

Unit

1

Properties of Magnet

You know magnet remains steady in north-south direction. This characteristic of magnet is used to decide direction.

Observe the adjacent figure and answer the following questions :



(1) Which instrument is shown in the figure ?

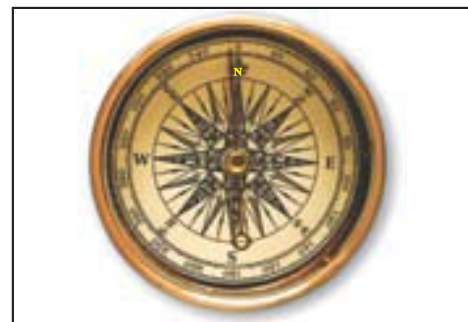
(2) Which type of magnet is used in it ?

(3) What is represented by N-E-S-W ?



What is the use of this instrument ?

To decide direction compass is used. In it a magnetic needle is provided on the axis which can freely rotate it, it shows North-South directions on the dial of the compass N-S-E-W directions are shown. Get a compass and observe it. Two types of compasses are shown below :



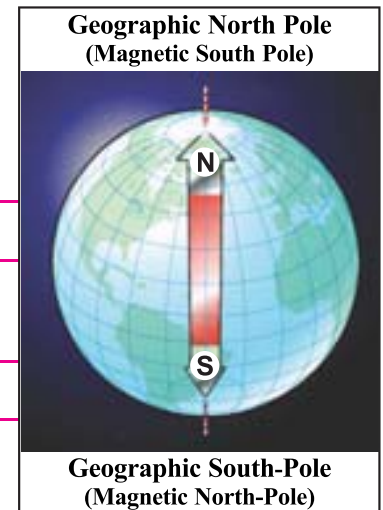
- Observe the adjacent figure and answer the following questions :

(1) Which pole is upward on the sphere of the earth ?

(2) Which pole is downward on the sphere of the earth ?

(3) Which pole of the magnet is toward the North-pole of the earth ?

(4) Which pole of the magnet is towards the South-pole of the earth ?



Why does the freely hanged magnet on the earth, always becomes steady in North - South direction ?

Which magnetic pole is towards the geographic pole of earth ?



What is required ? A white paper, bar-magnet and iron dust

What to do ?

- ☞ Place bar-magnet on the table place white paper on it.
- ☞ Now spread the iron dust on the paper then slowly tapping it observe the iron dust.

- What is formed in the surrounding of the magnet ?

- Observe the curves on the paper and draw the same curves around the magnet given in the following figure :



The definite pattern formed in the surrounding of magnet are known as magnetic field lines. Where the magnetic field lines are closely spaced in this activity ?



What is required ?

Magnet and iron pins

What to do ?

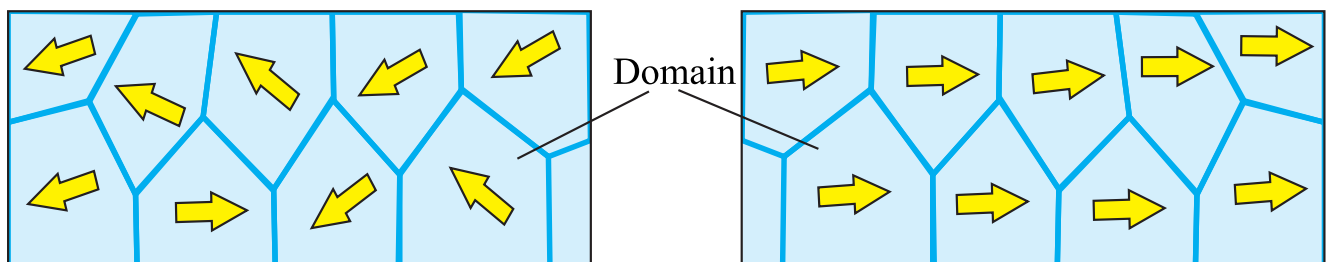
- ☞ Place the pins on the table.
- ☞ Now place the magnet at a distance from the pins on the table and slowly bring the magnet near the pins. Note that from which maximum distance, the pins are attracted towards magnet.
- ☞ Repeat this process two to three times.

- The space in which magnet can attract objects of iron, that space is called magnetic field of magnet.
- Repeat above activity by taking small and large magnet and note the observations.

- Are magnetic fields of both magnets same ?

- For each magnet magnetic fields are different.

Observe the domain of iron and magnet from the following figures and note it.



Position of domain in iron piece

Position of domains in magnet

- (1) What is the difference in domains of iron and magnet ?

Domains of magnet are arranged in the same direction so it behaves as magnet.

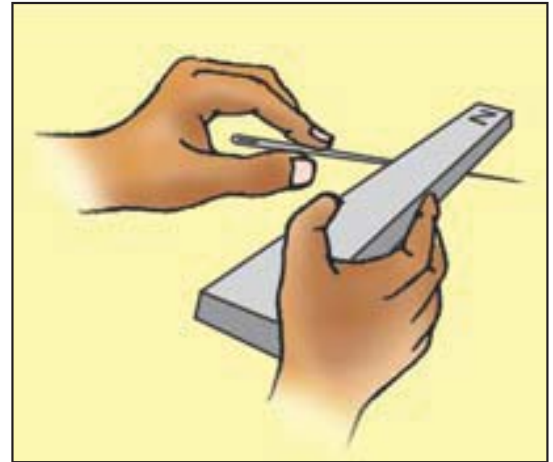
- (2) Can iron piece be converted into magnet ?

**What is required ?**

Needle, iron dust and bar magnet

What to do ?

- ☞ Take a magnet.
- ☞ As show in figure rub that magnet with needle on one side.
- ☞ After rubbing for some time take that needle close to iron dust.
- ☞ What happens ?

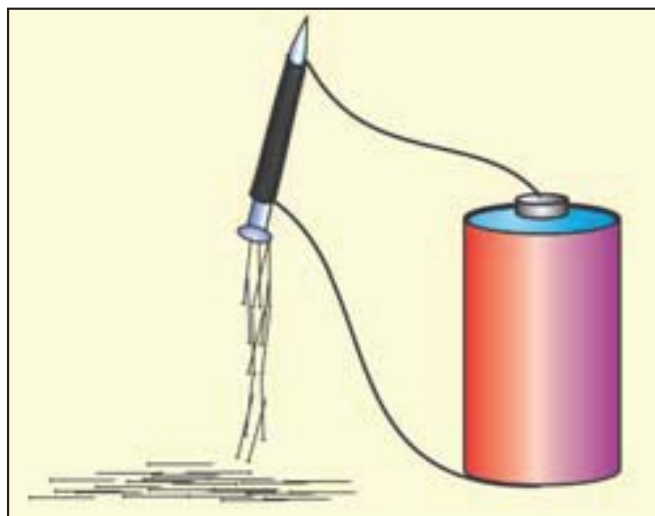




How is the iron needle converted to a magnet ?

**What is required ?**

Pins, insulated copper wire, nail and cell.



What to do ?

- ☞ Take some pins.
- ☞ As shown in figure wound the copper wire on the nail.
- ☞ As shown in figure connect two ends of copper wire with cell.
- ☞ Place the nail slightly above the pins.
- ☞ Observe the pins.

- Why are the pins attracted towards the nail ?



Why the magnetism is induced in the nail ?

Now, disconnect one end of copper wire from the cell and observe the pins.

The magnet made in this way is called electromagnet.



Where the magnet is used in the items shown in following pictures ?



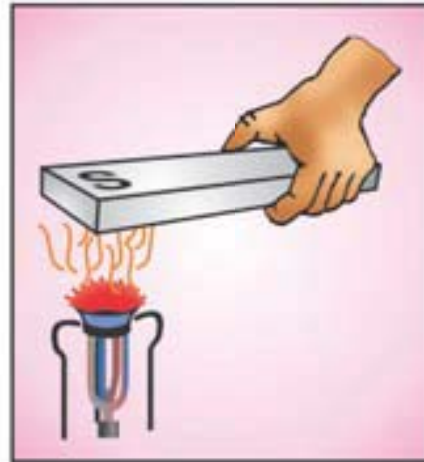


By discussion with your friends list the items in which magnet is used.



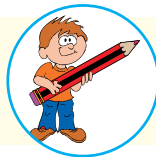
By observing following pictures, discuss the causes for vanish of magnetism of magnet and note it.







How does magnetism of magnet vanishes ?



- Q.1. List the house-hold items in which magnet is used.
- Q.2. Take a nail or pin and convert it in magnet.
- Q.3. Take a nail and make electromagnet.



If you want to prepare delicious food, what will be your favorite one ?

Let us check that the food which you have prepared does contain essential minerals which our body need ? Bring the food prepared for 'Madhyahan Bhojan' in a bowl. Have you brought snacks with you ? Bring some snacks that you have brought from your home.



What is required ?

Collected food samples, solution of iodine and a dropper

What to do ?

- ☞ Take any one sample of food.
- ☞ Put two to three drops of iodine solution on that food.
- ☞ Does the food material show any colour change ?
- ☞ Test all those samples collected by you.
- ☞ Note down your observation in the following table :



No.	Name of the etable substance	Colour change due to iodine solution

Drop of iodine solution can change the colour of carbohydrates. Carbohydrates become black in colour. In our experiment those all food material which turns to black contains carbohydrates. Generally we get carbohydrates from the food shown in the following photograph :



1.

2.

3.

4.

5.

6.



Sweet food contains carbohydrates. Whether all carbohydrate containing food are sweet in taste ?

Importance of carbohydrates :

Carbohydrates provide energy required for our body.

**What is required ?**

Green gram (Mung) seeds, rice, groundnut seeds, castor seeds, sesame (Till) seeds, fennel seeds and a paper.

What to do ?

- ☞ Rub seeds on paper one after another.
- ☞ Observe the paper and tabulate your observation here under.

Names of seeds which show oil marks on paper by rubbing them on the paper	Names of seeds which do not show oil marks on paper by rubbing them on the paper

Here we can say that the seeds, which show oil marks on paper by rubbing them on paper, contain fat. Fatty substances are sticky.

Fatty substances :

Soya bean seed, Mustard seed, Carom (Ajwain) seeds, Sesame (Till) seed, Cinnamon seed, Castor seed, Cotton seed, Cashew nut, Almond nut, Clove, Ghee, Butter, Oil.

- Fat provides energy to our body.
- Play an important role in the constituent of cells and muscles.
- Provides double or more than double energy compare to carbohydrates.
- Provides heat to our body.
- Additional fat gets stored in our body and it is utilized at the time of requirement of nutrition.



Oil



Cheese



Ghee



What is required ? Green gram seeds, Field bean seeds, Pea seeds, Gram seeds, Wheat seeds, Pearl Millet seeds, Maize seeds, Jowrie seeds, Seeds of ladyfinger, Caustic soda (NaOH solution), Solution of blue vitriol (CuSO_4), water and a dropper.

What to do ?

- ☞ Grind any one of the seeds given to you. Add 10-12 drops of caustic soda on it.
- ☞ Add 2-3 drops of solution of blue vitriol on it and tabulate your observation.

Seeds show colour change (converts to purple colour)	Seeds do not show colour change (do not convert in to purple colour)

Seeds converted into purple colour contains protein.

We get protein from following food :



Milk, Paneer, Eggs, Fish, Butterfly bean and all types of pulses contain protein, soya bean provides more amount of protein.

Protein of pulses becomes addible when boiled.

Importance :

- Protein is required as the constituent of cell as well as tissue.
- Regulates biochemical reactions in our body.
- Required for muscle construction.
- Provides immune power against disease.
- Required in the structure of hormones.

Make a list of fruits and green leafy vegetables usually you eat :**List of fruits and green leafy vegetables :**



All these fruits and green leafy vegetables contain vitamins.

There are many types of vitamins. Their source, importance and diseases caused due to their deficiency are given in the following table.

Name of Vitamin	Source	Importance and Uses	Disease caused by their deficiency
Vitamin A	Carrot, green leafy vegetable, milk, butter, Codliver oil	Helpful to maintain healthy eyes and skin	Diseases related with eye and skin
Vitamin B	Milk, soya bean, green leafy vegetable, pea, eggs, meat, potato, cereal grains, tomato, groundnut, pulses	Essential for Biochemical reactions	Beriberi
Vitamin C	Goose berry, lemon, orange and other citrus fruits	Essential for immunity	Scurvy
Vitamin D	Milk, fish, sun-rays	For growth of bones	Rickets, Osteomalacia
Vitamin E	Green leafy vegetables, milk, butter, tomato	Maintains the integrity of cells	Anemia
Vitamin K	From synthesis during metabolism	Helping in blood culture	Diseases related to liver



Prepare a list of vegetables you take as food generally.

Fe, Ca, NaCl, K, I are minerals. We get them from vegetables. The following table provides the source and importance of them :

Mineral Elements	Source	Importance
Calcium [Ca]	Milk, green vegetable, buttermilk, curd	Essential for the structure of bones
Iron [Fe]	Meat, dry-fruits, green leafy vegetables	Synthesis of hemoglobin
Phosphorus [P]	Milk, green leafy vegetable	Useful in formation of bones
Sulphur [S]	Green vegetable, onion	Useful for development of Tissues and flesh
Iodine [I]	Sea-food, iodized salt	Deficiency creates goiter

Water :

Usually our body contains approximately 60 % water of its total volume. We can survive without food for some days, but can't survive without water for long time.

Water is very essential for healthy life.

Importance :

- Required for biochemical reactions running within the body.
- Transports gases, nutrients and excretory substances in the body.
- Maintains the temperature of the body.

Now you can answer :

(1) Why should we drink water ?

(2) What happens if we don't drink water ?

Thus, check your diet plan scientifically. If our food is scientifically perfect then and then only we can live a healthy life. Healthy body is the first step of healthy life.

Balanced Diet :

We have studied about the ingredients of food. According to that we can say that the food which contains protein, fat, carbohydrates, minerals, vitamins etc is called balanced diet. Milk contains most of the necessary elements, hence milk is called complete diet. We can't remain healthy, if we take food containing only protein or only carbohydrates or only fat or only vitamins or only minerals. We must take balance food if we want to live healthy for long time. Due to that our body can get enough elements according to its requirement. Decide about the nutrients you get from your favourite dish.

Prepare a list of food you have taken till yesterday.





Will you justify your meal as balance diet ? Give reason.

Deficiency diseases :

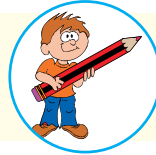
Balance diet is necessary to keep our body healthy and to protect our body against different diseases. If our diet is not a balanced one then our body feels deficiency of nutrients. Which in turn develops diseases in our body and it is called incomplete diet or imbalance diet.

Diseases caused by incomplete diet are called deficiency based diseases.

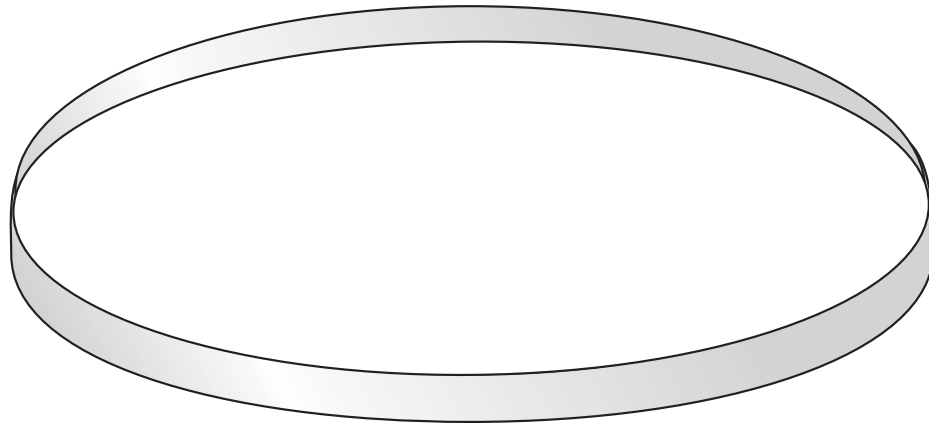
If one constituents is missing for long time in our diet then it invites deficiency based diseases. The following table explains about deficiency based diseases :

Deficient diet	Deficient diseases	Pictures showing symptoms of diseases
Protein	Marasmus, Kwashiorkor	
Iodine	Goiter	
Iron	Anemia	
Vitamin	Colour blindness, Anemia, Pellagra, Beriberi, Scurvy, Rictus, Bleeding	

Bring the book 'Food and Health' from your school library and collect more information regarding disease.



Q.1 Picture of a plate is given below. Write down the names of food and prepare a dish for your lunch or dinner. And decide whether that is balance diet or not ?



Q.2 Prepare a list of your weekly diet.

Day	Food
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

Unit

4

Properties of Water

You know that water is very useful for live elements. Due to this necessity it is said that 'Water is Life.' Water is included in the fundamental needs of living beings. Now, let us know about water in details.

Make note of some information about water :

- (1) Taste _____
- (2) Colour _____
- (3) Smell _____

At ordinary temperature water is in the liquid form. When it is cooled at 0°C temperature it turns into solid form and we call it ice. Heating it up to 100°C it starts boiling and turns into gaseous form, which we call vapour.



As water absorbs heat slowly and gets heated; also it emits heat slowly and cools down. But metals and soil get heated very fast and they cool down also very fast. Due to this nature of water, on the earth there is not very much big difference between the temperatures of day and night. Also due to this nature of water, water is used in radiators for vehicles.

**What is required :**

Test-tube, pieces of wax, a match-box, a transparent glass, water, pieces of ice, a candle and a tripod stand.

What to do ?

- Taking a few pieces of wax in a test-tube, heat the test-tube with the help of a candle.
- Add some solid pieces of wax in the melted wax in test-tube and then make your observation.

- Now, put some pieces of ice in a transparent glass of water and observe what happens.



Why does it happen like this ?

Solid form of water is lighter than the liquid form of water. This is a specific physical property of water.



If water is cooled from 4°C to 0°C , instead of decreasing the volume of water, the volume increases and the density decreases. This is called an irregular expansion or anomalous expansion of water. Due to this nature of water ice floats on water.

In cold regions the top layer of water of ponds and lakes turns into ice, but there is water just below the layer of the ice hence the creatures living in water are able to live in it. This ice layer prevents the heat of the water going away into the atmosphere; hence the creatures under water get the proper temperature. Thus, formation of ice is a blessing for the creatures living under water.

Chemical properties of water :

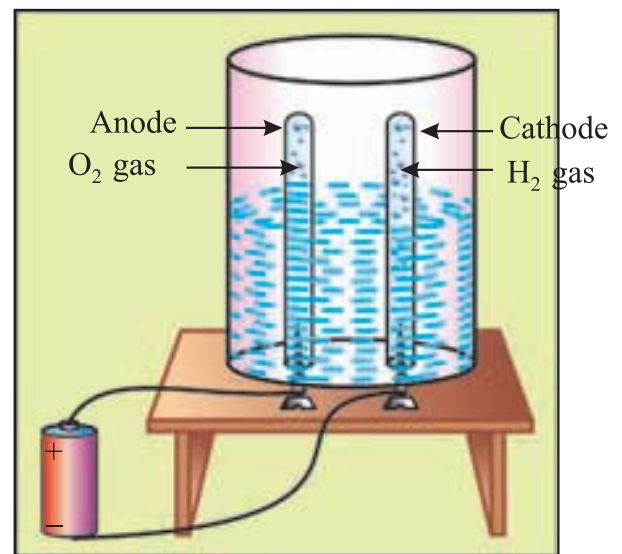
Electrolysis of water :



What is required ? Half cut plastic jar, two screws, copper wire, two test-tubes, a shell or a six volt battery and dilute sulphuric

What to do ?

- ☞ As shown in the figure, making two holes in the bottom of the half cut jar fix two screws in such a way that water does not leak.
- ☞ Join the outer ends of the screws with wire to the battery or a shell. We call it a voltmeter. (Even a ready voltmeter can be used.)
- ☞ Now fill water in the voltmeter up to the half level.
- ☞ Add four or five drops of sulphuric acid in it so that it turns out to be a good conductor of electricity.



Now, fill two test-tubes by water up to the brim and arrange them upside down on the screws in such a way that the water from the test-tubes does not come out. The screw joined with positive end of the battery behaves as positive pole (Anode) and the screw joined with negative end of the battery behaves as negative pole (Cathode). Now, complete the circuit and start electricity. What do you observe in the test-tubes of both the poles ?

There are hydrogen and oxygen in water. Passing electric current in water, hydrogen and oxygen are separated.



Hydrogen gas is inflammable and it burns with cracking sound. But oxygen gas is a supporter of combustion hence it helps things to burn.

After sometime, observe the portion of gas collected on both the test-tubes. On which pole the test-tube contains more gas ? _____

- When the test-tube on the negative pole is filled half then stop the electric current.
 - Now closing the mouth of the test-tube on the negative pole by pressing the thumb against it, remove the test-tube out and turn it with the right side up and keep a lighted match stick in front of it. Observe, what happens ?
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It shows that this test-tube contains hydrogen gas in it.

- Similarly remove the test-tube from the positive pole and insert a smoking incense trick (Agarbatti) in it up to the half level. Then observe, what happens ?
-
-

In shows that in this test-tube there is oxygen gas.

From this we can say that water is mixture of hydrogen and oxygen. The portion of hydrogen is double than the portion of oxygen in it.

Caution : With voltmeter connect only 6 volt D.C. Battery or a shell. Should not connect it directly to A.C. Current.

Solvent, soluble and solution :



What is required ? Common salt, water, transparent glass and a spoon.

What to do ?

- ☞ Take water in a glass made from glass.
- ☞ Add some common salt in it and go on stirring it with a spoon.
- ☞ You will see that common salt is dissolved in water.

Solvent : A liquid in which a thing dissolves is called a solvent. e.g. Water.

Soluble : A thing which dissolves in a solvent is called soluble. e.g. Salt.

Solution : The mixture of soluble and the solvent is known as solution. e.g. Solution of common salt.



The solution of anything made in water is called water solution. E.g. water solution of common salt.

Sugar dissolves in milk. Here milk is a solvent, sugar is a soluble and sweet milk is a solution.



What is required ? Milk, common salt, sugar, sand, alum, oil, water and a glass made from glass.

What to do ?

- ☞ Take water in a glass made from glass.
- ☞ Now add sugar in it.
- ☞ After that go on stirring it by a spoon.

Make your observation and make a note of it in the following table :

Things dissolving in water	Things not dissolving in water

Soft water and hard water :

Rain water is pure water but some gases dissolve in it from the atmosphere. When this water flows on the soil and through the layers of rock some of the salts dissolve in it and hence it appears to be salty in some of the regions. In this way pure water becomes impure.



In the soil of some of the region the proportion of salts is more and hence in these regions there is more probability of water to be salty. In some of the regions of Gujarat and Rajasthan, having salty water is a big problem.



What is required ?

Five test-tubes, a dropper, a beaker, a tripod stand, solution of Aretha powder, distilled water, water from a tube-well, sea-water, water from a river or a lake.

What to do ?

- ☞ Write the names of the sample water on five test-tubes and fill them with the corresponding water.
- ☞ Prepare Aretha solution in a beaker.
- ☞ In each of the test-tubes add five drops of Aretha solution with the help of a dropper. Turn by turn shake all the test-tubes well.
- ☞ Water in which, more foam is formed has less salt in it. Water in which, less foam is formed has more salt in it.
- ☞ Make a note of your observations in the following tables.

No.	Name of the sample water, which forms more foam.	Name of the sample water, which forms less foam.

- Water in which there is less proportion of salt is called soft water.
- Water in which there is more proportion of salt is called hard water.

In our school or at home, to know the proportion of dissolved salts in the water we get, T.D.S. (Total dissolved solid) meter is used. This instrument measures in ppm (parts per million).

0 ppm to 50 ppm	- Ideal water
51 ppm to 100 ppm	- Spring water or carbon filtered water.
101 ppm to 200 ppm	- Normal-tap water.
201 ppm to 400 ppm	- Hard water
401 ppm to 500 ppm	- Water containing more salts.
Above 500 ppm	- Water is harmful to drink.



T.D.S. meter



Different methods to remove hardness of water :



Solar steel

What is required ?

A big vessel, a bowl, salt-water, plastic sheet, string and a stone.

What to do ?

- ☞ Keep a bowl in the middle of the vessel.
 - ☞ Pour salt-water in the vessel in such a way that the bowl is not immersed in it.
 - ☞ Cover the vessel by a plastic sheet and tie it with a string.
 - ☞ Put a stone on the plastic in such a way that it is exactly above the bowl.
 - ☞ Now, keep this vessel in the sun for two to three hours. After that make your observation.
-
-
-

Taste the water collected in the bowl and mention what is the taste of it :

(Taste original water also)

Now take some water from the bowl and fill it in a test-tube. Fill the other test-tube with the water from the vessel. Add four or five drops of Aretha solution in both the test-tubes and shake them well and then make your observation.

Water collected in the bowl is distilled water, because in that dissolve salts are absent.

There are two types of hardness in water :

- (1) **Permanent hardness** : Water in which chlorides of calcium and magnesium and sulphate salts are dissolved and hardness caused due to them is called permanent hardness.
- (2) **Temporary hardness** : Water is which bicarbonate salts of calcium and magnesium are dissolved and the hardness caused due to them is called temporary hardness. This type of hardness can be removed by boiling and filtering the water.



Methods of making hard water soft :

- To remove the different salts very much dissolved in hard water, can be done by boiling such water very much. So dissolve salts are converted into undissolved salt.
- Doing this, some of the salts settle down at the bottom and some of the salts float on the top.
- Filtering this water it becomes soft water.
- Adding washing soda or borax powder in the hard water it can be made into soft water.

Water purification :

We receive drinking water from different sources and this water is not very much pure. There are different types of impurities in it. Mainly there are three types of impurities in water :

- (1) Non-dissolved impurities
- (2) Dissolved impurities
- (3) Impurities of microgerms

To verify whether the water we use for drinking is really proper for drinking or not, 'Water and sanitation management organization' (WASMO) sends a kit to some schools and institutions. Water is filled in this instrument according to the given information and it is kept for some time, then it shows colour changes. From this we come to know whether the water is proper for drinking purpose or not.



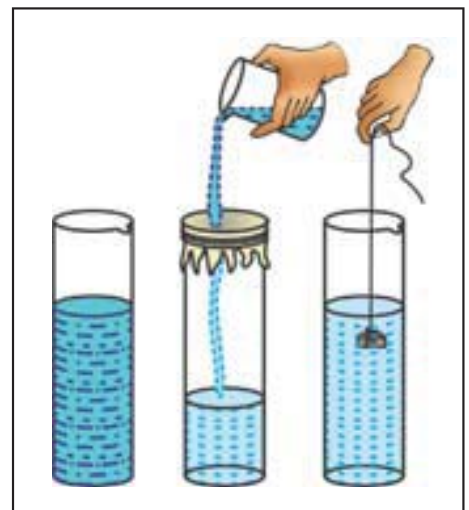
What is required ?

Three beakers, a piece of cotton cloth, dirty water and alum.



What to do ?

- ☞ As shown in the picture, tie a piece of cloth on one of the beakers. Pour dirty water in it. After that take dirty water in the other beaker.
- Now, compare the water collected in both the beakers.
 - What difference do you find ?
-
-



- Now deep a piece of alum in the filtered water for some time and then remove it out.
- Let the water be kept as it is for half an hour.
- Compare this water with the dirty water of the other beaker.
- What do you see ?

- After this, filter this water in the third beaker.

With this method we can get rid of most of the non-dissolved impurities.

The instrument used for purification of water in the modern era (time) :

R.O. Plant (Reverse Osmosis Plant) :

The process of separating the dissolved salts from a liquid is known as reverse osmosis. In this plant water is passed through a membrane made of small nets with a very high pressure and the dissolved salts are removed. The surplus water containing all salts is left to go out. Now, the water with no salt in it is allowed to pass through ultraviolet rays and the microgerms are made inactive and the water thus obtained is proper for drinking.

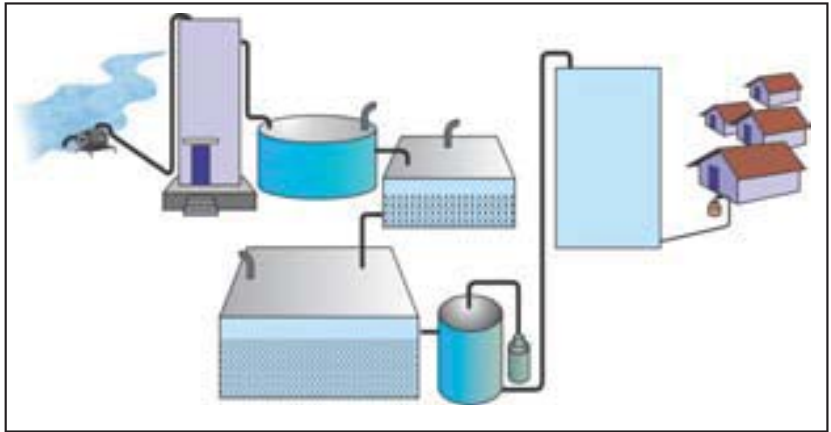


R.O. Plants

Water-purification plants used in big cities :

In big cities water is distributed by the water supply project. This water is obtained from rivers, dams, wells and tube-wells. To purify this water it is passed through different layers.

- For purification of water at the bottom a layer of big stones is made. Above it a layer of small stones is prepared and above this layer a layer of sand is spread. The non-dissolved impurities are left over the layer of sand hence this layer of



sand is very often changed after every few days. After this process is completed chlorine gas is passed through the water and it is made germs-free. The water obtained in this way is then supplied from house to house.

- During monsoon to keep the water germsfree the health workers appointed by the health department go from house to house and put chlorine tablets in the water as per the requirement and make the water germsfree.
- Water is made germs free by adding bleaching powder in it.
- During the epidemic, water should be boiled so that the microgerms contained in it are destroyed and then it should be used for drinking.



Mention which methods are used to purify water in your home. If water comes from Gram Panchayat or Nagarpalika at your home, then gets information that how can they purify water ?

Do it yourself :

1. Take water into a transparent glass up to half the level and making a level mark on it put it in the deep freezer of the refrigerator in your house. After it has turned into ice, mark the level. Now, keep the ice made in the glass outside and let it be turned into water. Now mark the level of water.
- What difference do you find in the levels.

- Why does it happen like this ?

2. Perform an experiment yourself and find it out that the water supplied in your school by the water-tank in the village or the city is hard or soft.

I am a compound; there are hydrogen and oxygen in me.
 My chemical formula is H_2O .
 You do eat me and you do drink me.
 You wash clothes and vessels by me.
 Some time when I am found in the hard form you make me soft by boiling me.
 I exist in all the three forms; solid, liquid and gas.
 Ninety per cent of the proportion of blood is me and I am the life for you.
 The love of the clouds rains and I arrive on the earth in a splendid manner.
 I am collected in rivers, brooks and wells.
 If you waste me feeling that I am free, you will destroy your life in vain. Do you know who am I ?

I am water, I am water.



- Q.1 Classify the following in solvent, soluble and solution :**

Common salt, solution of common salt, sugar, solution of sugar, alum and water

Solvent	Soluble	Solution

- Q.2 Answer the following questions :**

- (1) In modern times, which instruments are used to purify water ?
- (2) What is the arrangement in your school to purify drinking water ?



We are familiar with the soil. Soil is very important for us. Write a short note about soil after discussing it with your friends.

Soil is chiefly used for agriculture. **Soil having required nutrients is called fertile soil.** Soil should be tested at regular intervals to increase and maintain its fertility.



Soil-testing :

Visit your village-volunteer with your teacher and collect information regarding testing of the soil.

(In absence of village-volunteer you may engage any farmer or a person related to the agriculture to collect above said information.)

What is soil-testing ?

What are the methods of soil-testing ?

After how much interval of time, soil-testing should be done ?

What are the benefits of soil-testing ?



Soil pH is also determined along with soil-testing. With the help of pH, we can measure the water holding capacity of the soil. pH meter is used to determine pH. To get approximate idea of pH, pH streep is used.

Soil research centers are established in every district for soil-testing and modern methods for agriculture in our state.



Visit a farmer near your house or school. Discuss about the soil and crop of your village and note down the names of those crops.

- What is ploughing ?

- What are the benefits of ploughing ?

- Which type of equipments used for ploughing ?

- What is sowing ?

- What precautions should be taken at the time of sowing ?

- Which apparatus are used during sowing ?

- What are the weeds ?

- Which harmful effects does a crop bare due to the weeds ?

- Which steps can be taken to remove the weeds ?

- What is rotation of crops ? Why does it required ?

- Which crops can be rotated ?

- What is an alternative crop ?

- What are the benefits of an alternative crop ?

- Which crops can be selected as an alternative crop ?

- Why do fertilizers added to the soil ?

- Which types of fertilizers are used generally ?

- Which types of other fertilizers can be used ?

- What are the losses to the soil by using chemical fertilizers ?

- What are the benefits to the soil by using chemical fertilizers ?

- Which steps should be taken to save the crop ?

- What is protection of crop ? How can we do that ?

Bring the book 'Soil and Agriculture' from your school library and collect more information regarding the soil.



Discuss with your teacher or parents about the production of different types of natural fertilizers.



Soil loses its fertility due to some reasons. Discuss the following question with your friends :

- Why do we clean our house and class-room daily ?

- What shall we see in the dust while we clean the floor ?

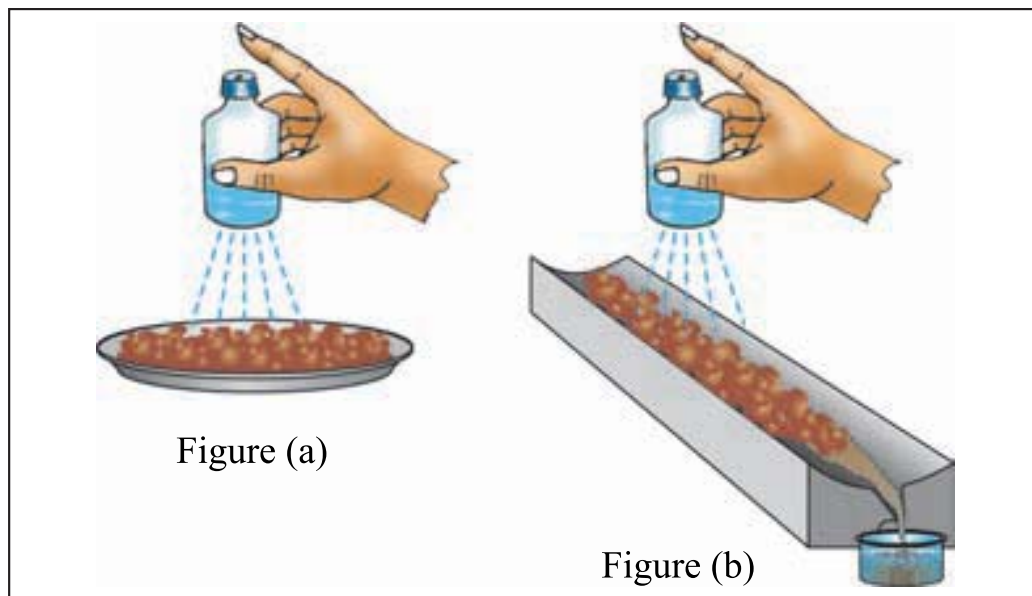
- How do the soil particles come to our house ?

You may have seen the soil particles blowing with the air. Thus, soil particles move from one place to another due to wind.



What is required ?

Heap of soil, plastic bottles, needle, water, pan, cardboard, bucket.



What to do ?

- ☞ Arrange all equipments as shown in the diagram.
- ☞ Take a plastic bottle and make 8 to 10 holes at its bottom.
- ☞ Make a hole in its cap.
- ☞ Now take water in a bucket and fill the bottle by dipping it in to the bucket.
- ☞ Now close the cap of bottle keeping it under the water.

- ☞ Put your finger on the hole of the cap of the bottle.
 - ☞ Now, remove your finger from the hole as shown in the figure (a) and let the water drop on the heap of soil kept in the pan.
 - ☞ What happens to the heap of soil when water drops on it.
-
-

- Whether soil particles become free from one another ? Yes / No
 - Now, repeat this activity with the heap of soil kept on the slanting card board as shown in the diagram (b).
 - Now, observe the water gathered in the pan.
-
-

- Which type of water was there that you poured on card board.
-
-

- Which type of water accumulated in the pan ?
-
-

- Why did the water in the pan become turbid ?
-
-

- How did the sand come into the pan ?
-
-

Removal of soil particles due to natural factors such as wind, rain and running water is called soil-erosion.

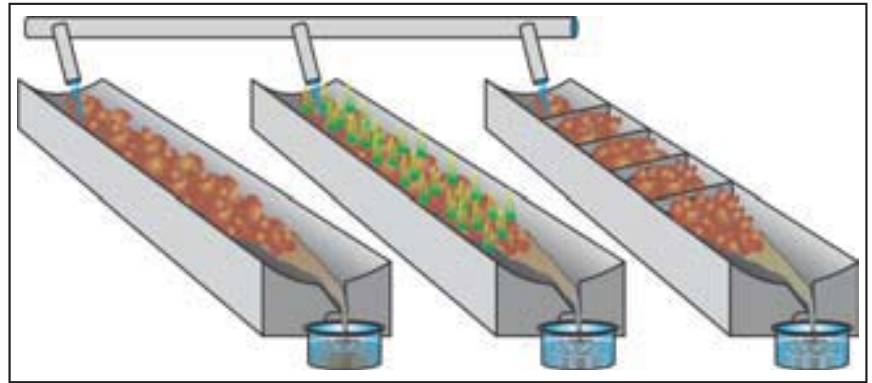
It reduces the soil-fertility. Hence soil-erosion must be prevented.

Measures to prevent soil erosion :**What is required ?**

Three cubical boxes of card-board, green grass with soil, water and three glass beakers.

What to do ?

- ☞ First of all, fill all the three boxes with equal amount of soil.
- ☞ In any one out of three boxes, put the green grass with soil.
- ☞ Make horizontal steps in the second box.
- ☞ Arrange all the three boxes on a slope as shown in the diagram.
- ☞ Pour equal amount of water in each box simultaneously.
- ☞ Collect the water coming out of the each box in separate beakers.
- Observe the water coming out of the each box in separate beakers.
- Which type of water is collected in each of three beakers ?



-
- In which beaker there is the cleanest water ?

-
- In which beaker there is the most turbid water ?

-
- Which soil shows least soil-erosion ?

-
- Which soil shows most soil-erosion ?
-

- How does soil erosion can be prevented by growing trees ? Discuss it with your friend and teacher ?

Soil erosion can be prevented by proper irrigation method.

Earthen pot irrigation :

It is most useful method for irrigation of fruit crops. A quite deep pit is made near the roots of plant. Make some pores either at the base or make pores in such a way that the pores remain towards the plant and put this earthen pot in the pit, in such a way that the mouth of pot remains towards the upper side. The remaining pit is filled with the soil. Plants are provided water by filling this pot. This irrigation method saves the water as well as time.



Channel (Nick / Dhoria) irrigation method :

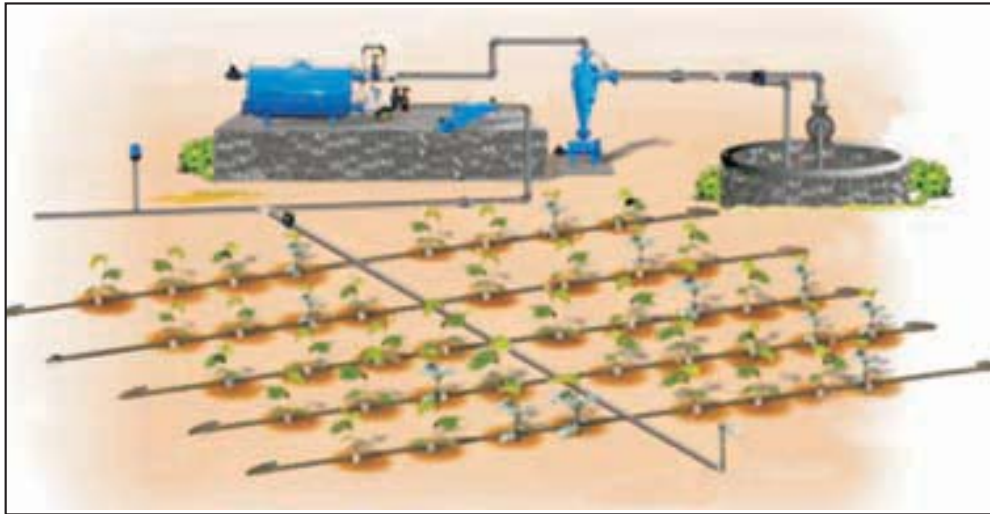
In this method a nick is prepared in the farm and water is given to the crop by it.



It is very popular method but it invites huge wastage of water.

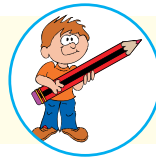
Drip irrigation method :

A pipe with holes toward the roots of each plant is fitted in each row of crop. Each plant gets water drops by the pipe.



This irrigation uses minimum amount of water. Weeds do not get water. As a result weeds cannot grow. Plants can grow better because it gets enough quantity of water. This method is useful even in uneven soil. This method is very useful in hilly regions.

Bring books named 'Soil and Irrigation' and 'Speciality of District' from your school library and gather more information about the irrigation.



Q.1 Which methods should we adopt to control soil-erosion ?



Unit

6

Unit of Living – Cell



See the following picture what is relation between them ?



Scientist Robert Hook, who discovered the cell first



Building



Different room



Room



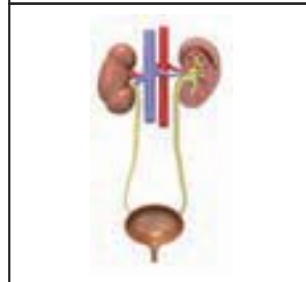
Wall



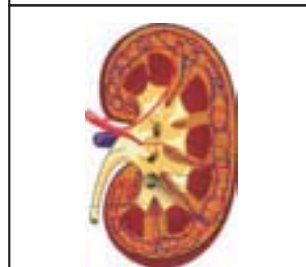
Brick



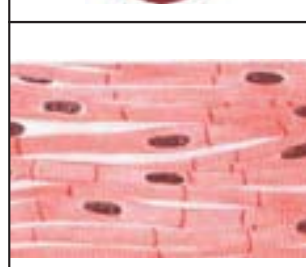
Body



System



Organ



Tissue



Cell



As the brick is the basic unit of a building, in the same way cell is the basic unit of body.

- Our body is also made up of cells.
- Cell is a very minute thing.
- Cell cannot be seen with naked eye.
- Microscope should be used to observe a cell.

Now we will observe the cell.



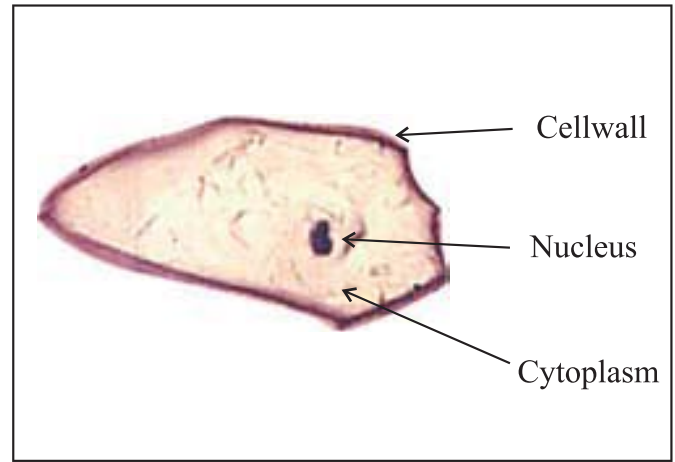
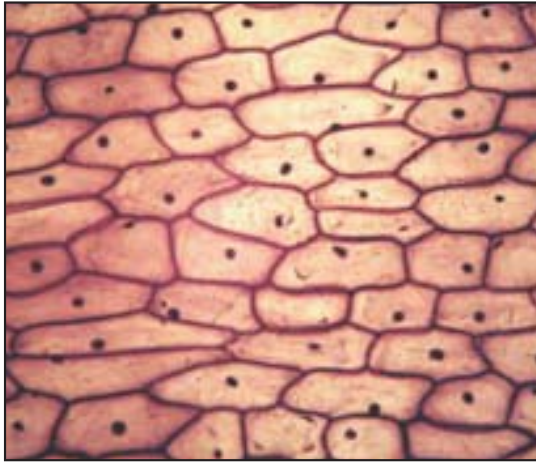
What is required ?

Onion, microscope, watch-glass, slide, cover slip, forceps, dropper, blotting-paper, methylene blue

What to do ?

- ☞ Take some water in a watch-glass and add two-three drops of methylene blue.
- ☞ Put thin layer of onion in the colourful liquid.
- ☞ With the help of a dropper put a drop of water on the slide.
- ☞ Take the peel of onion from watch-glass to slide with the help of forceps.
- ☞ Cover the peel of onion with cover slip to avoid air bubbles.
- ☞ Remove additional water with the help of blotting-paper.
- Observe the prepared slide with the help of microscope.





An onion cell

**What is required ?**

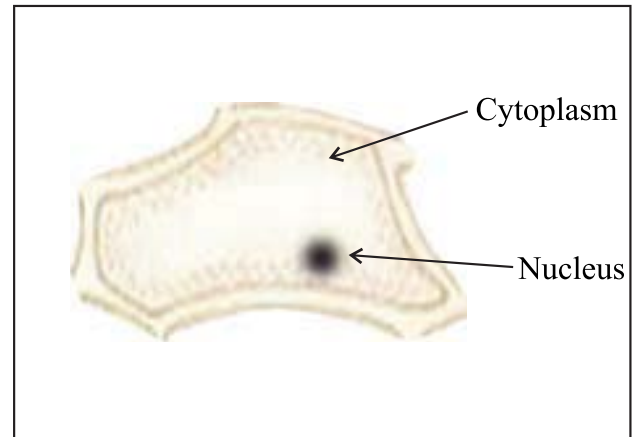
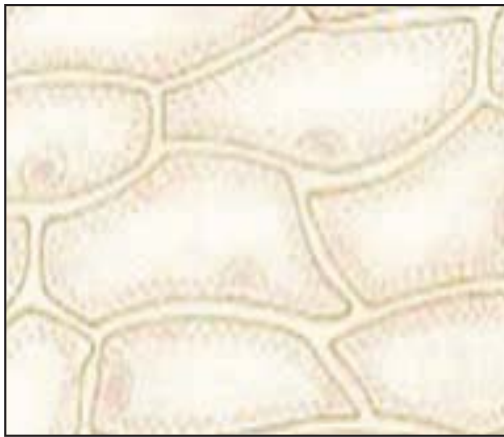
Microscope, slide, cover slip, tea-spoon, water, dropper, blotting-paper and methylene blue

What to do ?

- ☞ Take some water in watch-glass and add 2-3 drops of methylene blue in it.
- ☞ Rub the spoon on the inner surface of chick.
- ☞ Put the drop of liquid from tea-spoon of slide.
- ☞ Take a drop of water on the slide from watch-glass.
- ☞ Cover the slide with cover slip.
- ☞ Remove excess water with the help of blotting-paper.
- ☞ Observe the slide with the help of microscope.



- Draw a diagram of cheek cells observed in microscope.



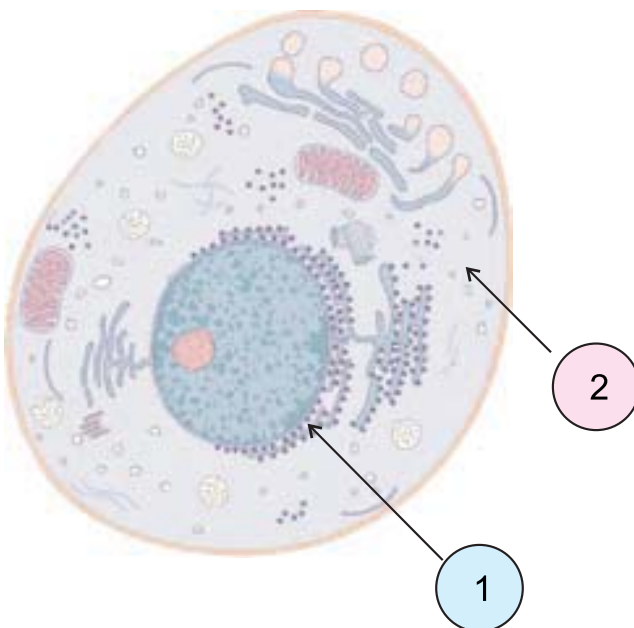
A chick cell

- Note down the things you have noticed while observing the diagram.

Here we saw plant (onion) cell and animal (cheek) cell. Very minute organelles present in this cell can be seen with the help of E.M.

The structure of typical plant cell and animal cell show following peculiarities :

(1) Nucleus (2) Cytoplasm

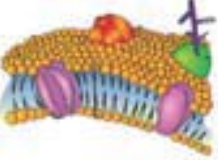










(1) Nucleus :

- Chromosomes, Nucleus, Nucleoplasm.
- Nucleus is a regulatory centre of various cellular activities.

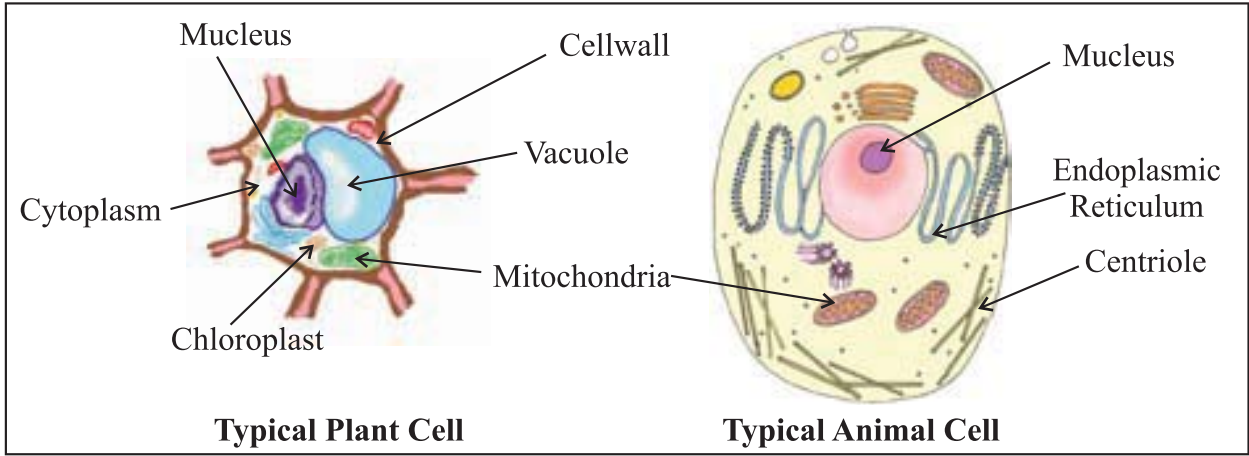
(2) Cytoplasm :

- Endoplasmic reticulum, Vacuole, Ribosome, Golgi body, Lysosome, Mitochondria, Centriole (absent in the plant cell).
- Chloroplast, Plasma membrane, Cellwall.

Diagram of organell	Name of organelles	Function
	Cell-membrane	Regulates the transportation of different materials coming to cell and going out of the cell.
	Endoplasmic Reticulum	They are related to the synthesis of protein. Secretes protein, steroids etc.
	Ribosomes	Protein synthesis occurs on its surface.
	Golgibody	It secrets the proteins and other substances produced in the cell.
	Lysosome	It contains many digestive enzymes. Performs the intra cellular digestion.
	Mitochondria	Produces energy required for the metabolism. This energy is stored in the form of ATP. Hence it is known as the powerhouse of the cell.
	Centriole (only in The animal cell)	Produces bipolar spindles during the cell division.
	Chloroplast	Produces the organic food by the process of photosynthesis. Contains the chlorophyll.
	Cellwall	Supports and protects the cell.

Actually all the organelles are not found in animal cell and plant cells at a time. This imaginary diagram is prepared to learn all these organelles at once. Plant cell is covered by the cellwall (made up of the non-living cellulose).

Observe the following diagram of plant cell and animal cell and note down the differences between them in the following table :

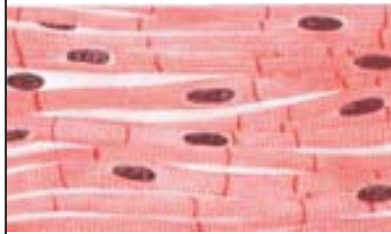


No.	Plant cell	Animal cell

Group of cells associated for specific function is called tissue, whether it is plant cell or animal cell.



Basic unit of an organism - cell



Group of cells - Tissue



Group of tissues - Organ



Group of organs associated with specific function - Organ system

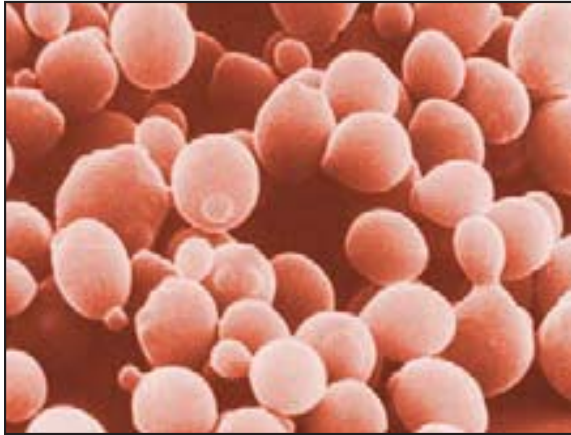


**Isn't it a funny thing ?
Cell -Tissue - Organs-System-Body ?**

- The organism whose body contains more than one cell is called multicellular organism. E.g. Human
- The organism whose body contains only one cell is called unicellular organism. E.g. Amoeba

Unicellular and multicellular organisms are found in plant kingdom as well as animal kingdom.

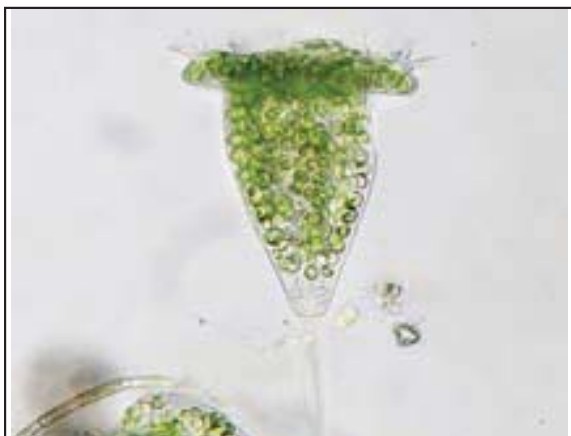
Unicellular plants



Yeast



Chlamydomonas

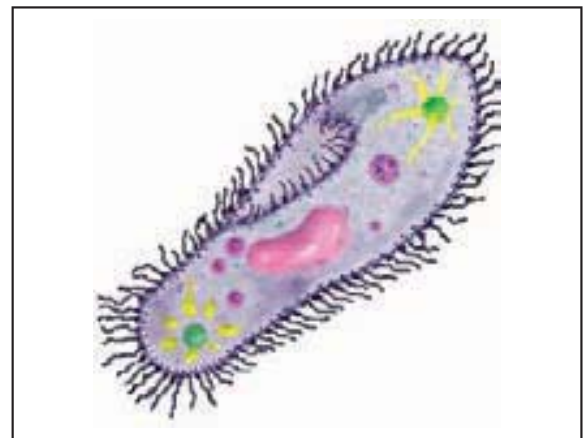


Verticella

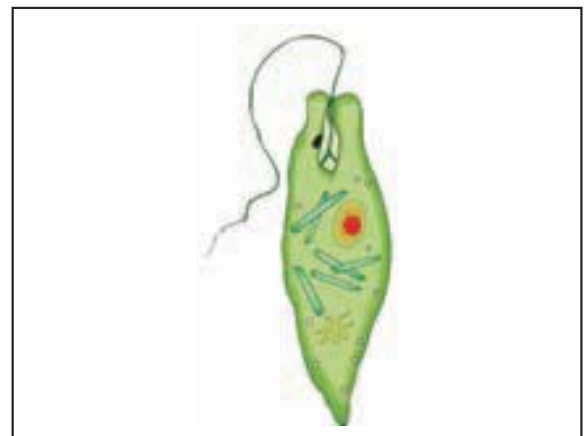
Unicellular animals



Amoeba



Paramecium



Euglena

Note down :

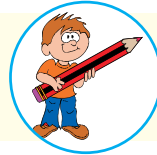
Unicellular organisms – _____

Multicellular organisms – _____

Cell is the basic unit of organism. Body of unicellular organism is made up of one cell only. The body of a multicellular organism is made up of many cells. Thus, cell is the structural unit of the body of an organism. All the life processes are the result of processes running within the cell. Thus, cell is the functional unit of an organism.



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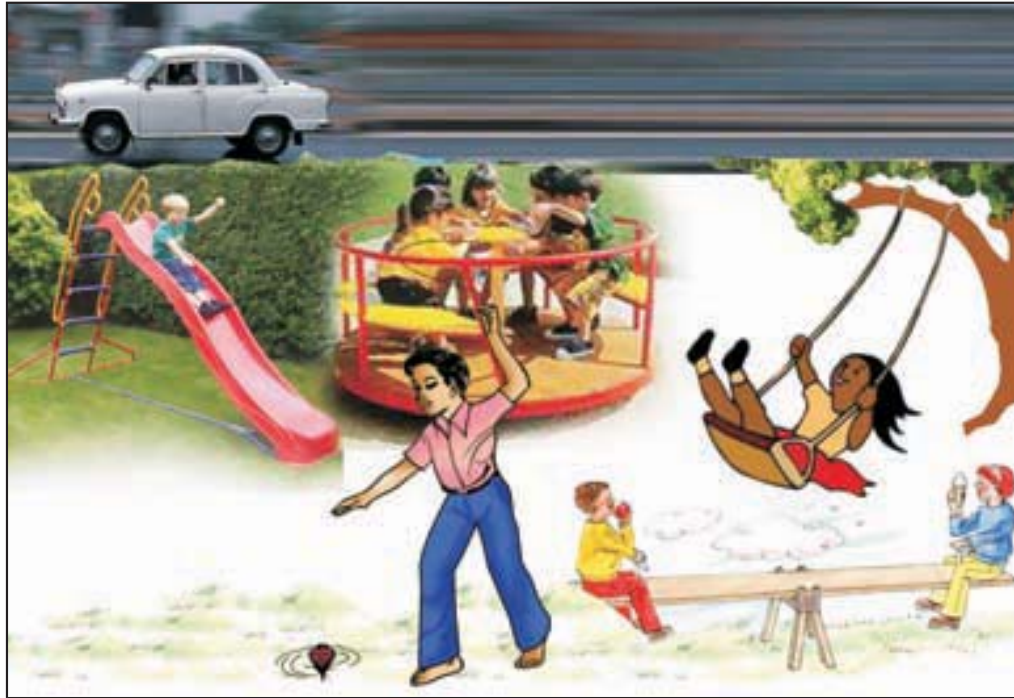
Q.1 What is a cell ?

Q.2 Describe the structure of cell to organism ?

Let us try :

- (1) Tore a leaf of a plant gently. You will find a thin white layer, observe this layer under microscope and draw a diagram of the cell you observed.
- (2) As we saw the onion cell in the same way take a transverse section / longitudinal section of a twig of a plant, stain it with methylene blue and observe it under a microscope.
- (3) Observe a slide of unicellular organism under a microscope by preparing it with the help of your teacher. Draw a diagram of it.

Observe following picture carefully. Prepare a list in the below table for the object in picture which are stationary and non-stationary :



Stationary object	Non-stationary object

From this conclusion is that, certain objects continuously changes their positions. When any object continuously changes its positions with respect to any stationary object then that object is said to be in motion, i.e. Is not stationary.

List the objects in motion which you have seen.



Is the motion of each object same ? Note the difference observed in their motion.

- The motion of an object in a straight line is called linear motion.
e.g. Motion of free falling ball from a height. Note the following of linear motion.

- The motion of an object revolving around a fix points is called circular motion.
e.g. Motion of a blade of a fan. Note the example of circular motion.

- The motion of an object completing one revolution in certain time interval is called periodic motion.
e.g. Motion of hand of a clock. Note the examples of uniform circular motion.

- When any object executes repetitive motion with respect to a fixed point then it is called a oscillatory motion.
- e.g. Motion of a pendulum of a clock. Note the examples of the periodic motion.

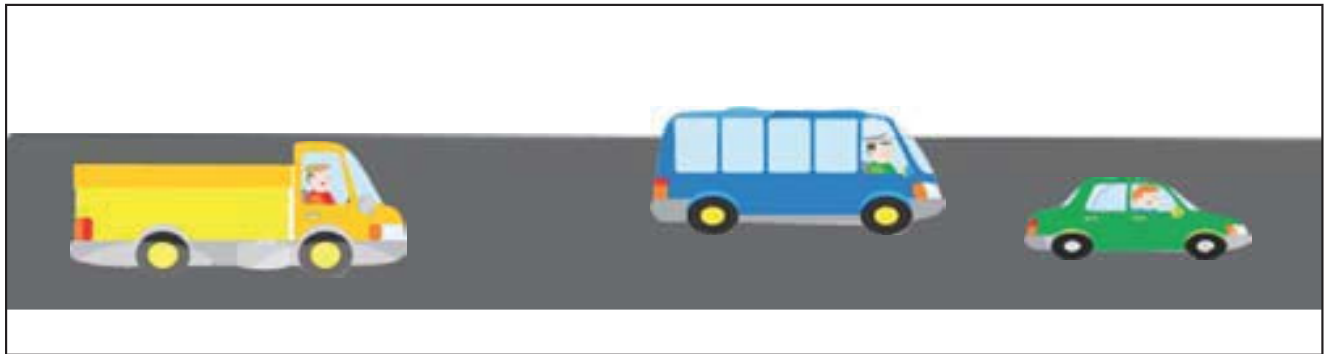
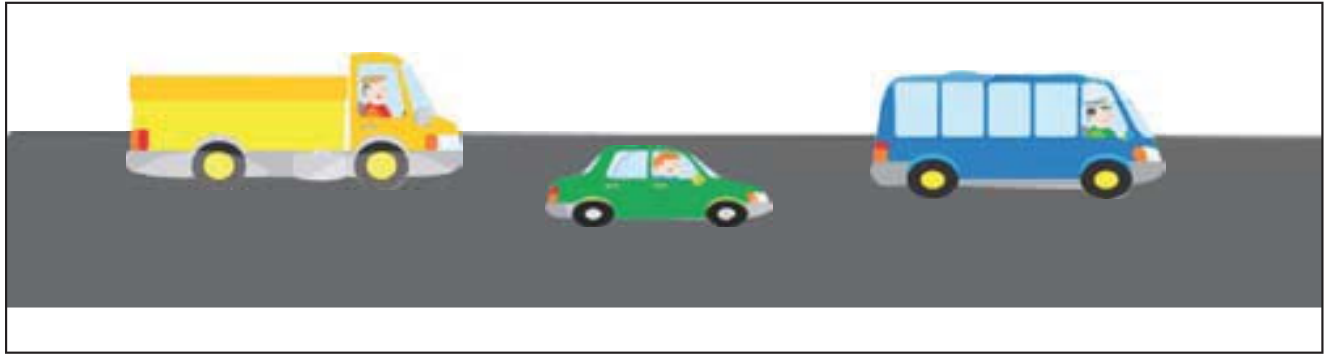
- When object executing random motion is called random motion.
e.g. Motion of flying butterfly. Note the examples of curved motion.

- Which types of motion are associated with the moving bicycle ?

Note the type of motion associated with the following examples :

1. Bicycle moving on a straight path : _____
2. Car moving on a circular path : _____
3. Motion of a top : _____
4. Motion of a wings of flying bird : _____
5. Motion of the earth : _____
6. Motion of soldiers doing march-past : _____
7. Motion of hand of a runner : _____
8. Motion of paddle of moving bicycle : _____
9. Motion of earth around the sun : _____
10. Motion of fly in air : _____

Observe following pictures. What is the difference ? Why ? Note down.





Activity : Trileg running

What to do ?

- ☞ Divide children in the group of five and give name to each group.
- ☞ Tie one-one leg left-right of two boys with handkerchief from each group.
- ☞ Remaining three students will note the time.
- ☞ The groups ready to run, stand in attention.
- ☞ When whistle blows, start running.

- Note down time taken by each group to cover 50 meter distance :

No.	Name of group	Time taken to complete run		Distance / time
		Minute	Second	

- Now, for same play, another two students of the remaining three from each group will be ready to tie legs.
- Ready pairs of each group stand in attention.
- Note down the distance travelled in meter by each group in 60 sec, in the following table :

No.	Name of group	Distance travelled (In metre)	Time for run 60 sec	Distance / time

- The ratio of the distance travelled by the object to time taken is called speed of the object.
- ☞ In both the tables last column is the speed.
- Which group have maximum speed in first round ? Why ? Note down.

- ☞ Least time is taken by the group to cover the same distance has the maximum speed.
- Which group have maximum speed in second round ? Why ? Note down.

- ☞ The maximum distance travelled by the group in same time interval have maximum speed.
- In short, **‘The distance travelled by an object per unit time is called it’s speed’.**

$$\text{Speed} = \frac{\text{Distance travelled}}{\text{Time taken to cover that distance}}$$

- If distance is measured in meter and time is measured in second then the unit of speed is meter / second.



One unit of speed is meter / second. Note other possible units.

- The distance between Vijay’s home and his school is 300 m. On bicycle he reaches at the school in 60 sec, then calculate his speed.

- Shruti completes 100 m distance running in 8 sec then calculate her speed.

Force :

Move the tables in the class-room. What have you done to move it ?

Retrieve the motion which you noted from the picture of garden. A certain cause is responsible for the motion of object. Bullocks pull the bullock-cart, it can't move itself. When you hit the ball or throw it then it will be in motion. To move the table you have to give it push or pull. In this way if a push or pull is given to the object then its position changes.

The external effect, which change the position of the object is called force.

- In your day to day life for which work you apply the force, note down that.

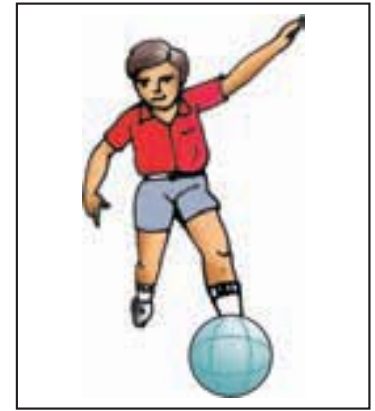


Different effects of force :

What is required ? Ball and balloon

What to do ?

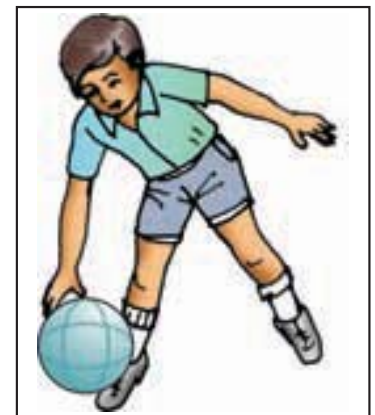
1. Kick the stationary ball lying on the ground.
What is the change in it's state ?



2. Kick the rolling ball with more force. What is the change in state of ball ?



3. If you place your leg in the path of rolling ball then what is the change in its state ?



4. What is change in state of rolling ball when it is stopped by your hand ?

5. Blow the balloon. Press the blown balloon between your hands. What is the change in its shape ?



In this way, with the help of force,

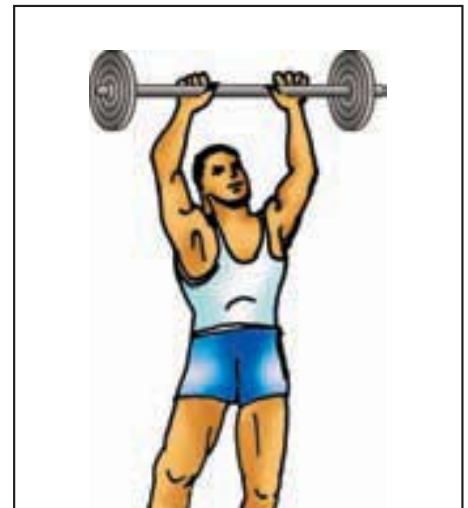
- (1) stationary object can be moved.
- (2) the speed of moving object can be increased or decreased.
- (3) direction of motion can be changed.
- (4) motion of the object can be stopped.
- (5) the shape of object can be changed.

Type of force :

- (1) Muscle force (2) Magnetic force (3) Gravitational force (4) Frictional force

(1) Muscle Force :

The force exerted due to different muscles in our body is called Muscle force. In your day to day life where you use muscle force, note down that.



(2) Magnetic Force :



What is required ?

Glass, water, pins and magnet

What to do ?

- ☞ Fill water in the glass and place pins in it.
- ☞ Now, bring pins out using magnet.
- ☞ Magnet attracts iron or iron objects towards it.
- ☞ This attractive force is called magnetic force.
- ☞ You heard about maglev train, which runs at high speed without making contact with track with the help of magnetic force.



(3) Gravitational Force :

- Why fruit falls from tree in downward direction ?
- Why vertically upward thrown ball move towards the surface of Earth ?
- Why rain from the sky fall on the surface of the Earth ?

In this way, **'all objects are attracted towards the earth, which is called Gravitational force of earth'**.

Note down that, where in your day to day life where the gravitational force is used.



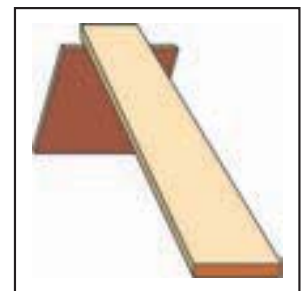
Each and every object in the universe exerts gravitational force on other.
Due to gravitational force of sun, planets revolve around the sun.
Similarly, moon revolve round the earth.

(4) Friction Force :

What is required ? Two same plank, gum, dust and two same marbles

What to do ?

- ☞ Take two planks.
 - ☞ Paste gum on one plank and spread dust particles uniform on it.
 - ☞ When gum is dried remove excess dust. Keep other plank as it is.
 - ☞ As shown in the figure, adjust both the planks at same inclination.
 - ☞ Release both the marbles from the upper ends of planks at same time.
 - What you observed ?
-



- Which marble reaches at far distance ?
-

Why ?

- The marble rolling on the plank with dust, take more time to reach at bottom due to rough surface.

When any object move on any surface, the force exerted on it which opposes its motion is called frictional force.

E.g. The ball rolling on the surface of the earth is automatically stopped after some time.

- When breaks are applied to moving vehicle it stops.
 - What happens when your leg is on banana ? Why ?
-
-



When the brake is applied, why is the moving bicycle is stopped ?

In this way, by using brake, producing friction force, the motion of any vehicle can be stopped.

- Due to frictional force, we can walk, we can write on paper and due to frictional force between teeth we can chew.



Why is the surface of the tyres of vehicle torned after prolonged use ?



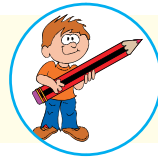
Why is the surface of the shoes torned after prolonged use ?

- Why the spareparts of machines or vehicles turned ?

- Why more force is required to move bicycle on rough surface ?

Due to frictional force on the surface of tyre, we have to change the tyres of vehicles and the surface of shoes/sandals when turned.

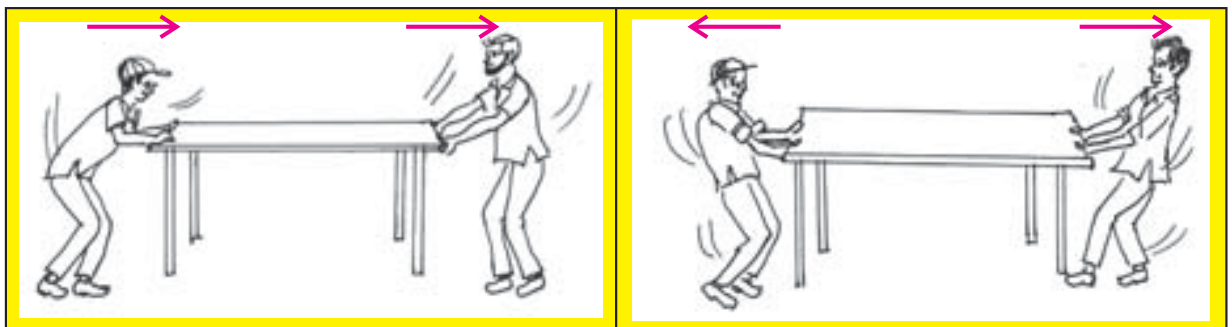
- What we have to do, to stop the noise from different parts of bicycle, swing or machines ?



- Q.1** Stick the picture of moving object in the following boxes :

--	--	--

- Q.2** See the following pictures carefully. In which situation table will be more displaced ? Why ?



- What happens if the frictional force is absent ?
- What happens if the gravitational force is absent ?

Q.3 Stick the vehicles used for the transportation in following boxes :

- From where you obtained the pictures ? Note it.

Take the books from library related with 'Road Transportation' and 'Communication' and collect the information related to both.



Tour of Bolus

Question sir : Where are you going ?

Mr Bolus : I am going to my tour for digestion.

Question sir : Please allow me to join you.

Mr Bolus : You can't come.

Question sir : Then tell me about your tour.

First of all tell me that what is digestion ?

Mr Bolus : Digestion is a process in which complex substances of our food is converted into simple form.

Question sir : Which things help you in your digestion ?

Mr Bolus : Mouth, buccal cavity, oesophagus, stomach, small intestine, large intestine, rectum, anus, liver, pancreas, help me in digestion.

Question sir : Now I am very eager to know about that. Tell me about your tour in detail.

Mr Bolus : Look Mr Question... Organs or parts of our body which are helpful in digestion are known as digestive organs. Different organs show different type of reaction over me.

Mr Bolus : From where a person engulfs his food ?

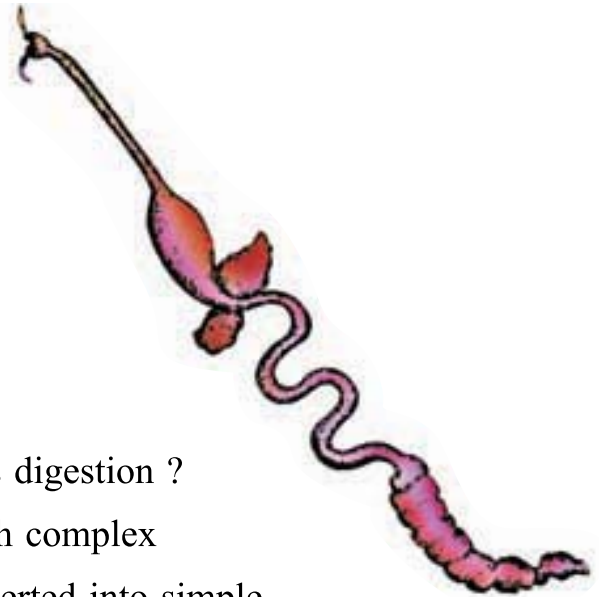
Question sir : From mouth.

Mr Bolus : So you can understand that digestion begins from mouth.

Question sir : It means our teeth and tongue are useful in digestion.

Mr Bolus : Yes of course... My digestion begins at buccal cavity (mouth) with the help of teeth and tongue, chewing of food takes place here, hence food is covered in small particles, salivary gland present in our mouth secretes saliva. Saliva contains an enzyme called ptyaline. Ptyaline digest starch and converts it into simple sugar.

Let us do an activity to understand this.



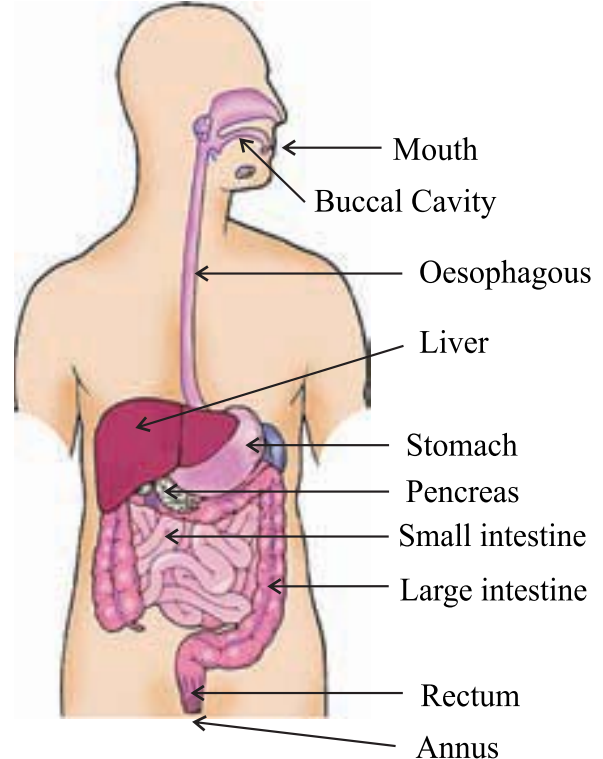
**What is required ?**

Iodine, Bread (Roti) and Dropper.

What to do ?

- ☞ Put two to three drops of iodine on the bread.
- ☞ Do you observe any colour in the bread ? Yes / No

Now, chew a piece of bread and take it out of your mouth. Put two or three drops of iodine over it. Do you observe any colour change in the colour of the bread ? Note down.

Digestive System

Starch present within me (bolus) is digested in the buccal cavity (mouth). It is better to chew the food. That food is easily digested if we chew it as more as possible. Hence one should chew the food as more as possible. “Drink food and eat liquid.”

Question sir : Bolus sir, your structure is completely changed now. Isn't it ?
Where will you move now and what will happen to you further ?

Mr Bolus : I will move towards stomach through oesophagus.

Questions sir : Give me the information regarding reactions take place in stomach.

Mr Bolus : After being chewed in mouth I reach to stomach through oesophagus. Gastric juices secreted from the wall of stomach get mixed with me. Gastric juices kill micro organisms present within me and partially digest my proteins. I am converted into semi liquid form.

- Question sir : Now, your tour has become interesting.
- Mr. Bolus : Actually, important phase of my tour starts now. I move from stomach to intestine. Undigested carbohydrates, proteins and fats are digested here and then absorbed by the wall of intestine. This digested food is given to blood. I pass maximum time in the intestine.
- Question sir : I think your tour is going to be completed now. What happens to the undigested food ?
- Mr. Bolus : Now, undigested food moves to large intestine. My movement is very slow here. Additional water is absorbed here and it is given to the blood and remaining undigested part is stored in rectum situated at the end of digestive track. That is excreted by anus in the form of stool. Thus, organs related with digestion forms digestive system.
- Question sir : Thank you, I am going now.
- Initial part of small intestine is known as duodenum. Bile produced in liver and pancreatic juice produced in the pancreas mixed with food in duodenum. It is essential for the digestion of the food. Small intestine is the longest organ of digestive track. Small intestine which is arranged like a coil in our belly is 7 meter long.

Assessory digestive organs : Liver and pancreas also help in digestion hence they are assessory digestive organs.

Tour of Air :

- Question sir : I have just come to know about the tour of Mr Bolus. It is your turn now.
- Miss Air : Sir, you are very unique. I will certainly answer you. But let us perform an activity first. Does air come out in equal proportion from both of our nostrils ? Feel the air coming out of your nostrils and tell whether it is coming out from both of nostril or one of nostril only ?
- Question sir : Not only I, but all the students sitting in this classroom will perform this and note down the observation.
-
-

Question sir : I like that... What will happen now ?

Miss Air : See, I am going to travel through respiratory organs of body. And now I am going to tell you about that tour.

Question sir : I certainly know that your tour begins from the nose. But I want to ask you that can't you start your journey from the mouth ?

Miss Air : No, because nose contains mucus and hairs inside, which filters me (Air) and due to that filtration small particles and micro-organisms can't enter in the body.

Question sir : As Mr Bolus moves further in oesophagus in the same manner, do you have your own tube to move further ?

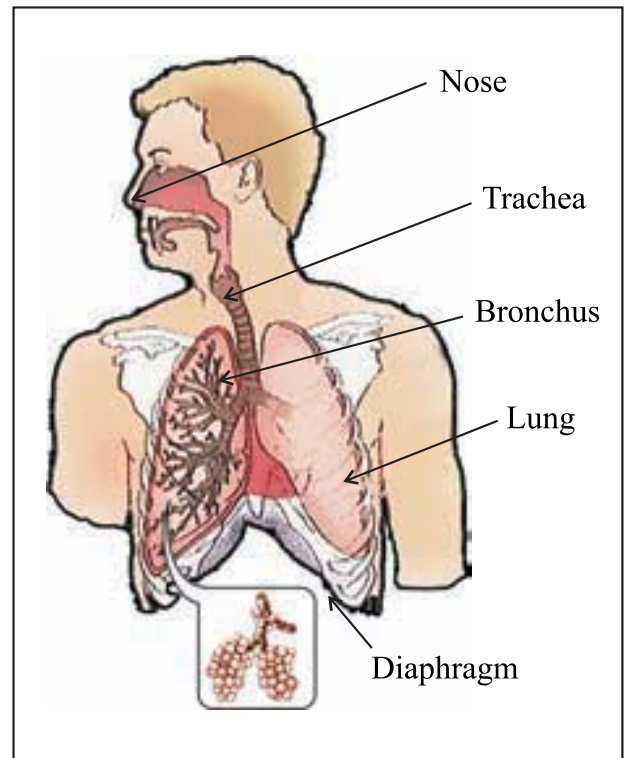
Miss Air : Yes, my brother yes. I move further through trachea. The wall of trachea is made up of 'C' shape incomplete rings of cartilage. Trachea further divides into two branches. Each branch is known as primary bronchi. With help of these bronchi I enter into the lungs.

Question sir : I want to know about internal structure of lungs. Please tell me about your travelling.

Miss Air : Ok baba let us move further... Lungs are elastic in nature. Within the lungs bronchus divides in small ducts known as alveolar ducts. I reach to alveoli through alveolar ducts. Lungs contain many air sacs or alveoli. Blood absorbs oxygen and release carbon dioxide here.

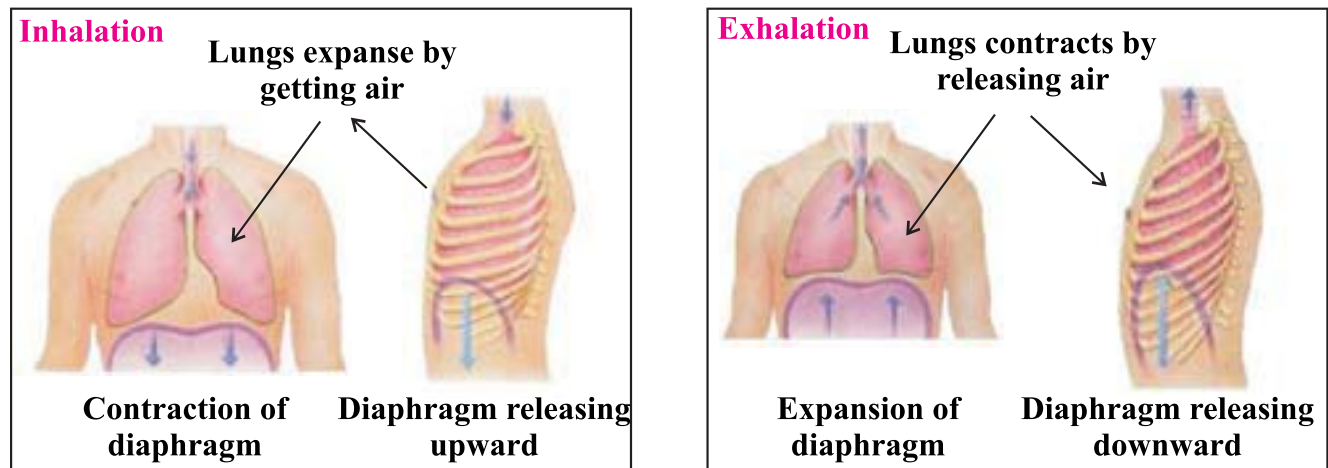
Question sir : Whether chest expands or belly expands when we inhale ?

Miss Air : See the diagram on the next page, you will understand everything.



Question sir : Not only I but all the students sitting in this classroom will perform this activity.

Miss Air : This intake of air from atmosphere is called inhalation and expelling of air from lungs is called exhalation. Inhalation and exhalation takes place alternately and it is called breathing.



Question sir : Ya... Good... Miss Air, I am going to meet Mr Blood now.

Tour of blood :

Question sir : Mr Blood, our body gets useful substances through digestion of food, oxygen and carbon dioxide are being exchanged with atmosphere by breathing. But how do all required nutrients and oxygen reach to all parts of our body.

Mr Blood : Our body has a special system for the transportation of useful and useless things. It is called circulatory system. Circulation of blood in the body is called blood circulation.

Question sir : How do you flow in the body ?

Mr Blood : My conduction is carried out with the help of heart, arteries, veins and capillaries.

Question sir : Oh ! Your family is not small too. Please give me introduction of the members of your family.

Mr Blood : Let us do an activity to understand all these. Are you ready ?

Question sir : I am fond of doing activities. All the students sitting in this classroom will also join me.

**What is required ?**

Thin tube of rubber, funnel, stop-watch

What to do ?

- ☞ Fix a funnel at the end of rubber tube and put this funnel on your heart.
- ☞ Put another end of the tube near your ear and count heart beats per minute.

Put the finger of right hand over the vein towards the thumb of your left wrist and count the pulses per minute.

Now, do some exercise for few time and count it again.

Pulse rate before exercise :

Pulse rate after exercise :

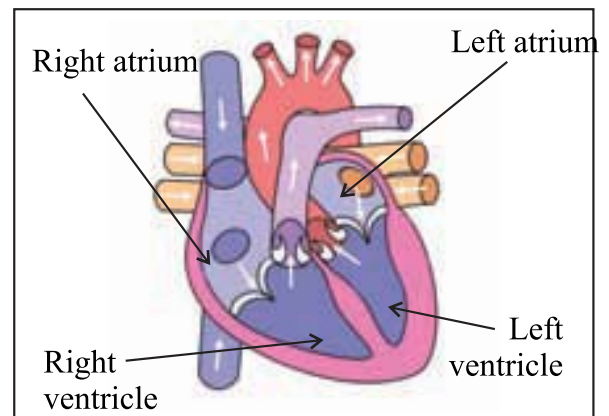


Note down the reason for the pulse.

Question sir : You are doing wonder...!!! But tell me about the heart.

Mr. Blood : OK... My brother, have some patience. Look at this diagram. This is the most important organ of my family.

Heart is situated slightly on the left side in our rib cage (Thoracic cavity).



Volume of heart is almost equal to the fist of a person. Heart is made up of four chambers. Upper two chambers are called atria and two lower chambers are known as ventricles. Heart continuously keep beating and works like pump. It circulates the blood with the help of arteries and veins.

Question sir : Who are these arteries and veins ?

Artery



1. The ducts which carry me with the pressure towards different organs of the body from heart are called arteries.
2. Oxygenated blood moves further with the pressure inside the artery.
3. Due to the presence of oxygen I resemble shiny red.
4. Artery is devoid of valves.

Vein



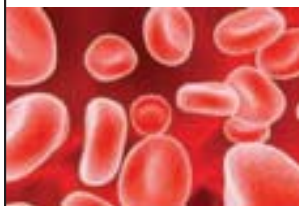
1. The ducts which bring me back towards the heart from different organs of the body is called vein.
2. I (blood) with carbon dioxide moves inside the vein.
3. When I am in vein I do not contain oxygen hence I resemble blackish red.
4. Veins are provided with semi lunar valves.

Mr Blood : These both help me in my circulation in the body.

Question sir : During our talk we came to know about heart, artery and vein but we missed to know about you.

Mr Blood : See the following blocks if you want to know about me.

1



Red Blood Cell :

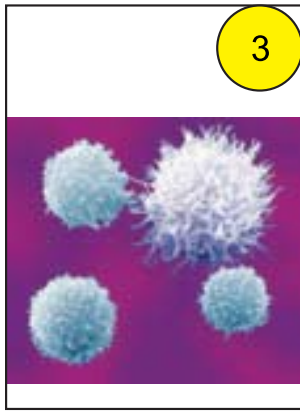
This red coloured cells are responsible for the transport of oxygen and carbon dioxide.

2



Platelets :

These cells are responsible for the process of blood clotting.



3

White Blood Cell :

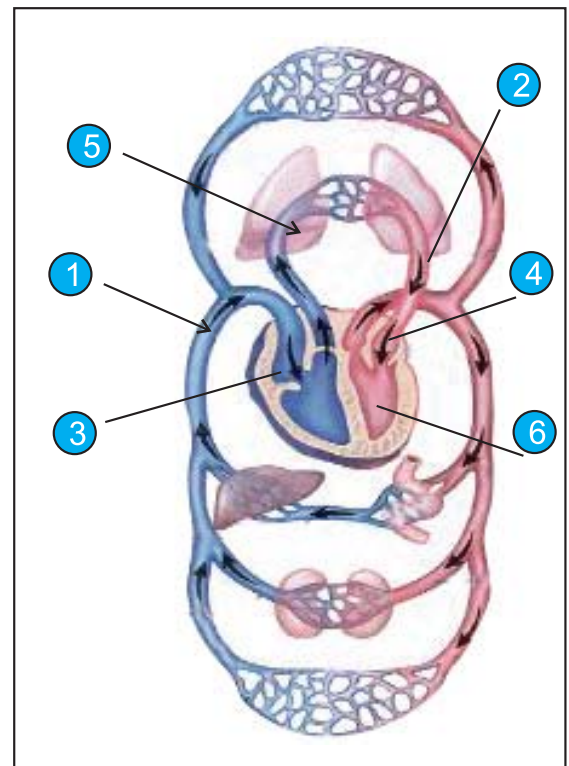
These white coloured blood cells protect our body against different diseases.

The fluid excluding these types of cell is known as plasma.

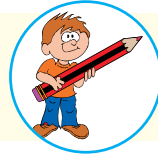
Question sir : That is all right, but how do you move in the body ?

Mr Blood : Follow me by observing the following diagram and follow my dialogs.

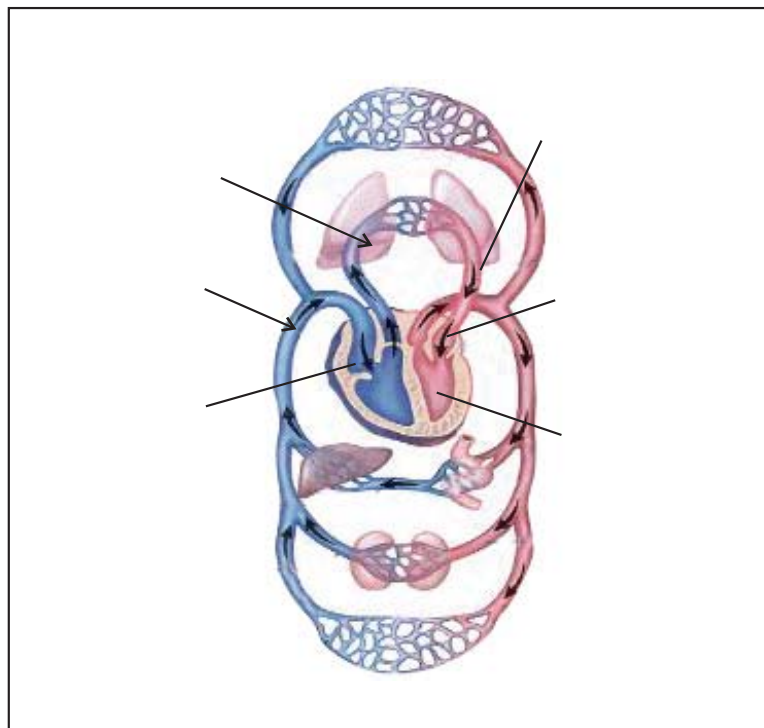
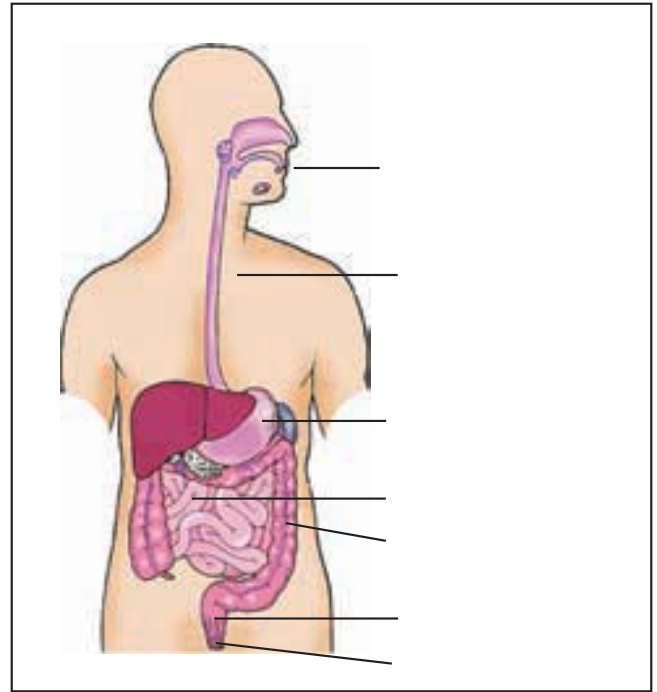
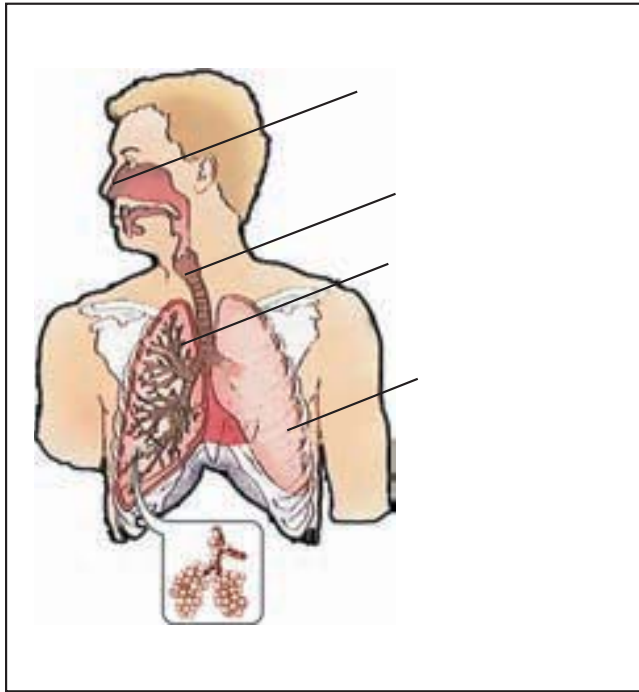
1. Blood containing CO_2 from different parts of body is being poured in the right atrium.
2. At the same time oxygenated blood coming from the lungs is poured in the left atrium.
3. Due to contraction of right atrium, tricuspid valve opens and blood moves to right ventricle.
4. Due to contraction of left atrium, bicuspid valve opens and blood moved to left ventricle.
5. Due to contraction of right ventricle blood moves to lungs.
6. Due to contraction of left ventricle blood moves to different organs of body.



Question sir : Now, I come to know about all the things regarding you and these student also come to know about you.



Q.1 Identify the following organs and write their functions :



Unit

9

Sources of Energy

In std 6 you have studied about different sources of energy. List the different sources of energy and where those are used.



As shown in the figure, the fan works with two different sources of energy :
(1) Solar cell (2) Dry cell
Which device will you prefer for fan ? Why ?



Sources of energy is divided in two parts :

(1) Non-Renewable Energy Source :

When the energy of any source of energy is used then naturally if the energy of that source is not available for use in near future, that source of energy is called non-renewable energy source.

Characteristics :

- This source of energy decreases.
- The use of this energy source increases pollution.

- This energy source is under the ownership of an individual, a particular group or a country.



Near time interval means the average lifetime of human being e.g. 60 to 80 years.

(2) Renewable Energy Source :

When the energy of any source of energy used then naturally if the energy of that source is available for use in near future then, that sources of energy is called renewable energy source.

- Continuous energy is available from this energy source so it is not decreasing.
- Normally this type of energy source is non-polluted.
- These energy source is not under the ownership of any individual, a particular group or a country.
- The energy from this source of energy is free of cost.
- These energy source is easily available everywhere.

List out the energy sources in the surrounding of you. Distribute those into renewable and non-renewable energy source.

Renewable Energy Sources	Non-renewable Energy Sources

Let's take detail information about these two energy sources.

Non-renewable energy sources :

Mineral Coal :

Mineral coal is available from Earth. Mineral coal is made by naturally buried trees and vegetables. This coal is taken out by mining work.

Uses :

- Used as a fuel in the thermal power-stations.
- In early days it was used as a fuel in home, ships and railway engine.
- It is used as a fuel in industries.

Benefits :

- By obtaining coal gas, the gaseous fuel, from coal the present energy crisis can be reduced.
- Coal is in more amount compared to petroleum.

Limitations :

- Pollution spread due to use of this energy source.
- Sooner or later coal extracted from earth core will end up.

Petroleum products :

Petrol, diesel, liquefied petroleum gas (LPG), kerosene, fuel oil etc. are obtained from petroleum. Petroleum is produced from the dead bodies of living things buried in the core of the earth millions of years ago. You have learned about practical usage of petroleum products in standard 6. Make a list of it.



Benefits :

- The energy from this source is easily available for a day to day use.
- Transportation of this energy source is easy.

Limitations :

- A petroleum product produces pollution.
- There is limited stock of petroleum inside the earth.
- Mixing in such fuel is very harmful for environment.

Natural Gases :

Natural gas is independently available from the core of the Earth, which is used as a fuel. Which is known as CNG (Compressed natural gas).

Uses :

- This gas is used as fuel in the vehicle like car, rickshaw, bus etc.
- It is used as fuel in thermal power-station.
- The region in which this gas is available, from there it is given to the houses of near by cities by pipeline for use as fuel at home. (This pipeline is of yellow colour. In Gujarat, in Gandhinagar, Ahmedabad, Vadodara, Bharuch, Ankleshwar, Surat this facility is there.)



Benefits :

- Use of this energy source produce less pollution.
- This energy source is in more amount compare to the petroleum in the core of the Earth.

Limitations :

- The use of this fuel produce carbon dioxide, which cause the greenhouse effect.
- This energy source is not endless.

Atomic Energy :

Due to fission of heavy nuclei like uranium, large amount of energy is released. It is called atomic energy.

Uses :

- Using the heat produced from it electricity is produced.

Benefits :

- From every small amount of uranium large amount of energy is available.
- Use of this energy source does not produces the gases like carbon dioxide.

Limitations :

- The uranium required for the atomic energy is in very small amount in the core of the Earth.
- If radiation leakage takes place due to improper care or Earth quake, tsunami, like natural calamities, then it is very much harmful for environment and all living organisms.

Renewable source of energy :**Wind-energy :**

Air in motion is called wind. The energy associated with this wind is called wind-energy.

**What is required ?**

Paper, scissor, pins and bamboo-stick

What to do ?

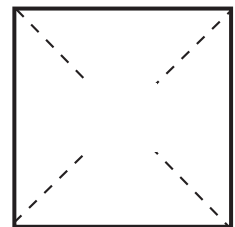
- ☞ First of all cut the paper as shown in figure A.
- ☞ Then fold the paper as shown in figure B and C.
- ☞ Now as shown in figure D attach this paper with bamboo-stick using pin.
- ☞ Place this one where the wind is blowing and see what happens.

From where does it obtain the energy for rotation ?

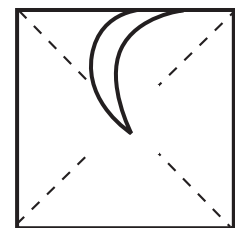
Uses :

- Sailing boats are sailed using wind-energy.
- By placing large number of windmills at the places where continuous wind is blowing, large amount of electric energy can be produced.

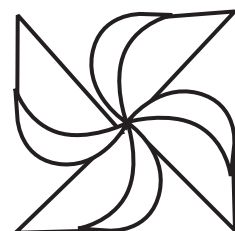
A



B



C



D



- This place is called wind farm. Using windmill following work can be done by wind energy.
- (1) To lift water from well.
- (2) To produced electrical energy.
- (3) To operate flour mill.
- For trashing in farming wind energy is used.



Benefits :

- This energy source is pollutionfree.
- After initial establishment expense for windmill this energy is free of cost.
- This energy source is endless.

Limitations :

- To operate windmill minimum speed of wind should be 16 km/hr.
- Initial expense to establish windmill is more.
- Continuous wind required for wind energy is not available in all regions.



Hydral Energy :

The energy associate with flowing water is called the hydral energy.



What is required ?

Circular plastic cap, straw, knife, rod, measure-tap, nail and hammer.

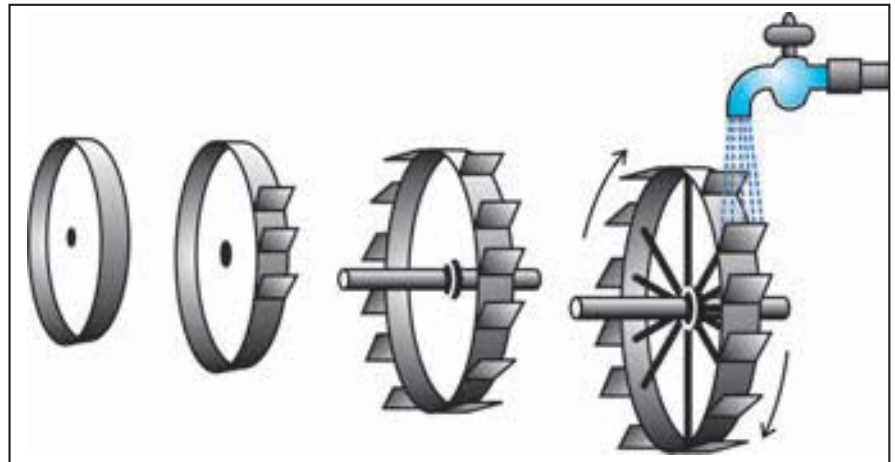
What to do ?

- ☞ Mark at definite distance on the plastic cap.
- ☞ Make cuts as shown in figure.
- ☞ Band the cut part so that it remains outside and prepare saws.

At the center of the cap make a hole of the size of straw and insert a rod in it.

Adjust it in such a way that the water coming out of the tap fall on the saws.

- See, what happens?



- From where the wheel get energy to rotate ?

Uses :

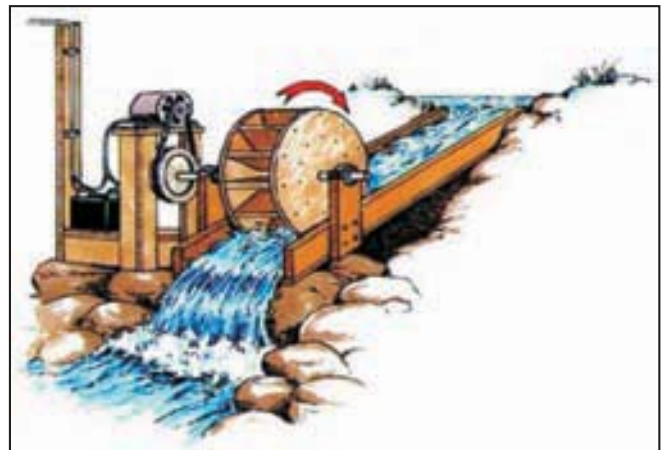
- The turbine convert hydal energy into mechanical energy. Which is used to produce electrical energy by rotating generator.

Benefits :

- This energy sources is pollution-free.
- After the establishment expense of hydropower-station the energy is costfree.

Limitations :

- Construction of hydropower station is very expensive.



Solar Energy :

For earth main energy source is sun. The light energy and heat energy in the form of radiation from the sun is called solar-energy.

Uses :

- The solar-energy is naturally used by plants to prepare food during the process of photosynthesis.
- Using solar cooker, solar water heater, solar furnace, the solar-energy is converted into heat-energy.
- With the help of solar cells, solar-energy is converted into electrical energy which is used to run water pumps.
- The electrical energy obtained by solar cells is stored in storage cells and used at night to get light.
- The electrical energy obtained from solar cells is used in calculator, wrist watch, toys etc.
- In the remote areas and artificial satellites for which conventional electrical energy is not available, the electrical energy is obtained from the solar energy using solar cells.

Benefits :

- Solar-energy is endless and available in almost all the regions.
- Solar-energy is non-polluted.

Limitations :

- Efficiency of solar devices is less and solar cells are costly.

Geo-thermal Energy :

Below the surface of the earth, different minerals and rocks are in molten form, which is called molten lava. In some region this molten lava is close to the surface to earth. In this region when underground water reaches at depth it is converted in vapour. The energy obtained by this compressed vapour is called geo-thermal energy. In this region at some places hot water springs are obtained.

Uses :

- By the compressed vapour in geo-thermal energy region, the turbine is rotated and electrical energy is obtained.
- Geo-thermal energy is used to maintain the temperature of houses in cold regions.

Benefits :

- This energy source is pollution-free.

Limitations :

- On the earth there are few regions from where geo-thermal energy is obtained.

Bio-mass Energy :

The matters form of solar energy is called bio-mass. Fossils of living elements, stool-wine, by products of farming, parts of plants are bio-mass. The solar energy is stored in this bio-mass.

Uses :

- Bio-mass is used as a fuel in rural areas.
- The gaseous fuel - bio-gas is obtained from Bio-mass. Which is used to get light and electricity and in kitchen.

Benefits :

- Bio-mass is continuously available in earth so it is renewable.
- If bio-gas is produced from biomass than dirtiness of rural area is removed and as a by-product organic composed is obtained.

Limitations :

- Air pollution is produced due to use of bio-mass.
- In addition to this methanol, ethanol, bio-diesel and hydrogen is also used as a sources of energy. Get the information about these energy sources.

Get the book 'Energy' from library and collect more information.

Which energy keeps our future safe ? Discuss.

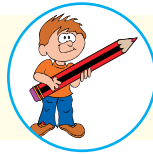
Measures of energy savings :

Energy is our important necessity, so we have to use energy rationally.

For conservation of energy source some points are as follows :

- For the cooking of food take the water as per requirement.
- During the cooking close the container and if possible use the pressure-cooker.
- Gas burner and stove should be regularly cleaned.
- Solar cooker should be used.
- Don't open the door of fridge frequently.
- Switch off electrical appliances when are not in use.
- The public transportation should be used for travelling.

How energy can be saved ?



Q.1 From the following information decide the energy should used is renewable or non-renewable :

- (1) Wood burning in fire place.
- (2) You are travelling in bus.
- (3) Rohan is riding scooter.
- (4) Bhakti is riding scooter.
- (5) Solar cooker is at Imaran's home.
- (6) Vaishnavi uses gas stove.
- (7) Bio-gas plant is at Naman's home.
- (8) Electricity is produced by turbine using waterfall.
- (9) Rabia uses tube-light, which use solar energy.
- (10) You are taking food.
- (11) Traffic signal light with solar panel.

Q.2 Give answer of following questions :

- (1) Explain the difference between renewable and non-renewable energy sources.
- (2) 'Mineral coal and petroleum products should be used rationally.' Explain this statement
- (3) Woods are which type of energy sources ? Renewable of non-renewable ?
- (4) What you will do at school to save energy ?



Some useless plants are found grown around your school campus. Find out them with the help of your teacher and try to pluck it out from the soil including its roots if your teacher permits. Can we pluck every small herb including roots easily ? Note down your observation.

Thus, we can say that roots anchors plants to the soil.

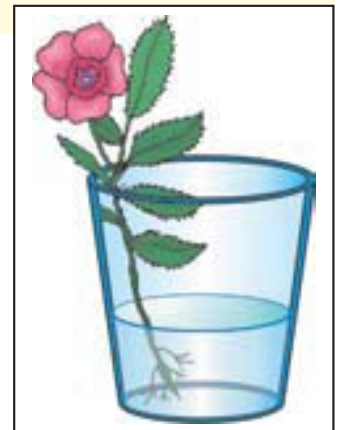


What is required ?

A ever green (*Vinca*) plant with white flower and roots, beaker / glass, ink, water.

What to do ?

- ☞ Bring a plant with roots bearing white flowers e.g. *Vinca*.
- ☞ Take some water in beaker / glass. Put some drops of ink to make water colourful.
- ☞ Now put down the plant into the glass in such a way that the roots remain sunken (submerged) in the water. Next day observe it and note down the changes.



How does it happen ?

Note : We shall use this plant in upcoming activities, hence keep the plant with proper care.

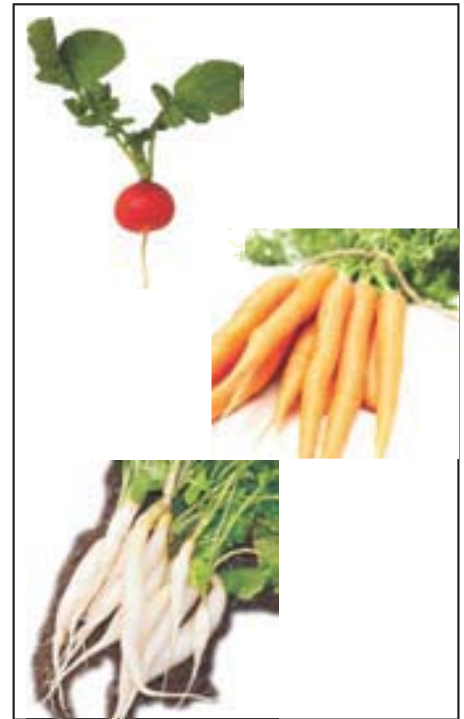
Normal functions of root :

- (1) Anchors the plant into soil.
- (2) Absorbs water and minerals from soil.

In addition to normal functions root also performs some other functions which are not performed by the roots of all the plants. Such type of functions are known as special functions.

Storage of food :

Let us go to school garden or farm in which carrot or radish are cultivated. Observe the swollen and fleshy part of the radish or carrot. Compare it with the root of any other plant. Discuss with your teacher that why it is fleshy ? And note down it.

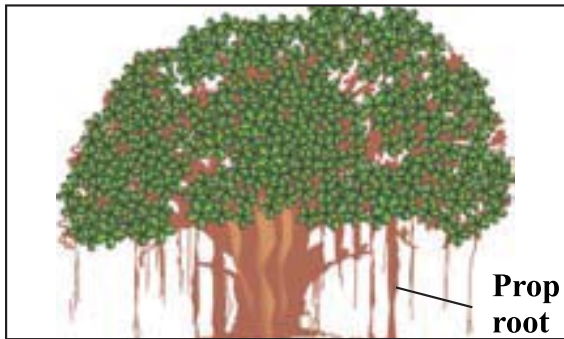


You can see storage of food in plant like radish, carrot, sweet potato and beet root. Write down some other examples of food storing roots.

Stilt Root :

- Observe the plants of maize, sugarcane or millet.
- You will see the structure shown in the diagram. Discuss about that with your teacher or a farmer. What is that and why it is so ? Note down that.





These roots arise from the stem and they are prop roots, which provide mechanical strength to the stem. Roots found in a Banyan tree are known as prop roots.

Special functions of root :

(1) Some roots store food.

e.g. _____

(2) Some plants show prop roots or stilt roots which provide mechanical support to stem.

E.g. _____



In previous activity we observe that colourful water absorbed by root convert the white flower into colourful. How does this water being transported from roots to the flowers ?

- Take the plant used in previous activity. Take transverse section of its stem.
- Put transverse section on a slide.
- Put a drop of water by using a dropper.
- Now cover it with cover slip.
- Observe prepared slide under the microscope.
- Spherical structures shown in diagram are tracheas.
- Structure of a trachea is like an elongated tube. Water and mineral salts are conducted upward by trachea.



Observe stem, branches or leaves of any plant found around your school. You will see that...

Stem provides support to the plant and also arrange leaves in such a manner that they get enough sunlight.

Normal functions of stem :

- (1) Conduction of water and mineral salts absorbed by root.
- (2) Arrange leaves in such a way that they can get enough sunlight.
- (3) Provides mechanical strength to the plant to stand erect.
- (4) Conduction of food produced by leaves.

Beyond this function stem performs other functions in several plants. They are called special functions.



- If tubers of potato is kept for some days, we find small leaves arising from it, observe them with magnifying glass, what do you find ?



Whether potato is root or stem ? Why ?

- Observe ginger and amorphophallus in the same way. Potato, ginger, amorphophallus are food storing underground stems. Note down any other example.

Food production :

Observe the plant of Opuntia. Green coloured part found in it is stem because it shows nodes and internodes. Stem of Opuntia shows chloroplast and produces its own food by process of photosynthesis.



Climbing : You may have seen stem tendrils on the climber of grapes.



What is the function of stem tendrils ?

Which other plants show stem tendrils ? Make a list.



This type of plants can climb on any support with the help of stem tendrils.

Special function of stem ;

(1) Storage of food : e.g.

(2) Food production : e.g.

(3) Climbing : e.g.

**What is required ?**

Leafy plant, polythene bag, a piece of cloth and decanted lime water

What to do ?

- ☞ Select one leafy plant.
- ☞ Take a cup of decanted lime water in polythene bag.
- ☞ Tie the bag filled with the leaf and cover it with the cloth as shown in the diagram.
- ☞ Observe it after four to five hours and note down your observation.



Why does this happen ? What can be the reason ?

Repeat this experiment at your home at night. Observe the changes.

Like other organism plants also respire round the clock. During the process of respiration plants absorbs oxygen and release carbon dioxide.

**What is required ?**

Plant with big leaves,
Polythene bag and thread

What to do ?

- ☞ Select a plant having big leaves.
- ☞ Tie a polythene bag on one or two leaves of the plant as shown in the diagram.
- ☞ Observe it after three to four hours and note down your observation.



Small pores are seen on the leaf surface. We call them stomata. Plants release water in the form of vapor through its stomata. Hence this process is known as transpiration. Repeat this experiment at your home at night. What happens ? Note down.



Why do we experience cold under the trees or in an area where trees are more in number ?

Photosynthesis :



What is required ? A plant with big leaves, solution of iodine, two thin strips of hard-board and u-pins.

What to do ?

- ☞ Select a plant with big leaves.
- ☞ Tie thin strip of hard-board on upper and lower surface of leaf with help of u-pin.
- ☞ Remove strips on the next day and observe the colour of the leaf ? What do you find ?

- What do you find on the surface of leaf where strips were tied ?

- What do you find on the surface without strips ?

- What is your conclusion ?

Green leaves of plants synthesize starch by using carbon dioxide of atmosphere and water absorbed by roots. This process is known as photosynthesis.



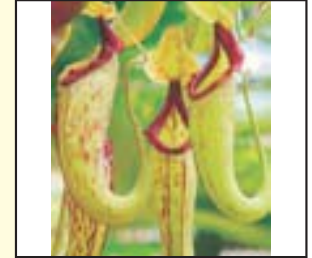
Do animals show photosynthesis ?



Try this experiment at your home at night. Note down your observation.



In some areas where plants do not get enough nutrients, they catch insects and eat them. Insect sits on the cup like structure and the leaf closes the mouth of that cup like structure thus insect is trapped.



Why do leaves are known as kitchen of the plant ?

Normal functions of leaf :

- (1) Performs respiration.
- (2) Performs transpiration.
- (3) Produces own food through photosynthesis.

Above these functions leaves of some plants perform some special functions.



(1) Storage of food :

- Cabbage is a leaf and it stores the food.
- Onion is also food storing leaf.

(2) Protection :

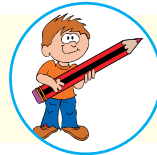
Leaves of the plant like Opuntia convert into spines, which protect the plant from animals.

**Special function of leaf :**

- (1) Stores the food
- (2) Protection

Why do plants require performing some special functions ? Discuss this with your friends or teacher and note down the points.

Bring the book 'Plant Kingdom' from your school library and know other uses of plants.



- Q.1** Take some specimens of monocot and dicot seeds found in your house or around. Germinate them and find the difference between their roots.
- Q.2** Take a young twig with white flowers. Cut that from its distal end and then put both the cut parts into different coloured solution. Observe the colour of the flower.
- Q.3** Take a transverse section of maize stem or any other monocot plant and try to observe with naked eye and try to draw a diagram.

