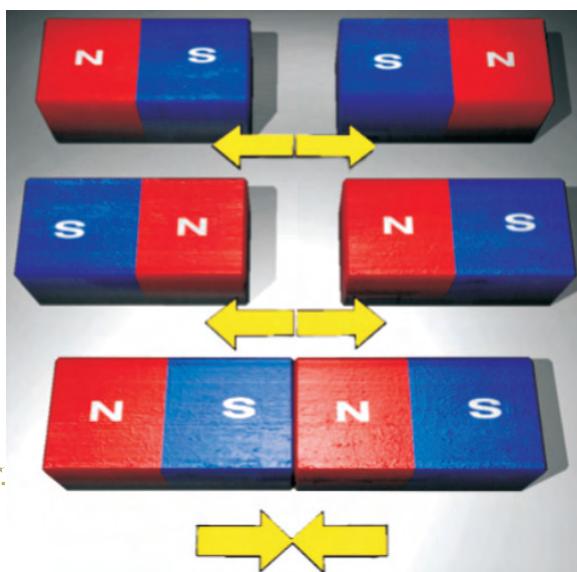
Bring a pin or some iron filings near a nail /a piece of Iron to check whether it has become a magnet. If not, continue the same process for some more time.

Shall we find out what happens when two magnets are brought closer? It is very easy to understand this.

Attraction? or repulsion ?

When we bring two north poles of two bar magnets closer as shown in the figure they move away from each other. Similarly when the south poles of two bar magnets are brought closer they too move away from each other.

When a north pole of one magnet and a south pole of another magnet



are brought closer, they pull towards each other.

Like poles repel each other.

Unlike poles attract each other.

Do magnets lose their properties ? When?

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

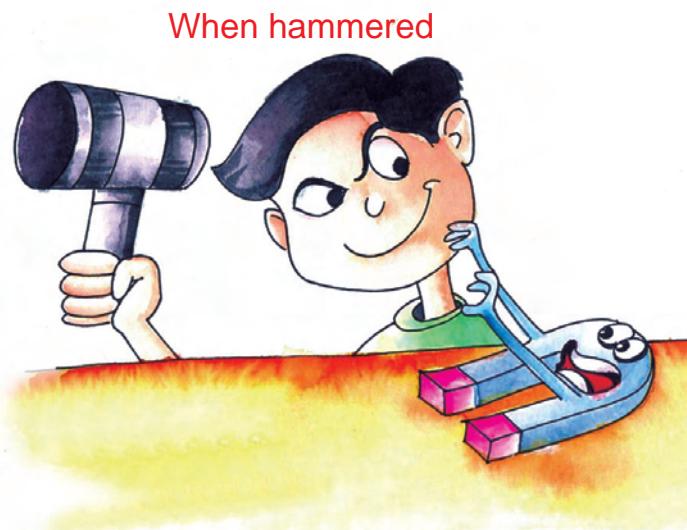
When heated



When dropped



Storage of magnets

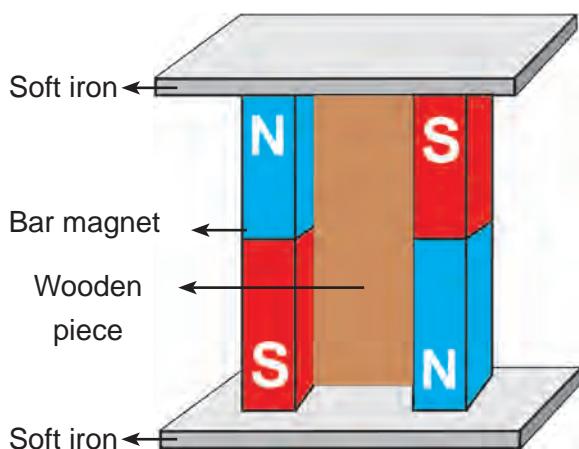


When hammered

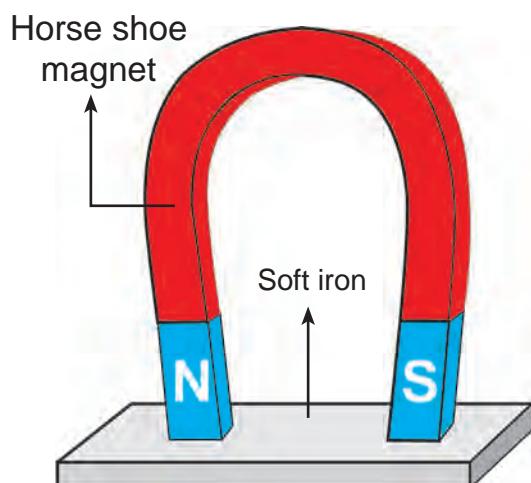
Improper storage can also cause magnets to lose their properties. To keep them safe, bar magnets should be kept in pairs with their unlike poles on the same side. They must be separated by a piece of wood and two pieces of soft iron should be placed across their ends.

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

Bar magnet



Horse shoe magnet



Let us know

Magnets lose their properties if we keep it near the cassettes, mobiles, televisions, compact disks and the computer. These materials may also get damaged.

Fact File

1. Electromagnets are used in giant wheels.
2. In 1600, English scientist William Gilbert proposed that earth behaves like a giant magnet.

Science today

Shall we learn about electromagnetic train?

Electromagnetic train is also called as suspension train. In France, it is called flying train. It does not require diesel or petrol.

