

AMAZING Science

TEACHER'S HELP BOOK



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1

Food : Where Does it Come From?

LONG ANSWER TYPE QUESTIONS

1. A sweet substance (liquid) prepared by bees from the nectar, *i.e.*, sweet juice collected from flowers is called honey. We get honey from honey bees.

Production of honey : Honey bees develop their nests called hives on tall trees and buildings. Bee workers collect nectar from flowers and store in container. The honey bees are also reared in artificial hives.

Extraction of honey : Honey is extracted from bee hives either manually or with the help of an artificial extractor.

2. Wastage of food can be avoided by following ways :

- (i) We should eat our tiffin in school recess fully and do not leave or throw the food meant for us to eat. If there is excess food in the tiffin then share the same with our friends and inform your parents for the next day to give us the food that we can eat.
- (ii) While eating our meals in our homes or outside. We should ask for the food and the quantity only which we can eat and need to eat.
- (iii) We should keep food well preserved away from the reach of rats, squirrels and ants.
- (iv) We should suggest your mother or domestic help to cook the food in the desired quantity only.

Excess food if cooked may be stored well in the refrigerator and its becoming stale may be avoided.

Herbivores	Carnivores	Omnivores
Animals which eat only plants, plant parts and plant products are called herbivores. Examples : Cow and elephant.	Animals which eat other animals are called carnivores. Examples : Lion and tiger	Animal which eat both plants and animals are called omnivores. Examples : Dog and human beings.

4. (i) Some important animals that give us milk are cow, buffalo, goat and camel.
 (ii) Birds like chicken, fowl and ducks give us eggs and meat.
 (iii) Fish provide us meat.
 (iv) Bees provide us honey.

HOTS TYPE QUESTIONS

1. (a) Honey (b) Honeybees (c) Milk (d) Cow and Goat.
 2. Redish is called as a root because we eat the root of this plant.



LONG ANSWER TYPE QUESTIONS

1. They are protective compounds with no energy value. They help in proper body-functioning and are required by the body in very small quantities. Various kinds of vitamins are—Vitamin A, Vitamin B-complex, Vitamin C, Vitamin D, Vitamin E and Vitamin K.
2. Sugars and starches are carbohydrates. They are nutrients that give you quick energy. Sugars are simply carbohydrates that are used to provide energy immediately. Starch are complex compounds. They release energy more slowly than sugars. Rice, wheat, potatoes, banana, bread and sugar are good sources of carbohydrates. If more carbohydrates are consumed than required by the body, the excess carbohydrates are normally stored in body as fats.

Vitamins	Sources	Functions
Vitamin A	Leafy vegetables, carrots, fish liver oil	Maintains healthy eye-sight, proper growth, healthy skin.
Vitamin B Complex (Group of vitamins)	Green vegetables, eggs, milk, whole cereals	Helps in proper functioning of the digestive system, the heart, the nerves and the muscles.
Vitamin C	Amla, citrus fruits (lime, lemon, orange), tomato, guava, green vegetables	Necessary for keeping teeth, gums and joints healthy.
Vitamin D	Milk, egg yolk, fish liver oil. It is also produced in the body when the skin is exposed to sunlight.	Essential for normal growth of bones and teeth.

4. Proteins are body-building foods and serious diseases like kwashiorkor and marasmus, develop in case of children if the proteins are not sufficient in their diet. It is for this reason that the children are often advised to take a protein rich diet-enough milk, pulses, eggs, meat and fish.

Symptoms of Kwashiorkor : Protruding belly, dark and scaly skin, brownish hair, stunted growth, usually under weight, swollen legs due to accumulate of water, Loss of appetite and anaemia, mental retardation, reduced resistance to diseases.

The deficiency of proteins, carbohydrates and fats in the diet of children leads to a disease called marasmus. This disease generally affected infants under one years of age.

Symptoms of Marasmus : Poor muscle development, bones showing through the skin, no fat, weak legs, loss of appetite and anaemia, grossly underweight, mental retardation, reduced resistance to disease.

5. The overeating of fat rich foods leads to an overweight condition called obesity. An obese person suffers from heart-related problems. He remains inactive and lazy. Many people, especially children, eat a lot of junk food such as burgers, chips and soft drinks. All these food items contain large amounts of fats and sugars. Due to lack of physical activity, fats get



accumulated in the body and cause obesity. So, avoid eating junk foods and exercise regularly to remain fit and healthy.

HOTS TYPE QUESTIONS

1. W : Iodine, X : Thyroid gland, Y : Iron, Z : Haemoglobin.
2. P : Phosphorus; Q : Calcium.

3

Fibre to Fabric

LONG ANSWER TYPE QUESTIONS

1. Cotton seeds are planted in the early spring in well prepared fields at a distance of 1m from each other. Cotton seeds grow steadily and within a span of two months become bushes measuring 1 m to 2 m. They start bearing yellow or white flowers, which turn pink within a week. At this moment pink petals gradually drop leaving behind tiny green pods which may contain two or more seeds.

The seeds develop within the pods and are gradually covered with white fibrous material which is commonly called cotton. The pods then grow into spherical shaped structure of the size of walnut, which are commonly called cotton bolls. On maturing, the green balls begin to turn brown. When completely mature, they burst, exposing the white fibres of cotton. These fibres then dry in Sun and become fluffy. The cotton fields at the drying of cotton fibre appear as if they are covered with snow.

The cotton is handpicked from the plants. Normally the picking continues for 2-3 months as the balls keep on maturing.

2. **Ginning** : The process of removing cotton seeds from cotton fibre is called ginning. The ginned cotton is called lint. The cotton is conveyed to gin machines where revolving circular saws pull the lint through closely spaced ribs that prevent the seed from passing through. The lint is removed from the saw teeth by air blasts or rotating brushes and compressed into bales. The ginned cotton is then stretched and twisted to make long strands.

Spinning : The process of making yarns from fibres is called spinning. In spinning, the fibres from a mass of cotton wool are drawn out and twisted. This brings the fibres together to form a yarn. The spinning process helps to hold the fibres together and makes the yarns strong, smooth and fine.

3. **Uses of Jute** :

- (i) Jute is used chiefly to make cloth for wrapping bales of raw cotton.
- (ii) Jute is used for making gunny bags, potato sacks, carpets, curtains, coarse clothes, ropes, etc.



(iii) Fine quality of jute is also used for making jute fabrics.

Uses of Cotton :

(i) Most of the cotton is used in the manufacture of cotton textiles and undergarments.

(ii) Cleaned cotton is used as absorbent in hospitals.

(iii) Cotton is used as raw-material for manufacture of rayon and paper industry.

(iv) Cleaned and carded cotton is used as fillers in pillows, quilts and mattresses.

(v) Superior grade cotton is used in the manufacture of rayon and superior paper used for printing currency notes and Government stamp paper.

(vi) Due to high power absorption property, clothes made from cotton are used as mops in the household cleaning.

4. These days we wear clothes made of various types of fabrics to cover our bodies. No fabrics (or clothing materials) were available in ancient times. So, in ancient times, people used the bark of trees, big leaves of trees, animal skins and furs, to cover themselves.

After people began to settle in agricultural communities, they learnt to weave twigs and grass into mats and baskets. Vines, animal fleece or hair were twisted together into long strands. These were woven into fabrics. The early Indians wore fabrics made out of cotton that grew in the regions near the river Ganga. Flax is also a plant that gives natural fibres. In ancient Egypt, cotton as well as flax were cultivated near the river Nile and were used for making fabrics.

In those days, stitching of fabric or cloth to make clothes was not known. With the invention of the stitching needle and sewing machine, a drastic change has taken place. And now we have entered into the world of fashion.

Fashion refers to the kinds of clothings that are in a desirable style at a particular time. At different times in history, fashionable dresses have taken very different forms.

5. Our clothes are made from different fibres. They are obtained from plants, animals or made synthetically. For example :
- (i) Cotton and mango have fibres on their seed.
 - (ii) Coconut have fibre called coir on its fruit.
 - (iii) Banana tree have fibre on its leaf.
 - (iv) Linen is made from fibres obtained from the stems of flax plants.
 - (v) Jute and hemp also have fibre in their stem which are called bast fibres.
 - (vi) Sisal is a fibre obtained from the leaves of an agave plant. Sisal, jute and hemp are used to make cords, ropes and rough.

HOTS TYPE QUESTIONS

1. (a) Y (b) X
2. P : Wool, Q : Woollen yarn, R : Spinning, S : Knitting.



4

Sorting Materials into Groups

LONG ANSWER TYPE QUESTIONS

- Shoes** : Leather, rubber, plastic, canvas
 - Chair** : Wood, metal, plastic, concrete
 - Coins** : Copper, silver, gold
 - Utensils** : Iron, copper, aluminium
 - Clothes** : Cotton, wool, silk, rayon, nylon.
- Some materials are attracted strongly towards a magnet. However most of the materials are not attracted towards magnet. The materials which are attracted towards a magnet are called magnetic materials. For example, materials made from iron, steel, cobalt and nickel are magnetic in nature.

The materials which are not attracted towards a magnet are called non-magnetic materials.

For example : All materials other than magnetic materials mentioned above are non-magnetic materials. For example : wood, plastic, cotton, wool, etc.

- When you can see easily through some materials, then the material is said to be transparent and this property is called transparency. While, when you cannot see through some materials, then the material is said to be opaque and this property is called opacity.
- All substances are made up of matter. Matter exists in three states—solid, liquid and gaseous.
Solid state : Solids have a definite shape and volume. You can move a box from one place to another but its volume and shape does not change.
Liquid state : Liquids flow. Liquids change shape but not volume. Pouring water from a jug into a glass causes water to take the shape of the glass. But we still have the same amount of water. Thus, its volume does not change.
Gaseous state : They easily change their shape and volume. If you pump air into a bicycle tyre, the air fills the tyre and takes its shape. It takes less space in the tyre than it did outside the tyre. Thus its volume also changes. A gas can occupy all the space available to it.
- When you open a bottle of perfume the smell spreads throughout the room. Perfume evaporates and the vapour mixes with the air. It spreads everywhere in the room along with air. This intermixing of one substance with other is called diffusion. The perfume vapour mixed with air reaches us due to diffusion. Gases diffuse very fast. Different gases diffuse at different rates. Many solids and liquids can diffuse in water. Matter can be classified on the basis of its diffusion property.

HOTS TYPE QUESTIONS

- (a) (i) Carbon dioxide (ii) Oxygen (iii) Nitrogen (b) Plants
- Cotton (soft material), All other are hard materials.



LONG ANSWER TYPE QUESTIONS

- Among different components of mixture there are many substances which are harmful or not useful for us. To remove these harmful or unuseful components we need to separate them.
Examples :
 - Tea leaves are separated from the liquid with a strainer while preparing tea.
 - Stone pieces from wheat, rice or pulses are picked out by hand.
- Sea water contains many salts mixed in it. One of them is common salt, when sea water is allowed to stand in shallow pits, water gets evaporated by sunlight and slowly turns into water vapour. In a few days, the water evaporates completely leaving behind the solid salts. Common salt is then obtained from this mixture of salts by further purification.
- When one component of a mixture is soluble in water and other component is insoluble in water, the soluble component gets dissolved and insoluble one is separated by filtering the solution. The process by which insoluble substance can be separated from a solution, by passing that solution through a porous paper (filter paper) is called filtration. During filtration, the solid insoluble substance is retained at the filter paper as residue while the liquid free from any suspended matter passes through the filter paper is collected as filtrate. This filtrate may be warmed to dry to obtain soluble component.
- Decantation is a process of separation of insoluble solids from liquid. The suspension of solid particles in liquid is allowed to stand for some time. The solid particles then settle down at the bottom of the container and clean water goes up. Without disturbing the settled particles, the clean water is transferred into other container.
 - Decantation is used to separate insoluble solids or liquid from liquid. Rain water is mixture of mud and water. It is purified by decantation.
 - Oil and water also get separated by this method because oil floats up.
- Mixture of wheat, sugar and husk.
 - For separating husk from the mixture, we should follow the winnowing method as husk is lighter than other two components.
 - Wheat and sugar can be separated by sieving as they have different sizes.
 - Mixture of rice, gram and iron fillings.
 - For separating iron fillings, we can use a magnet.
 - Rice and gram can be separated either by sieving or by handpicking.
 - Sand, black gram (urad) and husk.
 - For separating sand from the mixture, we can sieve the mixture.
 - Black gram (urad) and husk can be separated by the method of winnowing.



HOTS TYPE QUESTIONS

1. Mixture C containing salt and sugar cannot be separated by using water as solvent. This is because both, salt as well as sugar are soluble in water.
2. (a) Common salt (b) Evaporation (c) Iron filings (d) Magnet

6

Changes Around Us

LONG ANSWER TYPE QUESTIONS

1. A small quantity of curd is added to warm milk. The milk is stirred and is set aside undisturbed for a few hours at a warm place. In a few hours, the milk changes into curd. This is an irreversible change because curd formed from milk cannot be changed into milk again.
2. The metal rim is always made slightly smaller than the wooden wheel. On heating, the rim expands and fits onto the wheel then cold water is poured over the rim. Due to cooling, rim contracts and fits tightly over the wheel.
3. Some examples where expansion of metal by heating is used are—Fixing of a metal rim on a wooden wheel and fixing of wooden handles in iron blade in agricultural tools. The iron blade of these tools has a ring in which the wooden handle is fixed. Normally, the ring is slightly smaller in size than the wooden handle. To fix the handle, the ring is heated and it becomes slightly larger in size (expands). Now, the handle easily fits into the ring. When the ring cools down, it contracts and fits tightly on to the handle.

Such a change is also used for fixing the metal rim on a wooden wheel of a cart. Again the metal rim is made slightly smaller than the wooden wheel. On heating, the rim expands and fits onto the wheel. Cold water is then poured over the rim which contracts and fits tightly onto the wheel.

4. (i) Melting of ice : During this change, the water changes from its solid form to liquid form. It can be solidified again. The water remains water in both cases, hence reversible.
(ii) Glowing of an electric bulb : During this change, electricity is passed through the tungsten filament which becomes white hot and glows, but when the switch is off, the filament returns to its original shape and condition, hence totally reversible.

HOTS TYPE QUESTIONS

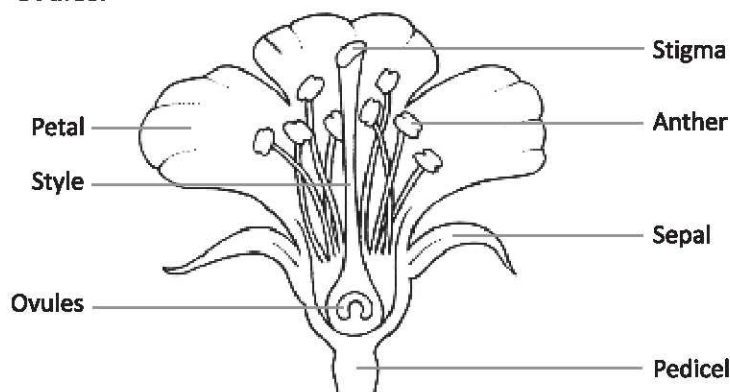
1. (a) Irreversible change (b) Reversible change.
2. (a) Water (b) Cement (c) Irreversible change.



LONG ANSWER TYPE QUESTIONS

- Plants with green and tender stem are called herbs. They are usually short and may or may not have branches. Plants of tomato and wehat are herbs.
 - Some plants have the stem branching out near the base. The stems are hard but not very thick. These plants are called shrubs.
 - Plants of china rose and jasmine are shrubs.

Plants that are very tall and have hard and thick stems are called trees. They have branches arising from upper part of the stem. For example, mango, neem, etc.
- There are two types of roots :
 - Tap roots** : The roots which have one main root and other smaller lateral roots arising from it are called tap roots. For example, mango.
 - Fibrous roots** : The roots which have no main root but all the roots are similar are called fibrous roots. For example, wheat.
- There are following two main functions of leaf :
 - Transpiration** : The extra water comes out of the leaves in the form of vapour. This process is called transpiration.
 - Photosynthesis** : The process by which leaves prepare their food from water and carbon dioxide in the presence of sunlight and a green-coloured substances, is called photosynthesis.
- Flower is the most attractive part of a plant. The main parts of the flower are—sepals, petals, stamens and pistils. The small green coloured leaf-like structures seen in flowers are called sepals. Petals are coloured so as to attract insects for pollination. When we remove petals and sepals then we see long filaments in a flower, are called stamens. The innermost part of a flower which we cannot see completely is called pistil. It consists of stigma, style and ovary. Stamens are the male part and pistil is the female part of a flower. The lowermost and swollen part of the pistil is called ovary. The small bead-like structures inside the ovary are called ovules.



HOTS TYPE QUESTIONS

1. Yes, stem conducts the water absorbed by the roots to the leaves and also the food prepared by the leaves to the roots.
2. Plant with leaves having parallel venation have fibrous roots and leaves having reticulate venation have taproot.
3. Flowers with joined sepals : (a) Bottle gourd (b) Datura
Flowers with separate sepals : (a) Mustard (b) Rose

8

Body Movements

LONG ANSWER TYPE QUESTIONS

1. The frame work of bones in our body is called skeleton. The functions of skeleton are :
 - (a) It gives shape and structure to the body.
 - (b) It protects the internal organs.
 - (c) It forms the framework of body.
 - (d) It helps in the movement and keeping body erect.
 - (e) Ribs of chest protects our heart, lungs and liver.
2. The main adaptations which have been made in the bodies of birds by nature to enable them to fly are the following :
 - (a) Their forelimbs are modified to form wings for flying.
 - (b) Their flight feathers provide a large flat surface which is light but strong.
 - (c) Their bones are hollow and light.
 - (d) Their bodies are streamlined and extremely light.
 - (e) They have powerful flight muscles.
3. Our body has four kinds of joints :
 - (a) Ball and socket joints : The rounded end of one bone fits into the hollow space of the other bone. Such a kind of joint allows movements in all directions and is called ball and socket joint, *e.g.*, the joint between the upper arm and the shoulder; the thigh and the hip.
 - (b) Pivotal joints : The skull is joined to the first two vertebrae of the backbone like a ball to a stick. This type of joints allow movements in many planes—up and down, left and right and also to rotate it.
 - (c) Hinge joints : These joints allow movement only in one plane like a door hinge and not more than 180 degree. For example, the fingers, the knee. The wrist is a double hinge joint.
 - (d) Gliding joints : These joints allow only a limited amount of movement of sliding nature of cartilages. For example, these movements can be seen in wrist and ankle.



- The body of a snail is covered with a hard shell. Snails have a large, flat foot. The foot produces a slimy substance called mucous; which helps them crawl over the surface. The mucous reduces the friction between the foot and the ground surface. The muscles of the foot enable the snails to move forward. A trail of mucous is left behind when the snails crawl.
- There are two shoulder bones : Collar bone and shoulder blade. The collar bone is a long, curved bone. One end of the collar bone is attached to the shoulder blade and the other end of collar bone is fixed to the breast bone of rib cage (for support). Collar bone keeps the shoulders apart. The shoulder blade is a large and flat triangular bone. Shoulder blades attach the arms to our body.

HOTS TYPE QUESTIONS

- (a) (i) Ribs (ii) breast bone (iii) Rib cage (b) (i) Heart (ii) Lungs (iii) Liver.
- A : Backbone, B : Skull, C : Hip bone.

9

The Living Organisms and their Habitats

LONG ANSWER TYPE QUESTIONS

- Carbon dioxide released by animals is used by plants for the synthesis of food. Plants need animals for the dispersal of seeds and pollination. Animal's excreta enrich the soil with nutrients. These nutrients are used by plants for their growth.
- Camel is adapted to live in a desert because of its following special features :
 - The camel has long legs which help to keep its body away from the hot sand in the desert.
 - A camel can drink large amount of water and store it in the body.
 - A camel passes small amount of urine; its dung is dry and it does not sweat. It can live for many days without drinking water.
 - A camel's hump has 'fat' stored in it.
- The deer is adapted to the grassland in the following ways :
 - The deer has eyes on the sides of its head which enable it to see in all directions at the same time.
 - The deer has big ears for good hearing.
 - The brown colour of deer helps it to hide in dry grasslands without being noticed by lion, etc.
 - The deer has strong teeth for chewing hard plant stems of the forest.
 - The deer is fast and agile animal.
- The fish adapted to live life in water because of its following special features :
 - The streamlined body shape helps the fish to move through the water easily (because such a shape offers least resistance to motion).



- (b) The fish has special organs called “gills” which help it to absorb oxygen dissolved in water for breathing.
- (c) The fish has slippery scales over its body which protect the body from water and also help in easy movement through water.
- (d) The fish has strong tail for swimming.
5. The place (or surroundings) where a plant or animal live is called its habitat. A habitat provides food, water, air, light, shelter (protection), and a place for breeding to the plants and animals living in it. Different types of plants and animals live in different habitats. Some of the examples of habitats are : Deserts, Mountain regions (or Hills), Forests, Grasslands, Garden, Fields, Soil, Pond, Lake, River, Ocean (or Sea) and Sea-shore.

The fish is an animal which lives in water. It cannot live without sufficient water. So, the habitat of a fish can be pond, lake, river or sea (because all these places contain water).

The term “biotic” mans “living”. So the living things in a habitat are its biotic components. The living things in a habitat are plants, animals and micro-organisms.

The term “abiotic” means “non-living”. The various non-living things a habitat are soil, rocks, air, water, sunlight and temperature, etc. The abiotic factors are necessary for the existence of plants and animals living in a habitat.

HOTS TYPE QUESTIONS

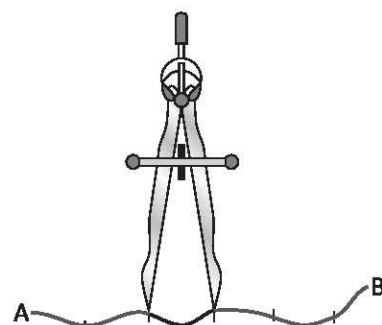
- As an aquatic plant can absorb water and dissolved minerals directly from the surface of their stems, branches and leaves. So they do not have to depend on their roots to obtain water and dissolved minerals, their roots are very short and small.
- Dolphins and whales breathe through the blowholes present on the upper parts of their head. You might have seen these animals come to the water surface from time to time. They come to gulp oxygen from the air.

10

Motion and Measurement of Distances

LONG ANSWER TYPE QUESTIONS

- To measure the length of curved lines we have to use divider. Let there be a curved line AB (as shown in adjoining figure). Open the legs of the divider to cover some convenient distance, say 5 mm. Place one leg of the divider at one end of the curved line. Put the other leg on the line. Now count the number of times the divider has to be taken along the line to cover the entire length of line AB. At the end, some portion of line may be left out, being less than the distance between the two legs. Measure it separately by adjusting the divider. Multiply the number of complete steps by the distance between the two



Measuring the length of curved line with the help of a divider.



legs. Add the length of the remaining distance to this length. You will get the total length of curved line.

2. Movement of an object along a circular path is called circular motion. Direction of moving body always changes in circular motion. For example, the movement of moon around the earth, the movement of earth around the sun.

The motion which repeats after a regular interval of time is called periodic motion. For example, motion of tip of arm of a clock and motion of pendulum of clock are periodic motions.

3. We need standard unit for measurement to make our judgement more reliable and accurate. For proper dealing, measurement should be same for everybody. Thus there should be uniformity in measurement. For the sake of uniformity we need a common set of units of measurement, which are called standard units. Now-a-days SI units are used in science and

S.No.	Wheel of moving bicycle	Mark on the blade of electric fan
1.	The motion is rotational and circular both	The motion is circular
2.	It changes position while doing circular motion	It cannot change its position
3.	It can execute rectilinear motion	It cannot execute rectilinear motion
4.	It can cover some distance in any time interval	It cannot cover any distance

5. Put one end of the pencil at nearest full mark say 3.0 cm in this case. Take the reading of the other end. Now subtract 3 from the previous reading and this will be the required length of pencil.

HOTS TYPE QUESTIONS

1. If we are sitting in a moving bus, we are not changing our position in comparison to things inside the bus. According to the definition of motion, we are not moving, the bus is moving. In other words, we can say that we are in motion in comparison to outside trees and other buildings and stationary in comparison to things inside the bus.
2. The sewing machine has a wheel which rotates on an axle. So, the wheel of a sewing machine shows rotational motion. The sewing machine has also a needle which moves up and down continuously (as long as the wheel rotates). The needle of sewing machine undergoes a periodic motion. Thus, a sewing machine exhibits two types of motion at the same time : rotational motion as well as periodic motion.

11

Light, Shadows and Reflections

LONG ANSWER TYPE QUESTIONS

1. A shadow is a dark outline or image cast by an opaque object that blocks light coming from a source of light. It is formed when light hits the opaque object which does not let the light pass



through. Everywhere else around the opaque object, the light continues in a straight path until it bounces off the ground or wall behind the object. The wall or ground behind the opaque object is the screen. On this screen is a dark patch, or shadow, with the same outline as the object is surrounded by light.

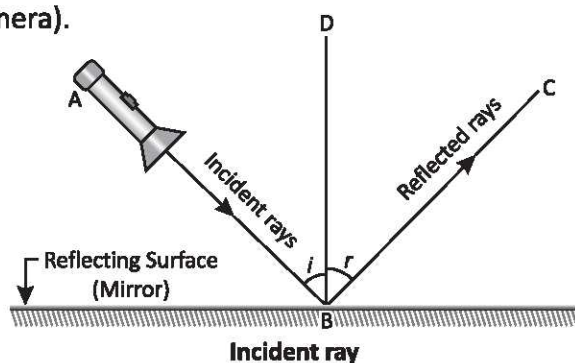
Image	Shadow
It is formed by intersection of reflected rays.	Shadow is formed when light does not reach behind the object.
Image is seen when reflected rays approach to observer's eyes.	No light enters the observer's eyes.
Image gives more information such as colour, structure, etc.	Shadow does not provide any such information.
Image can be straight or inverted.	Shadow is never inverted.

3. The image in a pinhole camera has the following characteristics :

- (i) It is inverted (upside down) as compared to the object.
- (ii) It is real (because it can be formed on a screen).
- (iii) It is of the same colour as the object.
- (iv) It can be smaller than the object, equal to the object or bigger than the object (depending on the distance of object from the pinhole camera).

4. **Incident Ray** : A ray light which travels from an optical medium towards mirror is called incident ray. In fig., AB is incident ray.

Reflected Ray : A ray of light which bounces off the mirror surface into the same optical medium in which incident ray was travelling is called reflected ray. In fig., BC is the reflected ray.



Point of Incidence : The point on the mirror surface where the incident ray strikes or the reflected ray bounces off is called point of incidence. In fig., point B is the point of incidence.

Normal : The perpendicular drawn at the point of incidence to the surface of mirror is called normal. In fig., BD is normal to mirror surface.

Angle of Incidence : The angle which the incident ray makes with the normal is called angle of incidence. In fig., $\angle ABD = \angle i$ is the angle of incidence.

Angle of Reflection : The angle which the reflected ray makes with the normal is called angle of reflection. In fig., $\angle DBC = \angle r$ is the angle of reflection.

5. (a) Image formed is virtual. It means the image cannot be taken on screen.
- (b) Image is of the same size as that of the object.
- (c) Image is formed as far behind the mirror, as the object is in front of it.



- (d) Image is laterally inverted. It means left hand side of the object appears as right hand side of the image and vice versa.
- (e) Image is erect. It is the same side up as the object.

Uses of Plane Mirrors :

- (a) Plane mirrors are used at home to view ourselves.
- (b) Plane mirrors are used in making periscopes.
- (c) Plane mirrors are fixed on the walls of certain shops (like jewellery shops) to make the shops look bigger.

HOTS TYPE QUESTIONS

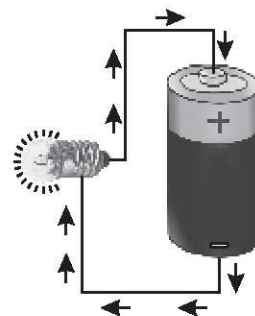
1. (a) The shadow of the pencil will be small when the pencil is taken close to the wall and away from the candle.
 (b) The shadow will be big in size when the pencil is taken closer to the candle.
 (c) To get the same size shadow as the pencil is, adjust the distance between the wall, pencil and candle at equal distances.
2. (a) Shadow
 (b) Image
 (c) The shadow is black but the image is of the same colour as the man.

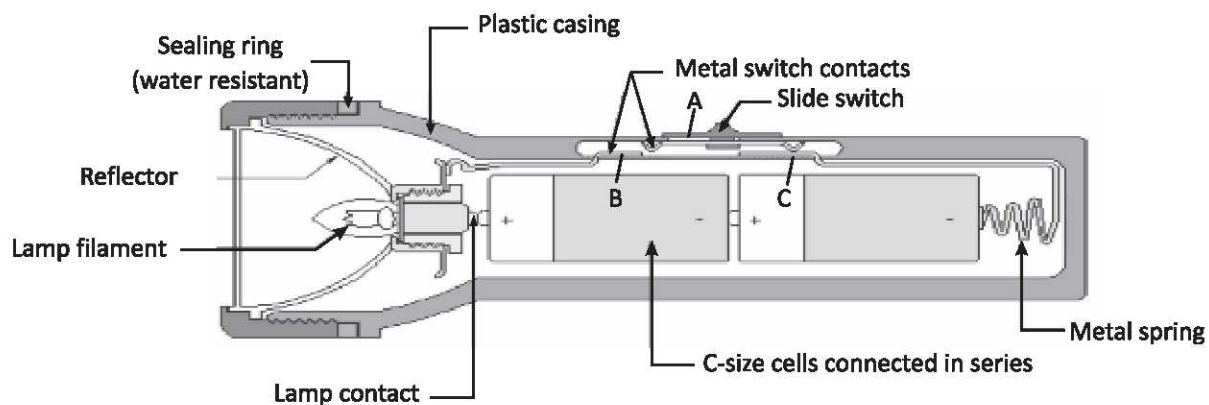
12

Electricity and Circuits

LONG ANSWER TYPE QUESTIONS

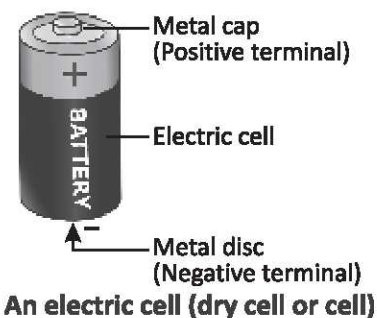
1. An electric circuit is a path along which electricity can flow. We can make a simple electric circuit by using a cell, a torch bulb and two pieces of wire (called connecting wires). On connecting the torch bulb between the two terminals of the cell, the bulb lights up or glows. The bulb lights up because electricity flows through its filament. Actually, electricity (or electric current) from one end of the cell flows along the wire through the bulb and then back to the cell along the other wire. The wires and bulb form a continuous path between the two terminals of the cell for electricity to flow through. This path is called an electric circuit.
2. A torch contains a simple electric circuit. In a torch, two (or more) cells are connected to a torch bulb through a sliding switch. When the torch is needed to provide light, we close the sliding switch by pushing it forward so that the circuit is completed and the bulb lights up. When the torch light is not needed, the sliding switch is opened by pushing it backwards so that the circuit breaks and the bulb is turned off. The two cells in a torch are joined like this : The positive terminal of one cell is always kept in contact with the negative terminal of the other cell.





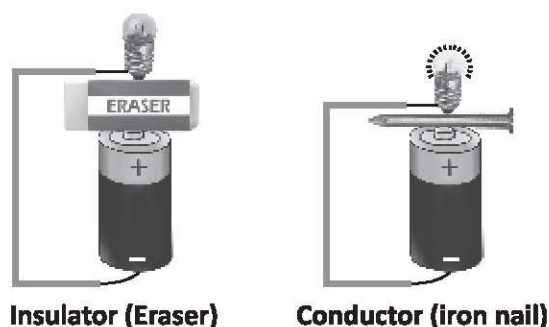
Inside view of an electric torch

3. The electric cell is a cylindrical device having a small metal cap on one side and a metal disc on the other side. The metal cap is positive terminal of the electric cell whereas metal disc is the negative terminal of the electric cell. An electric cell has a number of chemicals stored in it. The electric cell produces electricity from the chemicals stored inside it. When all the chemicals in the electric cell are used up, the electric cell stops producing electricity.



An electric cell (dry cell or cell)

4. For this we require a tester circuit which is a simple circuit consisting of bulb, wires and cell or battery. The material to be tested is connected within the circuit. If the material is a conductor, the bulb glows and if the material is an insulator the bulb will not glow.



5. A human body experiences an electric shock when high voltage electricity passes through it.

Precautions :

- Do not touch bare part of an electrical wire.
- Make sure you wear rubber slippers while handling or turning on and off electrical equipments.
- Keep your hands dry while handling electrical equipment.

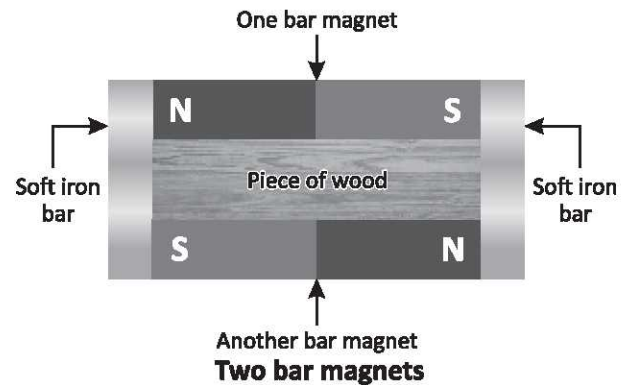
HOTS TYPE QUESTIONS

1. (a) No
(b) The two cells are joined wrongly. Actually, the positive terminal of one cell should be joined to the negative terminal of the second cell.
2. Fused bulb (having broken filament).

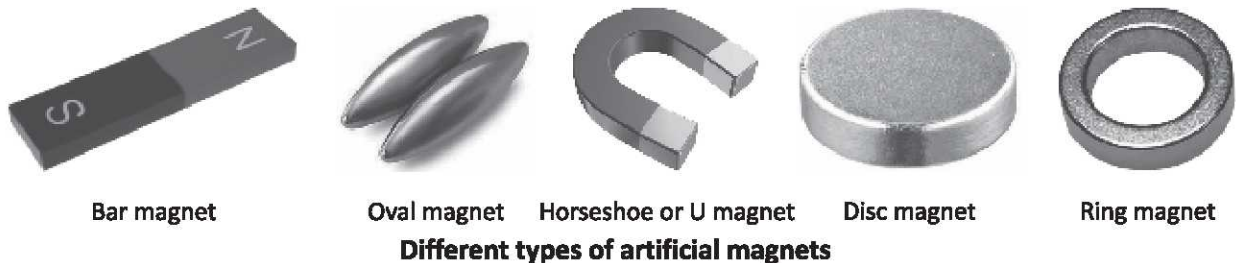


LONG ANSWER TYPE QUESTIONS

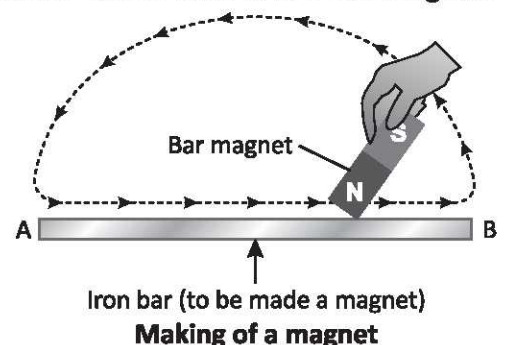
- After using it, two bar magnets are stored in pair so that :
 - The poles of two magnets lie opposite to each other.
 - A wooden piece should be kept between the two magnets.
 - Soft iron bars should be kept across the ends of two bar magnets, otherwise they will attract other magnetic objects.



- Artificial magnets are those magnets which have been imparted the properties of magnet by artificial means.



- Magnets were discovered by chance by an old sphered named Magnes who lived in ancient Greece. Magnes used to take his herd of sheep and goats to a nearby mountain for grazing. He always took a wooden stick with him to manage his herd of sheep and goats. The wooden stick had an iron casing at its lower end. One day, Magnes suddenly felt that something was pulling his stick away from him. It appeared as if the iron covered end of stick was being attracted by a rock. Magnes had to pull hard to free the iron end of stick from the rock. This rock which behaved like a magnet was given the name 'magnetite'. Magnetite rock contains iron. Magnets were named so after the name of shepherd Magnes.
- The easiest way of making a magnet is by the 'stroking method'. Take an iron bar (or an iron strip) which is to be made a magnet and keep it on a wooden table. Also take a bar magnet. Hold one end of the bar magnet in your hand and keep the other end of bar magnet at one end A of the iron bar (as shown in the figure). Without lifting, move the lower end of bar magnet along the whole length of iron bar till you reach its other end B. After reaching end B, lift the bar magnet and bring its same end (or same pole) again at the starting end A of the iron bar. Move the bar magnet again along the whole length of iron bar in the same direction (from A to B) as you did before.



Repeat this process of stroking the iron bar with the same end of bar magnet in the same direction about 30 to 40 times. The iron bar will then become a magnet. We can check whether the iron bar has become a magnet or not by bringing it near iron filings (or paper clips). If the iron filings (or paper clips) cling to the end of the iron bar, then it has become a magnet. If not, then we should continue the process of stroking the iron bar with bar magnet for some more time in the same way as before.

5. (i) Magnets are used in making magnetic stickers.
- (ii) Magnet in a magnetic compass can help find the direction.
- (iii) Magnets are used for separating iron from scrap in junk yards.
- (iv) Magnet is used in speakers, microphones, computer monitors and picture tubes of television.
- (v) Magnet is used in cassettes, ATM cards, credit cards and debit cards to store information.

HOTS TYPE QUESTIONS

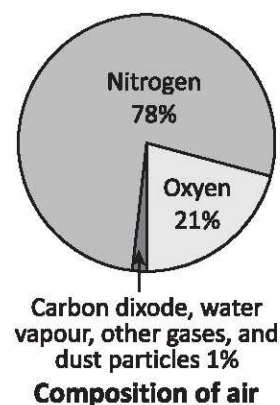
1. (a) North (N) pole (b) South (S) pole
2. Like poles (or similar poles) of magnet A and magnet B are facing each other causing repulsion between the two magnets. This force of repulsion makes the magnet A float above magnet B.

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Natural Resources : Water and Air

LONG ANSWER TYPE QUESTIONS

1. Air is a mixture of gases. It contains nitrogen (78%), oxygen (21%) and 1% of other gases like carbon dioxide, neon, helium and argon. Smoke and water vapour in the air are variable according to the temperature, rain and other physical conditions.
2. Respiration by animals and plants, and burning of fuels by human beings uses oxygen from air and puts carbon dioxide into air. On the other hand, photosynthesis by plants uses carbon dioxide from air but puts back oxygen into air. In this way, the plants and animals help in maintaining the balance of oxygen and carbon dioxide gases in air (or atmosphere). This shows the interdependence of plants and animals in nature.
3. (i) Water is used in homes for drinking, cooking food, washing utensils, cleaning floor, brushing teeth, bathing, washing clothes, flushing toilets and watering plants.
- (ii) Water is used in agriculture of growing food.
- (iii) Water is used in industries for producing almost all the things that we use.
- (iv) Water is used to keep things cool.



- (v) Water in the rivers and the seas is used for transporting passengers and goods from one place to another by boats, sailing boats, motor boats and ships.
 - (vi) Water of rivers and the sea helps in the dispersal of seeds of several plants and trees.
 - (vii) Water is used to generate electricity.
4. (i) Air is used by human beings for breathing (or respiration).
(ii) Air is used for burning fuels (like wood, coal and kerosene, etc.) to make fire.
(iii) Compressed air is used to fill tyres of various kinds of vehicles such as bicycles, scooters, cars, buses, trucks and aeroplanes. The air is also used for inflating balloons and footballs.
(iv) Air helps in the dispersal of seeds and pollen of flowers of several plants.
(v) Air plays an important role in water cycle in nature.
(vi) Air helps in the movement of yachts (sailing boats), parachutes, gliders and aeroplanes.
(vii) Air helps the birds, bats and insects in flying.
5. Rains give us many advantages. For example :
- (i) Rains bring relief by cooling the environment after hot summer days.
 - (ii) The sowing of many crops depends on the arrival of rains during monsoon.
 - (iii) Rains provide water in the rivers and dams of hydroelectric power plants.
 - (iv) Rains fill the lakes and ponds which act as sources of water.
 - (v) Rains are also responsible for the groundwater which gets stored under the surface of earth.

The excessive rainfall due to heavy rains leads to floods.

HOTS TYPE QUESTIONS

1. (a) Photosynthesis by plants (b) Respiration by plants and animals; Burning of fuels.
2. Rice is cooked in water. The heat supplied during cooking converts water into steam. On opening the pot of freshly cooked rice, condensation of steam occurs to form tiny drops of water on the underside of its lid.

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Waste Management

LONG ANSWER TYPE QUESTIONS

1. Difference between biodegradable and non-biodegradable substances :

Biodegradable	Non-biodegradable
These are wastes that decompose by natural process.	These are wastes that do not decompose by natural process.
It does not add to the bulk.	It adds up to the bulk.



Biodegradable	Non-biodegradable
It can be recycled.	It cannot be recycled.
Plant and animal remains are examples of such wastes.	Plastic, rubber, metals are examples of non-biodegradable wastes.

2. We can reduce the production of wastes by adopting the following practices :
- Try to buy only what you need.
 - Get broken items repaired so that you can reuse them.
 - Use both sides of paper.
 - Carry your cloth bag while shopping.
 - Start a compost pit in your kitchen garden or in a medium-sized wooden box. Dump kitchen waste like egg shells, leftover food, vegetable and fruit peels and dried leaves in the pit to make compost.
3. Composting is a process in which rotted plant and animal waste gets converted into manure by the action of microorganisms, mainly bacteria and fungi. The manure is rich in carbon and nitrogen. Composting is a cheap, clean, and safe method.

Benefits of Composting :

- Compost allows the soil to retain more plant nutrients.
 - It supplies essential elements needed by the plants.
 - It helps to reduce the adverse effects of the excessive use of chemical fertilisers.
 - It aids in preventing soil erosion by keeping the soil covered.
 - It helps in controlling the growth of weeds in the garden.
4. Demerits of plastics are :
- Plastics do not rot (or decompose) in nature on their own. So, the plastic bags (polythene bags) thrown away carelessly on roads and other places get into drains and sewers. These plastic bags block the drains and sewers causing the dirty drain water to spill on the roads.
 - Some people fill household garbage in plastic bags and throw it away. When stray cattle look for food in this thrown garbage, they also eat up plastic bags. The eating of plastic bags harms the cattle. Sometimes the cattle even die because of eating plastic bags.
 - Sometimes the plastic bags which have been used earlier for storing poisonous substances and then thrown in garbage dumps are picked up by ragpickers, washed and sold to shopkeepers in the market. The use of such plastic bags for packing and storing cooked food materials can harm our health.
 - The gases given out during the burning of plastics can even cause cancer disease in humans.
5. It is possible to reduce the problems relating to disposal of garbage, if we adopt the following means :
- The garbage should be thrown at proper places. It should not be thrown on streets, roads, parks, etc.
 - The part of the garbage that can be reused should be separated from the one that cannot be used. The non-useful components should be disposed off at landfill areas.



(c) Follow the rule of Four R's :

- A. **Refuse** : Say no to plastic bags as far as possible. Refuse to accept one. Carry a cloth bag with you.
- B. **Reduce** : Use the things in minimum amount which is necessary to fulfil your requirement.
- C. **Reuse** : It means use of things again and again. For example, plastic bottles of jam or pickle can be used for storing things in the kitchen.
- D. **Recycle** : The things such as plastic, paper, glass and metals separated from the garbage may be recycled to make new things instead of dumping them along with other wastes.

HOTS TYPE QUESTIONS

1. (a) (i) Non-biodegradable (ii) Biodegradable (b) (i) Polythene sheet (ii) Paper (c) Action of micro-organisms present in soil.
2. Yes, Compost is better to use instead of chemical fertilizers because :
 - (i) Compost is eco-friendly while chemical fertilizers destroy the natural composition of soil and have adverse effect on human health.
 - (ii) The production of compost is cheap, easy and harmless while that of chemical fertilizers is costlier, problem making, *i.e.*, adds pollution to environment.
 - (iii) Composting helps in recycling of matter and also disposal of garbage. Leaching of chemical fertilisers causes water pollution and death of aquatic organisms.



NOTES