The technology in which the property of magnetic attraction and repulsion used gave birth to super fast electromagnetic trains.

How does the electromagnetic train work?

Electromagnetic trains do not have wheels. Powerful electromagnets are attached to the bottom of the train as well as on the track. The north pole of the electromagnet on the track faces upwards and the north pole of the electromagnet on the train faces downwards. The north pole in the track repels the north pole on the train and levitates the train. The electric current that changes constantly allows a change in polarity of electromagnets. This change in polarity pushes and pulls the train.

Electromagnetic train runs faster than ordinary train. Another significance of electromagnetic train is that it does not make a noise. We can see electromagnetic train in Japan, China, France, Germany and America.



Electromagnetic train

Write any 5 differences between a train and an electromagnetic train. (First difference is given)

1. Electromagnetic trains do not have wheels, whereas ordinary trains have.

2. _____

3. _____

4. _____

5. _____



Evaluation

I. Choose the correct answer

1. It is a natural magnet
 - a) Bar magnet
 - b) Magnetite
 - c) Ring magnet
 - d) Horse-shoe magnet

2. An object that is attracted by magnet.
 - a) wooden piece
 - b) plain pins
 - c) eraser
 - d) a piece of paper

3. The people who made mariner's compass for the first time.
 - a) Indians
 - b) Europeans
 - c) Chinese
 - d) Egyptians

4. A freely suspended magnet always comes to rest in the _____ direction
 - a) North - east
 - b) South - west
 - c) East - west
 - d) North - south

5. Magnets lose their properties when they are
 - a) used
 - b) stored
 - c) hit with a hammer
 - d) cleaned

6. Mariner's compass is used to find the
 - a) speed
 - b) displacement
 - c) direction
 - d) motion

II. Circle the odd ones and give reasons .

1. Bar magnet, magnetite, ring magnet , horse- shoe magnet
2. Iron nail, pins, rubber tube , needle
3. Lift, escalator, electromagnetic train, electric bulb
4. Attraction, repulsion, pointing direction, illumination

III. Think and answer

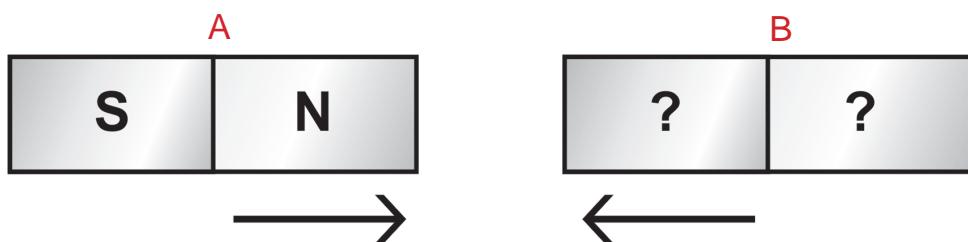
1. You are provided with a bar magnet without labelling the poles of the magnet and iron filings. Using this.
 - a) How will you identify the poles of the magnet?
 - b) Which part of the bar magnet attracts more iron filings? Why?

2. You are provided with an iron needle. How will you magnetize it ?



Chapter - 5

3. Two bar magnets are given in the figure A and B. By the property of attraction, identify the North pole and the South pole in the bar magnet (B)

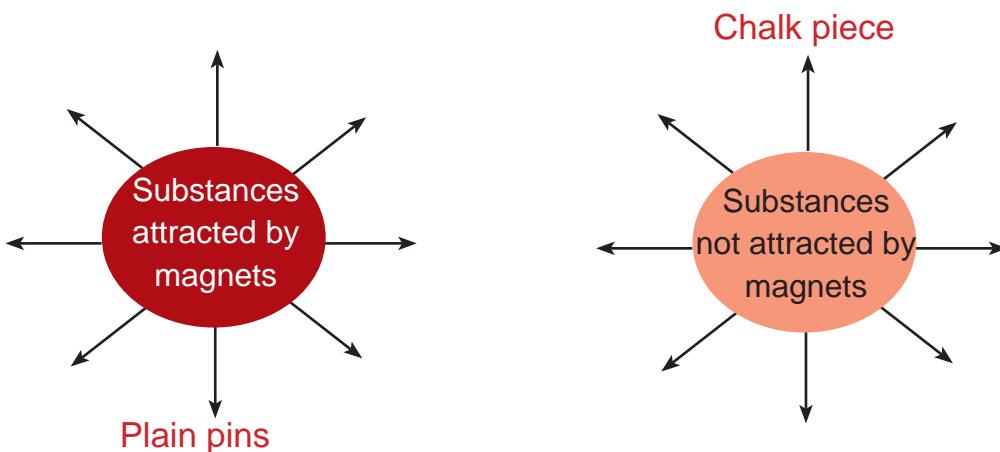


4. Take a glass of water with a few pins inside. How will you take out the pins without dipping your hands into water?

IV. Answer the following

1. What are artificial magnets? Draw some artificial magnets and name them and label the poles.
2. Explain the attraction and repulsion between magnetic poles.
3. Write the properties of magnets that you know.
4. When does a magnet lose its magnetic property?

V. Write down the names of substances.



Let us think over

With the help of your teacher find the direction in which the flagpole, principal's room, laboratory and playground are located in your school.

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<http://en.wikipedia.org/wiki/Magnetite>

'I can, I did' Student's Activity Record

Subject: