

Junior SCIENTIST

8

CHAPTER
1

Crop Production and Management



EXERCISE

A. Tick (✓) the correct option :

1. (a) 2. (a) 3. (d) 4. (b) 5. (b)
6. (b) 7. (c) 8. (a)

B. Fill in the blanks :

1. agricultura 2. summer crops 3. cultivator
4. tractor 5. trans plantation 6. Pump
7. weeds 8. Weedi cider

C. State whether the following statements are True or False :

1. True 2. False 3. True 4. True 5. True 6. False
7. False 8. True

D. Match the following columns :

1. (d) 2. (c) 3. (f) 4. (a) 5. (b) 6. (g)
7. (e)

E. Answer the following questions in brief :

1. The process of growing crops and rearing animals for food, clothing and other useful products is called agriculture.
2. The common agricultural practices are listed below :
- (i) Preparation of soil
 - (ii) Selection and sowing of seeds
 - (iii) Addition of manure and fertilisers
 - (iv) Irrigation (watering of crops)
 - (v) Protection of crops form weeds and pests.
 - (vi) Harvesting, threshing and winnowing.

(vii) Storage.

3. (i) Ploughing helps in bringing nutrients rich soil to the top for plant use.
- (ii) Ploughing helps the soil to retain moisture for a longer duration.

4.

S. N.	Manure	Fertilisers
1.	It is clean and does not pollute the soil.	Overuse may lead to toxicity and reduction of soil fertility.
2.	Storage is complicated.	Can be easily stored if kept away from the moisture.
3.	Provides favorable conditions for growth of microbes.	Does not provide favorable conditions for growth of microbes.
4.	Manure can be prepared in the fields.	A fertiliser is prepared in factories.

5. Fertilisers are man-made chemical substances that contain one or more nutrients which are essential for the growth of plants.
6. The removal of unwanted plants (weeds) from the field in which crop plants are grown is called weeding.
7. Advantages of using manure :
 - (i) It improves the texture of the soil.
 - (ii) It increases the number of friendly microbes.
 - (iii) It makes the soil porous due to which exchange of gases becomes easy.
 - (iv) It improves the water retention capacity of the soil.
 - (v) It does not affect the chemical properties of the soil like its pH value, etc.

8. **Rabi Crops** : These crops are sown during October-December and harvested during March-April. For example, Wheat, gram pea and mustard. Rabi crops are also known as winter crops.

Kharif Crops : These crops are sown during June-July and harvested during September-October. For example, paddy, maize, *bajra*, soya bean and cotton. Kharif crops are also called summer crops.

F. Answer the following questions in detail :

1. (a) **Harvesting** : The process of cutting the mature crop to gather grains is known as harvesting. In harvesting, crops are pulled out close the ground. It usually takes 3 to 4 months for a cereal crop to mature. Harvesting can be done manually by using a sickle. It can also be done by using a machine called as harvester.
- (b) **Threshing** : The process of separating the grains from the straw and chaff is called threshing. This can be done with the help of a machine called combine which is in fact combined harvester and thresher.

- (c) **Winnowing** : Farmers with small holdings of land do the separation of a grain and chaff by a process called winnowing. This process involves dropping the grain from a height allows the lighter substances to fly away leaving the heavier grains which fall on to the ground.
- (d) **Storage** : Grains are first dried in the sun and then packed in gunny bags or metallic bins to be stored in godowns. This prevents the attack by insects, pests, bacteria and fungi. The large scale storage of grains is done in silos and granaries to protect them from pest like rats, microbes and insects. Dried neem leaves are used for storing food grains at home.
2. The supply of water to soil for assisting growth of crops at regular intervals is called irrigation. The two modern and most economic methods of irrigation are sprinkler system and drip system.

Sprinkler system : This method is useful for the uneven land where sufficient water is not available. The water is allowed to flow through the main pipe under pressure with the help of a pump. It escapes from the rotating nozzles. This system is very useful for sandy soils.

Drip system : Drip irrigation is also known as trickle irrigation. In this system, the water falls drop by drop just at the root points. This method is suitable for watering fruit plants and trees. It is a good method of watering plants in regions where water is scarce. There is no wastage of water in this method.

3. Sowing in the process of planting seeds in the prepared soil. Different methods are adopted for sowing the seeds like broadcasting, using drills and transplantation.

Broadcasting (Manual sowing) : It is the ancient method of sowing seeds in which the seeds are scattered by hands. This method has a disadvantage that the seeds are not evenly distributed and lie too close to the surface. Though seeds get covered with soil, but their problem of uneven spacing remains.

Using a seed drill : This method is quicker and a better way of sowing seeds. A seed drill is a funnel-shaped bowl connected to a series of long tubes that have narrow holes. Seeds are put into the funnel. As the plough makes furrows in the soil, the seeds are deposited in the soil by the drill. The seed drill sows the seeds at equal distances and in proper depth. This helps the seeds to get covered by the soil properly and prevent them from being eaten by birds. Sowing by using a seed drill saves time and labour.

4. **Crop rotation** is a method of growing two or more crops alternatively on the same land in the same season. For example, after growing wheat for a season, a legume crop like peas, gram and groundnut is grown on the same land. The roots of these leguminous plants have nitrogen-fixing

bacteria called Rhizobium. These bacteria help to convert atmosphere nitrogen into water soluble nitrogen compounds that can be used by the plants. The soil is then ready for the next crop.

Mixed cropping involves growing two or more crops simultaneously in the same field. The crops are selected on the basis of the fulfillment of the nutrient requirement of the other crop. Any leguminous crop such as, peas or beans and a cereal crop such as, wheat or rice can be grown together in the same field.

5. Ploughing and leveling are the techniques used for preparing soil before the seeds are sown.

Ploughing : The preparation of soil by cutting, loosening and turning the soil in the fields is called tilling or ploughing. Ploughing is done by using wooden or iron ploughs that are either drawn by cattle or tractors. The wooden plough has been in use for thousands of years in agriculture. But recently, it is being replaced by iron plough.

Levelling : The ploughing of a field makes the surface of the field rough which can disrupt the circulation of water at the time of irrigation and sowing the seeds at equal depth. It also results in the formation of crumbs. *i.e.* big lumps of soil. These lumps are broken or crushed down using a wooden planks or iron planks called levellers. They help to level the soil. This practice is called levelling.

6. Rearing and breeding livestock on a large scale to obtain food and other products from them is called animal husbandry. Different varieties of food products that we get from animals are as follow :

- (i) **Milk** : Animals like cows, buffaloes and goat which provide us milk are called as milk animals. For example, paneer, cheese, cream, butter, curd, ghee, etc.

- (ii) **Eggs** : We get eggs from birds like hen, duck, etc. But hens are the main source of eggs.

- (iii) **Honey** : This is the food product obtained from honey bee. They collect nectar from different flowers, mix it with a secretion from their mouth and convert it into honey. Bees store this honey in their beehives. Rearing of honey bees on a large scale is called apiculture.

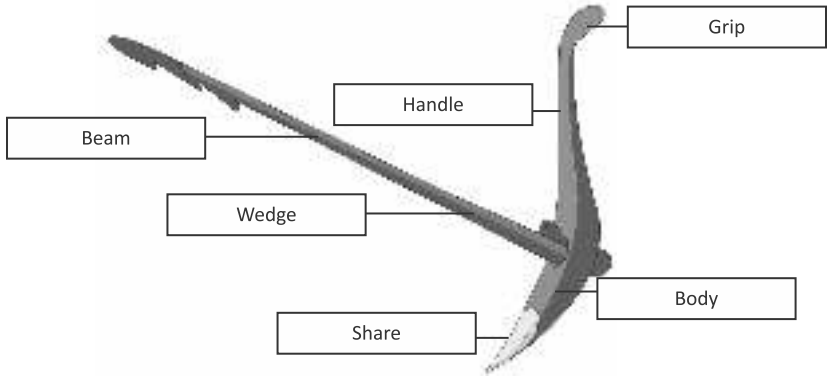
- (iv) **Meat** : Flesh of animals is called as meat. We get this from hen duck, sheep, goat, pig, cow, etc.

- (v) **Sea food** : Fish, prawns, crabs also provide us their meat as food. Rearing and breeding of fishes on a large scale is called pisciculture.



Learning With Fun

A. Picture talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

CHAPTER 2

Microorganisms : Friend and Foe



EXERCISE

A. Tick (✓) the correct option :

1. (d) 2. (d) 3. (d) 4. (a) 5. (d) 6. (c)
7. (a) 8. (a)

B. Fill in the blanks :

1. microorganisms 2. Bacteria 3. parasitic
4. animals cell 5. casein 6. Antibiotics
7. immunity

C. State whether the following statements are True or False :

1. False
2. False
3. True
4. True
5. True
6. False
7. True

D. Match the following columns :

1. (e)
2. (g)
3. (c)
4. (d)
5. (h)
6. (a)
7. (b)
8. (f)

E. Answer the following questions in brief :

1. Pond water and soil.
2. Microbes can be seen only with the help of microscope.
3. Bacteria, fungi, protozoa, algae and viruses.
4. No, microorganisms cannot be seen with the naked eyes. They can be seen only with the help of microscope.
5. Spherical, rod-shaped, spiral shaped, comma-shaped.
6. Diseases that can spread from an infected person to a healthy person through air, water, food or physical contact are called communicable diseases.
7. Rhizobium
8. The process of converting of atmosphere nitrogen into nitrogenous compounds mainly nitrates and making it available for plants is called as nitrogen fixation.

F. Answer the following questions in detail :

1. Microorganisms are useful to human beings in many different ways. They are used in :
 - (i) Making food items such as breads, curd and cake.
 - (ii) Alcoholic beverages etc.
 - (iii) Preparing medicines.
 - (iv) Improve soil fertility.
 - (v) Cleaning the environment, breakdown organic wastes.
2. Food preservation is the process of treating food items to slow down or stop the growth of microorganisms to maintain the quality, flavour, colour and texture of the food item so that these can be stored for a longer time. We can preserve food items in our home by adopting some simple food preservation methods:
 - (i) **Sun drying** : Microorganisms need moist conditions to grow and dry condition inhibits their growth. The food grains like cereals are sun dried before their storage.
 - (ii) **Storage and Packaging** : Day fruits and vegetables are sold in sealed air tight containers to prevent the growth of microorganisms. The air tight containers does not allow their growth.

- (iii) **Heat and cold treatments** : Heating is a simple method of preservation used in our homes for protecting milk from spoilage and for killing germs in water. Similarly, we keep our food in the refrigerator. Low temperature inhibits the growth of microbes. So we store many food items like milk, curd, cooked food, raw vegetable and fruits in refrigerator to store them for a longer time.
- (iv) **Bottling and canning** : It is a method of preserving drinks, colas, beverages and other products, which are to be stored under low temperatures. Carbon dioxide is added as a preservative in some cold drinks.
- (v) **Preservation by sugar** : Jams, Jellies and squashes are preserved by sugar. Sugar reduces the moisture content which inhibits the growth of bacteria that spoils the food.
3. Algae are simple green plants like organisms having no true root, leaves and stem. They contain chlorophyll which makes Capable of synthesizing their own food by the process of photosynthesis. They are found in both fresh water and sea water. Algae can be unicellular as well ax multicellular. The size of algae can vary from 1-micron to several meters as in large sea-weeds. Algae are also called grass of water because they remain floating on the surface of water. For example, Diatoms, *Volvox*, *Chlamydomonas*, *Spirogyra* and *Fucus*.
4. Microorganisms present in the soil help in the recycling of nitrogen in the environment. The microbes like *Rhizobium*, *Nitrobacter* are blue green algae help in fixing nitrogen from the atmosphere to enrich soil and to increase its fertility.
5. The process by which nitrogen in the atmosphere is passed into the soil and life forms and then released back into the atmosphere is called the nitrogen cycle. It can be fixed in the following ways:

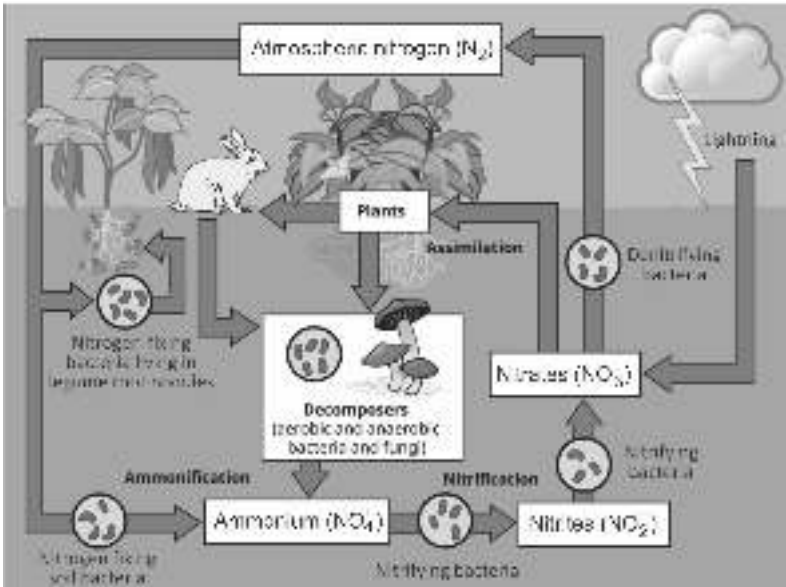
Nitrogen fixation by bacteria : The Rhizobium bacteria, living in the root nodules of legume plants such as beans and peas, with which it has a symbiotic relationship, fix nitrogen from at the atmosphere and convert it into compounds of nitrogen. Once nitrogen is converted into these usable compounds, it can be utilised by plants from the soil through their root system.

Decaying bacteria : When plants and animals die, bacteria and fungi; present in the soil breakdown protein, amino acids and other nitrogen containing compounds of dead and waste organic matter to form ammonia. This process is called ammonification.

Nitrifying bacteria : The ammonia thus formed is converted to nitrites and then to nitrates by the action of nitrifying bacteria such as *Nitrosomonas*

and *Nitrobacter*. This process is called nitrification. These nitrates are again absorbed by the plants and the cycle is repeated.

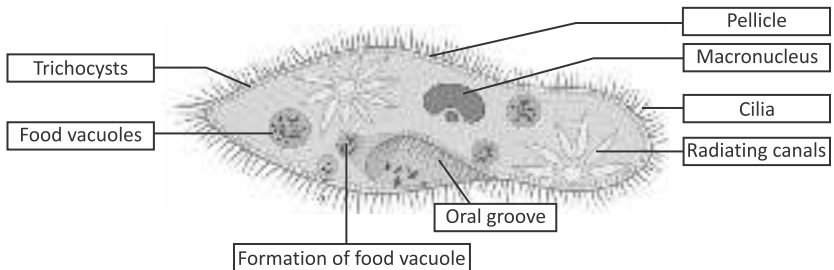
Nitrogen fixation by lightning : Lightning also helps in fixing atmospheric nitrogen into the soil. The temperature and pressure during lightning converts atmospheric nitrogen into nitrogen oxide. These nitrogen oxides combine with rain water to form nitric acid. The acid thus formed, reacts with alkalis present in the soil to form nitrates, which are then finally absorbed by the plants.



Nitrogen cycle

Learning With Fun

A. Picture talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

CHAPTER
3 Coal and Petroleum

EXERCISE

A. Tick (✓) the correct option :

1. (b) 2. (d) 3. (c) 4. (c) 5. (d) 6. (c)
7. (c) 8. (a)

B. Fill in the blanks :

1. fossil 2. peat 3. lignite
4. Digboi 5. blackgold 6. CH₄
7. Natural

C. State whether the following statements are True or False :

1. True 2. True 3. False 4. False 5. False 6. True 7. True

D. Match the following columns :

1. (e) 2. (a) 3. (b) 4. (f) 5. (g) 6. (c) 7. (d)

E. Answer the following questions in brief :

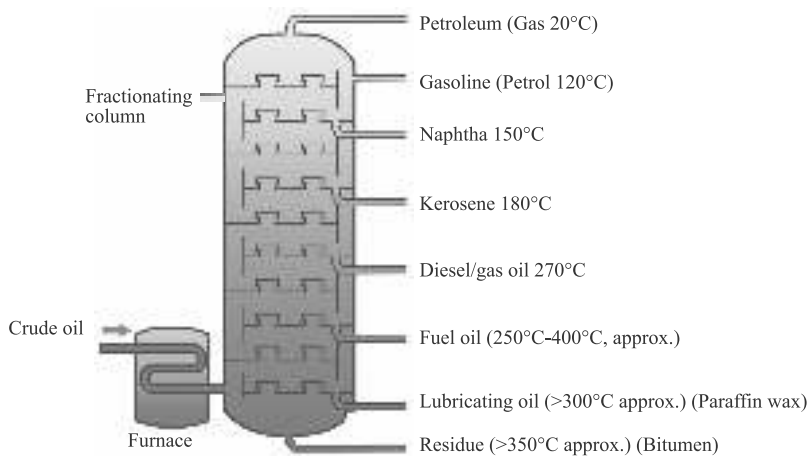
1. Coal and petroleum
2. Natural gas is another fossil fuel, like coal and petroleum, found under the crust of the earth above the layers of petroleum.
3. Natural resources which are present in unlimited quantities nature are called renewable resources. They can renew themselves if they are used sustainably. These resources are not likely to be exhausted by human activities. For example, air, water, sunlight, etc.
- Natural resources which are limited in nature and can not be renewed or regenerated as fast as they are consumed and used up are called non-renewable resources. They can get exhausted by human activities. For example, coal, petroleum, forest, minerals, etc.
4. (i) It is useful in the manufacture of glass, steel, plastics, paint and other products.

- (ii) It is used as a domestic fuel for cooking food.
 - (iii) It is an alternative to petrol that is being used as a fuel for transport vehicles because it is less polluting.
 - (iv) It is the major source of electricity generation through the use of gas turbines steam turbines.
5. The process of separating crude oil into various usable constituents is known as refining of petroleum.
 6. The different types of coal are peat, anthracite, bituminous and lignite.
 7. Compressed Natural Gas.

F. Answer the following questions in detail :

1. Coal was formed from the remains of plants that live in swampy forests of scale trees, giant ferns, horsetails, and club mosses over millions of years ago. Layer upon layer of these plants died and were compressed and then covered with soil. As the layers were successively covered, their access to the air was limited and this stopped the full decomposition process creating peat. Coal was formed due to the compression of the peat at high temperature and pressure. As coal was formed from the remains of vegetation, it is also called fossil fuel. Hence, the gradual process of conversion of dead vegetation into coal is called carbonisation. The period during which this process of coal formation takes place is called carboniferous age.
2. The process of heating coal to high temperature (about 1000°C) in the absence of air is called destructive distillation of coal. It is called destructive because the chemical composition of the end product is distinctly different from that of the input material. The main by-products of this process are coke, coal tar, coal gas and ammoniacal liquor.
3. Petroleum is formed by the decomposition of remains of plants and animals buried under the sea millions of years ago. When these living organisms died, they were dumped into sea floor, got buried and squeezed under the layers of sedimentary rocks. Immense heat and pressure transformed these remains into petroleum and natural gas. Natural gas always occurred above petroleum. The petroleum thus formed got trapped between two layers of impervious rocks forming an oil trap. They are obtained by drilling holes through the rocks. Such places where reservoirs of petroleum are found and petroleum is extracted out by drilling holes are known as oil wells.
4. At the refinery, the crude oil mixture is separated or 'fractionated' into different constituents by a process called fractional distillation. In this process, crude oil is introduced into a tall cylindrical column, known as fractionating column. These columns have horizontal trays attached to

them. The crude oil is heated upto about 400°C till it vapourises. As the vapours of crude oil rise in the fractionating column, they begin to cool and condense into liquid form. The temperature of the column varies from 400°C at the bottom to 25°C at the top. The different components of petroleum are condensed and separated at different heights in the fractionating column because they have different boiling points and get collected into separate trays. Remaining uncondensed petroleum passes out of the column. Thus, fractional distillation makes use of difference in boiling points to separate mixtures of a compound.



Fractional distillation

5. Natural gas is another fossil fuel, like coal and petroleum, found under the crust of the earth above the layers of petroleum. It is compressed to a high pressure and stored in hard cylindrical or spherical containers for distribution. It is then known as compressed Natural Gas or CNG.

Uses of natural gas

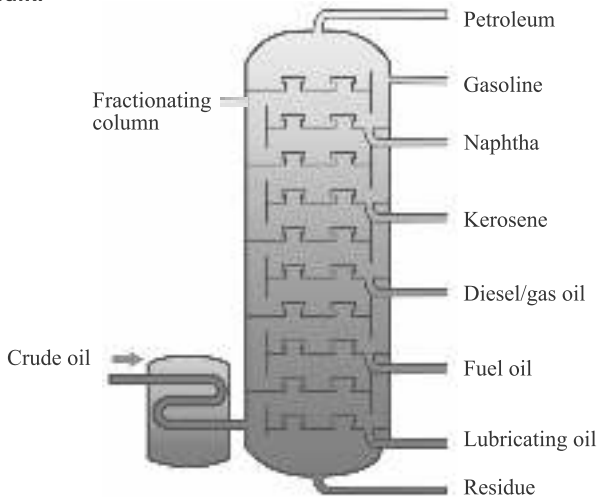
- It is useful in the manufacture of glass, steel, plastics, paint and other products.
- It is used as a domestic fuel for cooking food.
- It is an alternative to petrol that is being used as a fuel for transport vehicles because it is less polluting.
- It is the major source of electricity generation through the use of gas turbines steam turbines.
- It is used as a primary material for the manufacture of a number of chemicals and fertilisers.

6. The Petroleum Conservation Research Association (PCRA) of India has some tips for people on how to save petrol/diesel while driving:
- Drive the vehicle at a constant and moderate speed.
 - Ensure the correct tyre pressure for low consumption of fuel.
 - Switch off the engine of vehicle while waiting on traffic signals or at other places.
 - Ensure regular maintenance checks of the vehicle for less consumption of fuel.
 - Try to use public transport if your city offers a bus, train or subway system. Walking or riding bicycle helps us to exercise and also saves fossil fuel.
 - One solution to the depletion of non-renewable fossil fuel usages is to GO GREEN. Going green means living your life in a way that sustains current resources for future generations.



Learning With Fun

A. Picture Talk.



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.



EXERCISE

A. Tick (✓) the correct option :

1. (b) 2. (a) 3. (d) 4. (a) 5. (a) 6. (d)
7. (a) 8. (d) 9. (c)

B. Fill in the blanks :

1. combustible 2. spontaneous 3. CH₄
4. extreme 5. flame 6. non-luminous
7. smoke, ash 8. high

C. State whether the following statements are True or False :

1. False 2. False 3. False 4. False 5. True 6. False
7. True

D. Match the following columns :

1. (h) 2. (d) 3. (g) 4. (b) 5. (e) 6. (c)
7. (f) 8. (a)

E. Answer the following questions in brief :

1. Combustion is a chemical process of burning of a substance in the presence of air or oxygen with the liberation of heat and light.
2. (a) Substances that burn in air or oxygen to give off heat and light are called combustible substance. For example, wood, LPG, charcoal, petrol, diesel etc.

Substances that do not burn in air or oxygen to produce heat and light are called non-combustible substances. For example, iron, glass, sand, cement, water, etc.

- (b) Complete combustion occurs when the supply of air or oxygen is enough to support the burning of fuel.

Incomplete combustion occurs when the supply of air or oxygen is poor.

3. There are three conditions necessary for combustion : combustible substances, supporter of combustion, Ignition temperature.
4. (i) It should be cheap.
(ii) It should be readily available.
(iii) It should be safe to store, handle and transport.
(iv) The ignition temperature should be moderate, neither too high nor too low.

5. The middle zone of a candle flame gives us light.
6. The combustion of fossil fuels releases a large amount of carbon dioxide in the atmosphere. Carbon dioxide is a greenhouse gas, which is responsible for global warming. Global warming is rise in the overall temperature of earth's surface.
7. (i) Ensure an adequate air supply.
(ii) Ensure the appropriate combustion or temperature for fuel ignition.
8. Liquefied petroleum gas.

F. Answer the following questions in detail :

1. (a) **Fuel** : A substance which gives heat energy on burning in the presence of oxygen.
(b) **Calorific value** : The amount of heat energy produced on complete combustion of 1 kilogram of a fuel.
(c) **Ignition temperature** : The minimum temperature at which a substance catches fire.
(d) **Fire extinguisher** : A portable device which is often used to extinguish accidental fire.
2. The flame of a burner is blue when the air hole is open and it gets sufficient supply of oxygen. A blue flame is called a non-luminous flame as it emits very little light.

When the air hole is closed, the flame becomes yellow in colour due to insufficient supply of oxygen. A yellow flame is called a luminous flame as it emits a lot of light.

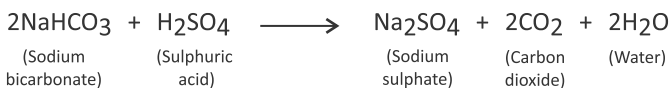
3. (a) **Rapid combustion** : It occurs when a substance burns rapidly and releases a large amount of heat and light within a very short time. For example, when a burning match stick is brought near cooking gas, the gas catches fire immediately and burns very quickly producing a lot of heat and light energy.
(b) **Spontaneous combustion** : It occurs when a substance catches fire on its own without the application of an external source of heat. For example, when phosphorous is left out in the open at room temperature for some time, it burns all by itself. Forests fires and fires in coal mines also occur because of spontaneous combustion.
(c) **Explosive combustion** : The combustion which is characterised by the sudden release of heat, light and sound accompanied by the liberation of a large amount of gas is called explosive combustion. The rapid expansion of the gases causes explosion and the production of sound. For example, burning of crackers produces a large amount of heat, light and sound.
4. The methods of extinguishing a fire involve the following:

Removal of the combustible substance : Removing the fuel is the most difficult task for most fires. For example, in case of fire in a building, the whole building becomes a fuel. So it is not possible to cut off the supply of fuel. Therefore, the firemen try to cut off air supply or bring down the temperature of combustible material below their ignition temperature.

Cooling the substance to below its ignition temperature : The best way to cool the substance is to dump water on the fire. Water is the most familiar and effective extinguishing material but it can be dangerous if used in a wrong situation. For example, water is a good extinguisher for burning wood, paper, etc.

Cutting off the supply of air : This can be done with the help of carbon dioxide gas, which is not a supporter of combustion. To control the electrical and oil fires, it is best to use carbon dioxide gas as an extinguisher. Since, carbon dioxide is heavier than oxygen, so it covers the flame like a blanket, cutting off the contact between the fuel and the oxygen.

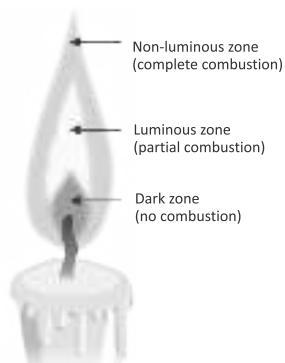
5. When we strike the knob of the extinguisher, the acid bottle breaks and the acid comes in contact with sodium bicarbonate solution. This produces carbon dioxide. Since, carbon dioxide is heavier than oxygen, so it covers the flame like a blanket, cutting off the contact between the fuel and oxygen due to which the fire gets extinguished.



6. A candle flame can be divided into three main zones depending on the amount of air it receives.

The Innermost Zone : This zone is just next to the wick. It is of black colour due to the presence of unburnt vapours of wax and carbon particles. There is no supply of air in this zone. This zone is the least hot part of the candle. This is also called the black zone.

The Middle Zone : This flame appears yellow in colour because of the incomplete combustion of wax vapours as there is inadequate supply of oxygen. This results in the formation of black deposits of unburnt carbon particles which glow when they get extremely hot. It is moderately hot zone of the candle flame. This zone emits the most light.

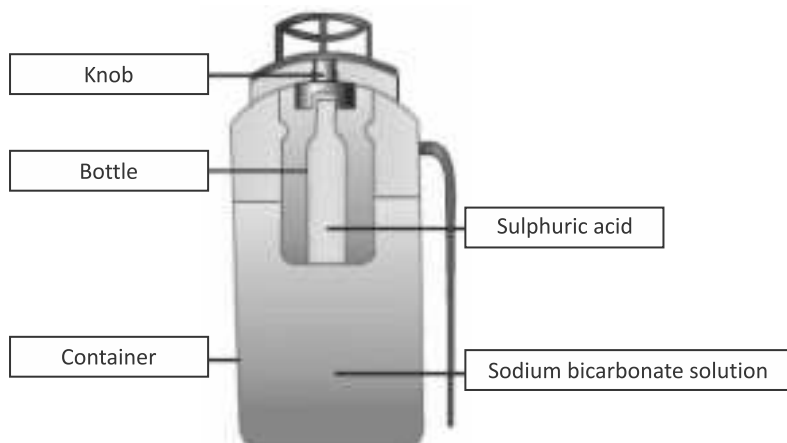


Different zones of candle flame

Outer Zone : This zone is blue and non-luminous. In this zone, complete combustion of wax takes place due to sufficient air around it. This is the hottest zone in the candle flame. This is called blue zone.

Learning With Fun

A. Picture Talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.



Conservation of Plants and Animals



EXERCISE

A. Tick (✓) the correct option :

- (a)
- (c)
- (d)
- (c)
- (d)
- (c)
- (a)
- (a)
- (d)

B. Fill in the blanks :

1. sal, wild mango 2. fuel 3. water
4. species 5. desertification 6. global
7. Tiger 8. extinct

C. State whether the following statements are True or False :

1. False 2. False 3. True 4. False 5. True 6. True
7. True 8. True 9. True

D. Match the following columns :

1. (e) 2. (b) 3. (c) 4. (f) 5. (a) 6. (b)

E. Answer the following questions in brief :

- All living things like plants, animals, human beings, microorganisms, their interrelationship and relationship with the biosphere is called biodiversity. The major threats to biodiversity are deforestation, pollution, climate change, invasion of non-native species and over exploitation.
- There are five main reason of loss of biodiversity : deforestation, pollution, climate change, invasion of non-native species and over exploitation.
- Species that are considered to be facing a very high risk of extinction in the wild are called endangered species. For example, bengal tiger, giant panda, snow leopard and asian elephant. Species that have disappeared and no longer exist any where on the Earth are called extinct species. For example, Quagga, dodo bird, labrador duck and tasmanian wolf.
- Seasonal movement of animals to avoid unfavourable conditions their natural habitats is called migration.
- Species of plant and animals that are exclusively found in a specific geographical area are called endemic species. Asiatic lion in gir forest, nilgiri tahr, malabar large spotted civet etc. are some endemic species in India.
- Reforestation.
- Due to deforestation, fewer trees are left which results in soil erosion. Due to removal of the top layer of the soil which is rich in humus and nutrients by soil erosion. The soil becomes less fertile and slowly gets converted into deserts.

8.

S. N.	Deforestation	Afforestation
1.	Deforestation means clearing forests and using the land for other purpose.	The restocking of the destroyed forests by planting new trees to restore the green forests is called reforestation.
2.	This is creating a tremendous impact on the environment.	This in turn increases the population of animal species which exhibit selective feeding habits.

9. The Red Data Book contains a list of rare and endangered species of plant and animals.

F. Answer the following questions in detail :

1. A biosphere reserve is a place meant for conservation of all life forms found in that particular area. Strict laws have been enacted all over the world to protect biosphere reserves from human exploitation. Biosphere reserves help in protecting wild population, traditional lifestyle of regional people and also domestication of plant and animal life. A biosphere reserve comprises of a number of national parks and wildlife sanctuaries. For example, the Pachmarhi Biosphere Reserve consists of one national park named Satpura National Park and two wildlife sanctuaries named Bori and Pachmarhi within it.
2. **National Parks :** National parks are large and diverse reserves owned by the government, which offers protection to plants, animals and many other aspects of the ecosystem. It also provides public recreations. Different wild animals like snow leopard, clouded leopard, marbled cat, panda, black bear, blue sheep, wild ass, toucan, musk deer, etc. are protected here from getting extinct. Corbett National Park, Kanha National Park, Kaziranga National Park, Periyar National Park, Bandhavgarh National Park are some of the national parks in India.

Wildlife Sanctuaries : Wildlife sanctuaries are special protected areas for conservation of flora and fauna with limited human activities. Killing animals and cutting trees in this area are strictly prohibited. Threatened wild animals like black buck, white eyed buck, elephant, python, rhinoceros, marsh crocodile and golden cat are preserved here. Bharatpur Bird Sanctuary, National Chambal Wildlife Sanctuary and Vedanthangal Bird Sanctuary are some of the famous sanctuaries of India.

3. Destruction of forest has the following adverse effects :

Droughts : Drought is a period when a particular region faces water shortage mainly due to the lack of rainfall. Deforestation leads to less number of trees on Earth. Carbon dioxide traps the heat rays reflected by Earth leading to global warming. As the temperature on the Earth increases, it disturbs the water cycle and reduces rainfall, which causes drought.

Increase in Global Warming : The trees utilize the greenhouse gases and help in maintaining the balance in the atmosphere. With constant deforestation, the ratio of greenhouse gases in the atmosphere has increased, adding to our global warming woes.

Desertification : Trees prevent soil erosion. Due to deforestation, fewer trees are left which results in soil erosion. Due to removal of the top layer of the soil which is rich in humus and nutrients by soil erosion. The soil

becomes less fertile and slowly gets converted into deserts. This is called as desertification.

Floods : When it rains, trees absorb and store large amount of water with the help of their roots. But due to deforestation, the water holding capacity of the soil reduces. Therefore, most of the water remains on the ground which in turn leads to floods.

4. The areas declared as protected areas by government are biosphere reserves, wildlife sanctuaries and national parks, zoological parks and botanical gardens.
 - (i) Biosphere reserves help in protecting wild population, traditional lifestyle of regional people and also domestication of plant and animal life. A biosphere reserve comprises of a number of national parks and wild life sanctuaries.
 - (ii) Killing animals and cutting trees in this area are strictly prohibited.
 - (iii) National parks offer protection to plants, animals and many other aspects of the ecosystem. It also provides public recreations.
 - (iv) Botanical gardens also keep record of extinct plants.
5. Tiger is one of the many species slowly disappearing from our forests. It is now under the endangered animals category. Hence the government launched a scheme called Project Tiger in April 1973.
6. The recycling process of paper is of great significance in saving trees because to make one tone of paper pulp, seventeen fully grown trees are required. Recycling of paper not only saves trees but in turn also saves energy and other resources to maintain the environment. Moreover, it also saves money and decreases the usage of harmful chemicals used in paper making. Paper can recycled five to seven times for use. If each one saves at least one sheet of paper in a day, we can save many trees in a year. For example, used paper can be sent back to the factories for recycling to produce new papers. Therefore, saving paper means saving trees.



Learning With Fun

- A. Answer is on the next page.
- B. **Research and Project :**
Do yourself.
- C. **Activity :**
Do yourself.
- D. **Group Discussion :**
Do yourself.

A. Picture Talk :





EXERCISE

A. Tick (✓) the correct option :

1. (d) 2. (b) 3. (d) 4. (d) 5. (d) 6. (b)
7. (d) 8. (a) 9. (a)

B. Fill in the blanks :

1. asexual 2. parents 3. embryo
4. umbilical cord 5. viviparous 6. land, water
7. caterpillar, pupa

C. State whether the following statements are True or False :

1. True 2. True 3. True 4. False 5. False 6. True
7. True

D. Match the following columns :

1. (b) 2. (d) 3. (e) 4. (f) 5. (a) 6. (c)

E. Answer the following questions in brief :

1. Reproduction is a process by which living organisms produce offspring of their own kind.
2. The zygote moves down to the uterus and divides repeatedly to form a ball of cells called embryo.
3. In sexual reproduction, two parents are involved to produce a new organism where as in asexual reproduction, only one organism can give rise to a new organism.
4. Testosterone, Estrogen and progesterone.
5. The transformation of larva into an adult through a series of drastic changes is called metamorphosis.
6. Animal which give birth to their young ones are called viviparous animals. For example, cow, dog, horse, cat and human beings. Animals which lay eggs are called oviparous animals. For example, snake, birds, frog, hen etc.
7. An asexual mode of reproduction in which a small bulb-like projection called a bud, grows on a parent and then separates to form a new organism, is called budding.
8. **Internal fertilisation** : When fertilisation takes place inside the female's body, it is called internal fertilisation. This is observed in human beings and other animals such as hens, cows and dogs.

External Fertilisation : When fertilisation takes place outside the female's body, it is called external fertilisation.

F. Answer the following questions in detail :

1. The methods of asexual reproduction in *hydra* and *amoeba* are as follow :

Budding : Budding is a form of asexual reproduction in which a small part of the body of the parent organism grows out as a small bulb-like projection called as bud. This bud, after being developed, detaches itself from the parent's body to grow independently into a new organism. It takes place in microorganisms such as yeast and Hydra.

Binary Fission : Binary fission is the simplest type of asexual reproduction in which a mature cell splits into two individual cells. It occurs in unicellular organisms like Amoeba, Paramecium, Euglena, etc.

2. Reproduction is a process by which living organisms produce offspring their own kind. The gametes of two opposite sex fuse together to produce a single cell structure the zygote. This process of fusion of male and female gametes to form a zygote is called fertilisation. The zygote undergoes cellular division and develops into an embryo, which further develops into a baby. Development continues and a baby eventually grows into a new individual.

3. The female reproductive system in humans consists of a pair of ovaries, a pair of oviducts, vagina and the uterus.

Ovaries are present in a pair in females and are placed on either side of the abdomen. Ovaries are stimulated during the onset of puberty and release one ovum in one menstrual cycle.

Oviducts (fallopian tubes) are a pair of thin and long muscular tubes that extend from the left and right superior corners of the uterus to the edge of the ovaries. They pick up and transport the ovum released by each ovary into the uterus. Fertilisation occurs here and thus, zygote is formed.

Uterus is a hollow muscular organ where the zygote matures and grows till it is ready to be born. It protects and nourishes the developing embryo. It is known as the womb, as it surrounds and supports the developing foetus during pregnancy.

Vagina is an elastic, muscular tube that connects the cervix of the uterus to the exterior of the body. The vagina functions as the receptacle for the penis during sexual intercourse and carries sperm to the uterus and fallopian tubes. It also serves as the birth canal by stretching, to allow delivery of the foetus during childbirth.

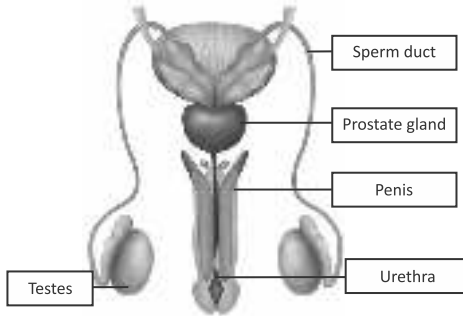
4. The process of fusion of sperm and egg is called fertilisation. Egg is released by the ovary and reaches one of the oviducts. The sperm in the testes of a man are introduced into the vagina of the woman through penis during copulation. In this way, millions of sperms are released into the

vagina at one time. The sperms are motile, so these come up through cervix into the uterus and then pass into the oviducts. Oviduct is the site of fertilisation. Only one sperm fuses with the ovum in the oviduct. From the oviduct, the zygote travels to the uterus where further development takes place. This fused cell is called zygote. The formation of zygote marks the beginning of a new individual.

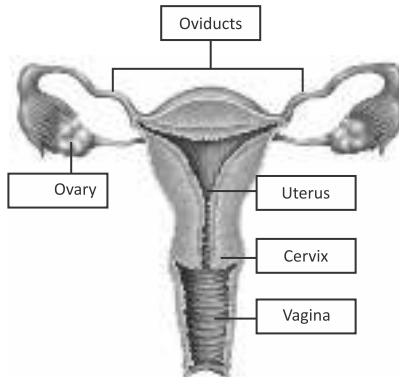
5. Female frogs lay their eggs in water. Tadpoles hatch from the eggs, swim and breathe using gills. At six weeks, external gills disappear and the tadpole breathes air with lungs. At eight weeks, the hind legs form. At 12 weeks, the front legs form, the tail shrinks, and the froglet can leave the water. The frog's tail is totally absorbed by it's body and the frog lives on land.

Learning With Fun

A. Picture talk



Male reproductive system



Female reproductive system

B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

**EXERCISE****A. Tick (✓) the correct option :**

1. (b) 2. (d) 3. (d) 4. (a) 5. (d) 6. (a)
7. (d) 8. (c)

B. Fill in the blanks :

1. teenage 2. larger 3. master
4. pituitary 5. puberty, 45-50 6. Ovulation
7. HIV

C. State whether the following statements are True or False :

1. True 2. True 3. True 4. False 5. False 6. True

D. Match the following columns :

1. (e) 2. (d) 3. (b) 4. (a) 5. (c) 6. (f)
7. (h) 8. (g)

E. Answer the following questions in brief :

- The period during which the body undergoes changes leading to reproductive maturity is called adolescence.
- Age at which reproductive organs become functionally active called puberty.
- Thyroxine.
- The chemical substances secreted by the endocrine glands is called hormones.
- (i) pituitary gland – Growth hormone
(ii) Thyroid gland – Thyroxine
(iii) Pancreas – Insulin
(iv) Adrenal gland – Adrenalinc
- Pituitary gland is located in the brain and is called the master gland.
- AIDS can be spread by using infected needles, blood transfusion from an infected individual, through infected mother to her baby by breast feeding or by having sexual contact with an infected person.

F. Answer the following questions in detail :

- Endocrine System :** The hormones are produced in special organs called endocrine glands. These endocrine glands together constitute the

endocrine system. The endocrine glands are also called as ductless glands because they release hormones directly into the blood stream, which are carried by blood to the target organ.

Menstruation Cycle : The cycle of producing and releasing mature ovum along with associated changes in the ovaries and uterus is called the menstrual cycle. The menstrual cycle takes place every 28-30 days.

Sex determination : If a sperm carrying X chromosome fertilises the ovum with X chromosome then the resulting baby is a girl. However, if a sperm carrying Y chromosome fertilises the ovum with X chromosome, then the resulting baby is a boy. Hence, males are responsible for the gender of the newly formed babies. Gender determination of an unborn baby is considered illegal in India.

2. The onset of puberty is marked by physical changes. The changes which take place during this period are as follows:

Development of Sex Organs : During the period of puberty in boys, the testes and penis develop completely and start producing sperms. In girls, the ovaries develop completely and start producing mature eggs.

Increase in Height and Weight : Puberty is characterised by a rapid increase in height and weight in both boys and girls. This is a period of a spurt in growth. Change in height is the most conspicuous change during this period. The long bones, i.e., the bones of the limbs (arms and legs), show sudden increase in length during this period.

Change in Body Shape : During puberty, boys have broader shoulders and wider chests due to faster growth of muscles. In girls, the pelvic region widens, hips broaden, breast begins to develop and increases in size.

Voice Change : During puberty, the voice box of boys (larynx) becomes larger and is seen as a swelling in the throat called Adam's apple. In girls, the voice box is smaller and their voice is high pitched. Later their voice becomes normal.

Secretion by Sweat and Sebaceous Glands : During puberty, the activity of sweat and sebaceous glands is increased. This results in secretion of more sweat and oil from the skin. This causes pimples and acne on the face of boys and girls.

Reaching Mental, Intellectual and Emotional Maturity : During puberty, mental, intellectual and emotional development takes place in both the genders. They become more independent, self-conscious and their way of thinking also changes. Sudden changes in the body may also develop some sense of insecurity or anxiety in the person. It may cause emotional swings such as joy, anger, boredom, worries, sadness, etc.

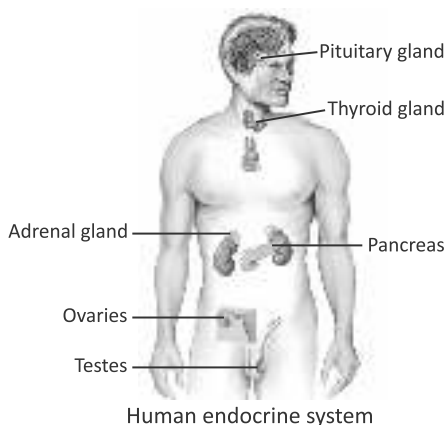
3. The process of release of a mature ovum by an ovary is called ovulation. The wall of the uterus becomes thick so as to receive the egg. In case it is

fertilised, it starts developing and results in pregnancy. In the absence of fertilisation, ovum and thickened uterine walls are disrupted and are shredded off bleeding. Bleeding continues for 3 to 6 days. The first menstrual flow begins at puberty and is called menarche. Around the age of 45 to 50 years, the menstrual cycle stops. This permanent stoppage of menstruation is called menopause. Menopause marks the end of the reproductive phase in the life of a female. Thus, menstrual cycle involves maturation of ovum, release of ovum, thickening of uterine wall and menstruation.

- The endocrine system release hormones directly into the blood stream, which are carried by blood to the target organ.

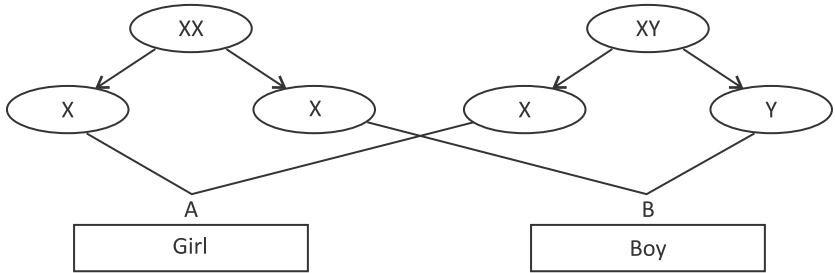
S.No.	Gland	Function(s)
1.	Pituitary gland	It stimulates the normal growth and development of the body. Oversecretion of growth hormone causes gigantism and under-secretion of the growth hormone causes dwarfism in human beings.
2.	Thyroid gland	Regulates general metabolism in the body and plays an important role in growth and development. Lack of thyroxine causes goitre.
3.	Pancreas	Regulates the blood sugar level in the body. Lack of insulin causes diabetes.
4.	Adrenal gland	Maintains correct salt balance in the blood, controls blood pressure and helps the body to fight stress.
5.	Testis	Promotes sperm production and development of secondary sex characters.
6.	Ovary	Oestrogen promotes egg production and development of secondary sex characters. Progesterone maintains pregnancy.

-





A. Picture talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.



Force and Pressure



EXERCISE

A. Tick (✓) the correct option :

1. (d) 2. (c) 3. (d) 4. (b) 5. (b) 6. (a)
7. (a) 8. (c) 9. (d)

B. Fill in the blanks :

1. Newton 2. muscular 3. two
4. dyne/cm² 5. suck 6. fluid
7. low

C. State whether the following statements are True or False :

1. False 2. False 3. False 4. False 5. False 6. False
7. True 8. True

D. Match the following columns :

1. (d) 2. (e) 3. (a) 4. (c) 5. (b)

E. Answer the following questions in brief :

1. A push or a pull that tends to affect an object in some way is called a force. The SI unit of force is Newton (N).
2. Magnetic force acts from a distance and pulls objects of iron.
3. The forces acting between two objects can be classified into two categories- contact forces and non-contact forces.
4. A contact force is a force between two objects that are in physical contact with each other directly or indirectly. Examples of contact forces are muscular force and frictional force.

Forces that do not need physical contact with the object on which they are acting are called non-contact forces. Examples of non-contact forces are magnetic force, electrostatic force and gravitational forces.

5. (a) **Resultant Force** : Many forces may be acting on an object at the same time. All these forces collectively produce the same effect on the object as if a single force is acting on the object. Such a single force is called the resultant force.

(b) **Pressure** : Pressure is a force acting on a unit area. The SI unit of pressure is Newton per metre square or N/m^2 . It is commonly called as Pascal (Pa). Mathematically, it can be stated as:

$$\text{Pressure (Pa)} = \text{Force (N)} / \text{Area (m}^2\text{)}$$

(c) **Atmospheric Pressure** : The pressure exerted by the atmospheric gases on the surroundings and on the surface of the Earth is called atmospheric pressure.

6. SI unit of Pressure is named after the French scientist Blaise Pascal.
7. The atmospheric pressure at a place depends on its altitude. It is maximum at the surface of the Earth and decreases as we move higher. Atmospheric pressure with altitude due to:
 - decrease in the height of the air column, which causes a linear decrease in atmospheric pressure.
 - decrease in the density of air, which leads to a decrease in atmospheric pressure.
8. Electrostatic force and magnetic force both are non-contact forces.

F. Answer the following questions in detail :

1. **Force causes movement in an object** : The object will move in the direction of the force applied on it. For example, a toy car can be moved by giving a little push.

Force can slow down or completely stop a moving object : A goalkeeper stops the football going towards the goal post by applying a force with his hand.

Force can change the direction of a moving object : When a player in the game of football kicks the ball to his male, he changes the direction of the moving football by applying force through his kick.

Force can change the shape of an object

- While making chapatti, we can change the shape of dough by applying force with our hands.
- A force can change the size of a rubber band. The length of the rubber band increases when it is stretched.
- A blacksmith changes the shape of an iron rod by applying force using a hammer.

2. Contact force

- Muscular force :** The force resulting from the action of muscles in our body is called the muscular force. We use muscular force for doing various activities such as pushing, pulling, throwing, kicking, lifting, running, jumping, etc.
- Frictional force :** This force causes the object to slow down and stop moving. It always acts in the direction opposite to the direction of motion of the object. If we roll a ball on the floor, it will slow down after a while and finally stops on its own.

Non-Contact force

- Magnetic force :** The force exerted by a magnet on another magnet or other magnetic materials like iron, cobalt and nickel is called a magnetic force.
 - Electrostatic force :** The force exerted by a charged body on another charged or uncharged body is known as electrostatic force. For example, rub a comb on your hair and bring it near tiny pieces of paper. The pieces of paper will get attached to the comb. This happens due to the electrostatic force.
 - Gravitational force :** Gravitational force is the force of attraction between any two objects in the universe. The force of gravity is an attractive force exerted by the Earth on objects, due to which objects fall to the ground. All these forces are non-contact forces as they act on an object from a distance. It is the gravitational force of the sun that keeps all the planets moving around it in fixed orbits.
3. To show that liquids exert pressure on the walls of the container.

Materials Required: A discarded plastic bottle, glass tube, a balloon and water.

Procedure:

- (i) Take a discarded water or soft drink bottle and fix a glass tube near its bottom.

- (ii) This can be done by slightly heating one end of the glass tube and then inserting it near the bottom of the bottle.
- (iii) Make sure that the water does not leak from the joint. Cover the mouth of the glass tube with a balloon.
- (iv) Now, fill the bottle upto half with water.
- (v) Record your observation.
- (vi) Add more water to fill the bottle and again record your observation.



Observation: As water is added to the bottle, the balloon fixed on the side of the bottle bulges out. The bulge of the balloon represents the pressure exerted by water on the balloon.

Conclusion: This shows that liquids exert pressure on the walls of the container.

4.
 - Desert animals like camels can walk easily on sand as compared to other animals because they have broader feet which exert less pressure on the ground.
 - Cutting and piercing tools such as knife, scissors and saw have sharp blades to reduce the area of contact so that they exert greater pressure with a comparatively small force.
 - Air pressure helps us to breathe. When we inhale, our lungs expand, reducing the air pressure inside them. This helps the air outside the lungs (which is at higher pressure) to move into the lungs.
 - Shoulder bags have broader straps or belts so that the surface area of contact increases and pressure on the shoulder or hand is reduced. It helps carrying bag on one's shoulder easily.
 - Army tanks move on caterpillar tracks that are broad and have chain like covers on the wheel. It increases the area of contact with the ground. Due to this, the pressure on the ground reduces so much that tanks can walk on all kinds of terrain.
5. **Objective :** To show the presence of atmospheric pressure.

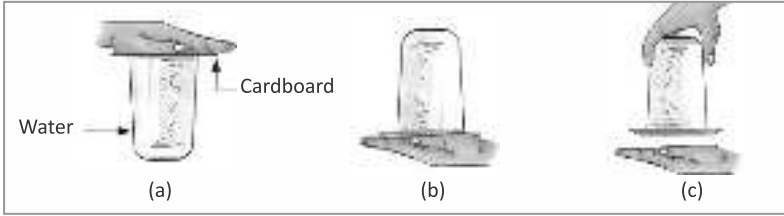
Materials Required : A glass tumbler, a piece of cardboard and water.

Procedure:

- (i) Fill the tumbler with water to the brim and cover its mouth with a piece of cardboard.
- (ii) Place the palm of your hand over the piece of cardboard, and quickly invert the tumbler.
- (iii) Now, slowly remove your hand holding the card.

Observation : We will observe that the cardboard does not fall from the inverted tumbler.

Conclusion : Atmospheric pressure provides enough pressure to support a full glass of water.



6. Total Force exerted by team A = $(100 + 115 + 125) \text{ N} = 340 \text{ N} = F_1$
 Total Force exerted by team B = $(110 + 120 + 105) \text{ N} = 335 \text{ N} = F_2$
 Resultant force, $F = F_1 - F_2$
 $= 340 \text{ N} - 335 \text{ N} = 5 \text{ N}$



A. Picture talk

As we will apply force downward, the ball will be squeezed and it will change its shape.

B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

CHAPTER
9 Friction

EXERCISE

A. Tick (✓) the correct option :

1. (c) 2. (b) 3. (c) 4. (d) 5. (b) 6. (d)
 7. (d) 8. (b) 9. (c) 10. (c)

B. Fill in the blanks :

- | | | |
|---------|-----------|----------------|
| 1. less | 2. fluids | 3. streamlined |
| 4. heat | 5. energy | 6. Lubricants |

C. State whether the following statements are True or False :

- | | | | | | |
|---------|----------|---------|----------|---------|---------|
| 1. True | 2. False | 3. True | 4. False | 5. True | 6. True |
| 7. True | 8. True | | | | |

D. Match the following columns :

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (d) | 2. (b) | 3. (e) | 4. (a) | 5. (c) |
|--------|--------|--------|--------|--------|

E. Answer the following questions in brief :

1. A force that opposes the relative motion between the surfaces of two objects in contact and acts along the surface is called friction.
2. The main cause of friction is the interlocking of irregularities between the surfaces of two objects which are in contact with each other.
3. The friction experienced by a body when it rolls over the surface of another is called rolling friction.
4. When the object starts sliding, the contact point on its surface does not have enough time to lock into the contact points on the other object. So sliding friction is always less than static friction.
5. When an object rolls over the surface of another object, then the frictional force that comes into picture is called rolling friction. When a surface slides over another surface, the resistance to its motion is called sliding friction.
6. (a) **Drag** : Friction exerted by fluids *i.e.*, gases or liquids is termed as fluid friction or drag.
(b) **Limiting Friction** : The maximum value of the friction force at which the body resting on the another body start to slide is called limiting friction.
7. The magnitude of fluid friction depends on speed of the object, shape of the object, size of the object and nature of the fluid.
8. (i) Friction can be increased by making the surfaces rough.
(ii) Sand and gravel are thrown on slippery ground during the rainy season to increase friction.
9. When an object moves through the fluids, they have to overcome friction acting on them. In this process, they lose a lot of energy. Therefore, efforts are being made to minimize the energy by giving special shape to the objects called a streamlined shape. That is why airplanes have streamlined bodies. Even birds and fish also have streamlined shape, which make it easier for them to move with great speeds in air and water respectively.

F. Answer the following questions in detail :

1. There are three types of friction that exist between two surface-static friction, sliding friction, and rolling friction.

Static friction : The force of friction that acts between objects in contact, but are not sliding with respect to each other is called static friction. For example, static friction can prevent you sliding down an inclined surface.

Sliding friction : When a surface slides over another surface, the resistance to its motion is called sliding friction, for example, rubbing both hands together to create heat.

Rolling friction : When an object, rolls over the surface of another object, then the frictional force that comes into picture is called rolling friction. For example, suitcases and luggage bags are fitted with wheels, so that one can roll them easily.

2. Friction can be reduced by the following ways:

By using Lubricants : Lubricants like oil, grease and graphite powder can reduce friction. The lubricants form a thin film between the moving parts and fill the tiny pores and depressions on the surfaces. This makes the surfaces smooth and reduces the friction. Lubricants are used in machines to prevent wear and tear.

By using Ball Bearings or Roller Bearings : As rolling friction is less than sliding friction, ball bearings and roller bearings are also used for decreasing friction. Small balls or rollers made of steel are placed between the moving parts of machines.

By Streamlining the Body : The shape of many objects moving through air or water is designed in such a way that friction between the objects and the medium through which they move is minimised. Aeroplanes, boats and paper rockets are examples of streamlined objects.

3. Cars, airplanes and rockets have streamlined bodies. Even birds and fish also have streamlined bodies, which make it easier for them to move with great speeds in air and water respectively. Such a shape facilitates easier movement through fluids.

4. **Advantages of Friction**

- It is the friction between brake pad and rim that prevents the wheel from moving ahead. Due to this, the running bicycle slows down and finally stops.
- Friction enables us to write on paper. It is due to the friction between tip of the pencil and paper that rubs off. Black graphite particles from the tip of the pencil stick to the paper and leave black marks on it.
- It is the friction between the sole of our shoes and ground that enables us to walk without slipping.

- We are able to cut things due to friction between the surface in contact.

Disadvantages of Friction

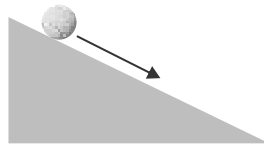
- Friction results in wear and tear of the parts that rub each other. For example, the soles of our shoes, the surface of tyres of vehicles, the moving parts of a machine wear out with time due to friction.
 - Friction wears out the brake pads of vehicles gradually. As a result brake pads of cycles have to be replaced quite often.
 - Friction causes wastage of energy. This is because to move a heavy object, a lot of energy is utilised in overcoming the friction.
 - Friction generates heat. The moving parts of a machine produce a lot of heat energy, which gets lost in the surroundings. This unwanted heat can damage and reduce the efficiency of machines. Arrangements have to be made to cool down fast moving machines to avoid damage. Cars have a cooling system to keep the engine cool.
5. There are instances in our daily life where friction is necessary. For example, without friction, we cannot hold objects in our hands; we cannot walk and cannot light a match stick. Sometimes friction is not desirable, for example, friction between machinery parts causes wear and tear. Since friction is advantageous to us, it is considered as a friend. But due to its disadvantages, it is a foe. Depending on the circumstances, friction can be a help or a hindrance. Thus, it is a necessary evil.

Learning With Fun

A. Picture talk



Static friction



Rolling friction



Sliding friction

B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.



EXERCISE

A. Tick (✓) the correct option :

1. (c) 2. (c) 3. (b) 4. (d) 5. (d) 6. (b)
7. (b) 8. (a) 9. (a)

B. Fill in the blanks :

1. Oscillation 2. sound 3. Pitch
4. loud, soft 5. ears 6. cochlea
7. Musical

C. State whether the following statements are True or False :

1. True 2. False 3. True 4. True 5. False 6. True
7. True 8. True

D. Match the following columns :

1. (c) 2. (a) 3. (d) 4. (f) 5. (e) 6. (b)

E. Answer the following questions in brief :

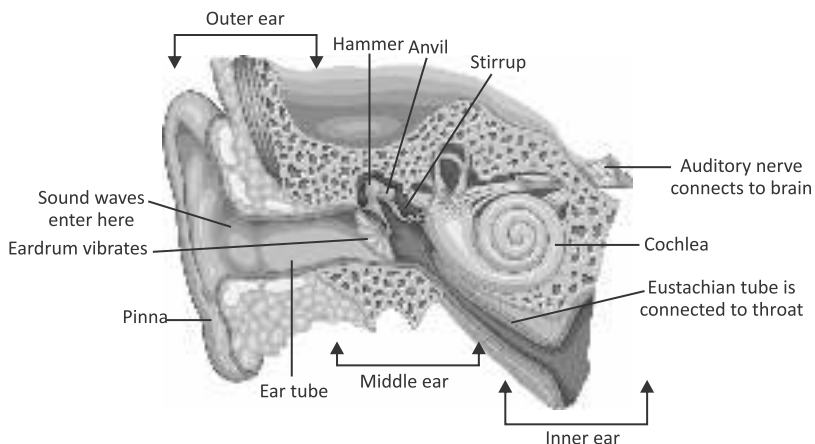
1. Sound is produced by vibrations.
2. Vibration is the rapid to and fro movement of a body about a central position.
3. The outer ear is made up of pinna and car tube.
4. The unit of frequency of sound is Hertz.
5. Sound waves of frequencies below 20Hz are called infrasonic waves and those frequencies above 20000 Hz are called ultrasonic waves.
6. Bats use echoes to locate their prey. They emit ultrasonic vibrations which are reflected from the obstacles and help the bats in avoiding them. Whales and seals use echoes to find their way around.
Echoes are used by doctors to get a picture of organs of the body. Ultrasonic vibrations reflected by different parts of an organ help to create an image of the organ.
7. Sound that appears unpleasant to us is called noise.
8. The two sources of noise pollution are the sound of horn and sound heard at the construction site.
9. (i) Use of silencers in vehicles reduces the noise coming from them.
(ii) At home radio, television, etc., should be played at lowest volume.
(iii) Heavy vehicle should be banned from entering residential areas.

F. Answer the following questions in detail :

1. The pinna collects the sound and transfers it into the ear tube. These then strike the eardrum, which starts vibrating with the same frequency. This causes the delicate bones of the middle ear to vibrate. The eardrum is a tightly stretched membrane that separates the outer ear from the middle ear.

The middle ear, which lies beyond the eardrum, has three delicate, interlocked bones, called the hammer, anvil and stirrup. These three bones are placed in such a way that they move when the eardrum vibrates and transmits the vibration to the inner ear.

The inner ear has a coiled tube called the cochlea. The inner ear is filled with a fluid. Tiny hairs in this liquid-filled tube pick up vibrations from the middle ear. They then send a signal to the brain through the auditory nerves. This is how we hear a sound.



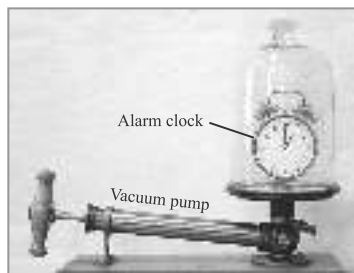
Parts of a human ear

2. **Objective :** To show that sound cannot travel through vacuum.

Materials Required : An alarm clock, glass jar, vacuum pump.

Procedure :

- (i) Take a small alarm clock or any other toy that can produce sound.
- (ii) Put it in an empty glass jar.
- (iii) You will be able to hear its sound easily.
- (iv) Now, cover the glass jar tightly with a stopper and connect it with a vacuum pump.



Sound needs a medium to travel.

Observation: You will find that as the air starts getting pumped out, the ticking sound of the clock slowly fades away and finally it is not heard at all.

This shows that, sound needs a medium to travel. It cannot travel through vacuum.

3. In stringed instruments such as guitar, violin, sitar, sarangi and tanpura, sound is produced by vibrating strings (metal wire).

Flute, shehnai, clarinet, saxophone, etc., are wind instruments. Sound in these instruments is produced by the vibrations produced in the air column inside the instruments.

Dholak, tabla, drum, mridangam, etc., are percussion instruments. They have a membrane stretched over a cylindrical body of metal, wood or clay. This type of instrument is played by striking.

4. In human beings, sound is produced by the voice box or larynx. The sound produced is controlled by vocal cords, which are thin membranes stretched across the voice box. Two vocal cords are stretched across the voice box or larynx in such a way that it leaves a narrow slit between them for the passage of air. When the lungs force air through the slit, the vocal cords vibrate producing sound.

5. Put your fingers on the throat and find a hard bump that seems to move when you swallow. This part of the body is known as the voice box. The sound produced is controlled by vocal cords, which are thin membranes stretched across the voice box.

6. Presence of harmful and unpleasing sounds in the environment for a prolonged duration can lead to a condition known as noise pollution.

Causes of noise pollution

- (i) On the roads, noise pollution occurs due to the rising number of automobiles each day. Screeching of tyres, squeaking brakes and sirens at the highest decibels are all possible factors that add to noise pollution.



- (ii) Blaring televisions, radios and live shows are other major factors contributing to noise pollution in India.



- (iii) In offices, there is noise pollution owing to the bells, telephones, clattering office machines and conversation.

- (iv) Air compressors, bulldozers, loaders and dump trucks are the major sources of noise pollution at construction sites. Industrial noise adds to noise pollution.



Different sources of noise pollution



A. Picture talk

Ans. The sound wave (b) will be shriller because it shows high frequency.

B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

11

Chemical Effects of Electric Current



EXERCISE

A. Tick (✓) the correct option :

1. (a) 2. (d) 3. (b) 4. (a) 5. (a) 6. (c)
7. (b) 8. (a)

B. Fill in the blanks :

1. charges 2. conductors 3. electrolyte
4. chemical 5. iron 6. refining
7. anode mud

C. State whether the following statements are True or False :

1. True 2. True 3. True 4. True 5. False 6. True
7. True

D. Match the following columns :

1. (b) 2. (c) 3. (d) 4. (a) 5. (f) 6. (e)

E. Answer the following questions in brief :

1. Distilled water, oil.
2. Electroplating is the process of depositing a layer of any desired metal on another material.
3. The process of decomposition of a chemical compound in a solution when an electric current passes through it is called electrolysis.
4. Conductors are substances which conduct electricity and the insulators are substances which do not conduct electricity.

5. Light Emitting Diode.
6. Electrolysis is used extensively for extraction of metals and purification of metals.
7. A bulb cannot be used to detect weak electric current flowing through liquid. Thus, the weak electric current through liquid can be detected by using LEDs.
8. The flow of electrical charge through a conductor is known as an electric current.

F. Answer the following questions in detail :

1. **LED** (Light Emitting Diode) is a light source. LEDs are used as indicator lamps in many devices. It glows when a weak electric current flows through it. LED has two leads (wires), one is slightly longer than the other which is always connected to the positive terminal, the shorter lead is connected to the negative terminal of the battery.

2. Gold plating is one of the most common applications of electroplating in ornament-making.

Tin cans used for storing food are made of iron electroplated with a coat of tin. Tin is less reactive than iron, and prevents food packed in them from getting spoiled.

Rims of wheels of cycle, cars, etc. are electroplated with chromium metal. Layer of chromium metal gives them a shiny appearance and prevents from rusting.

Water pipes, which are made of iron, are coated with a layer of zinc metal by the process of electroplating. Zinc is less reactive than iron and thus prevents the iron pipe from getting rusted.

Electroplating is also used for electrolytic refining of metals.

3. (a) **Electrolysis** : The process of decomposition of a chemical compound in a solution when an electric current is passed through it is called electrolysis. The solution that conducts electricity due to the presence of ions is called an electrolyte. The electrolyte contains ions, which are charged. The positively charged ions are called cations and the negatively charged ions are called anions. Cations, being positively charged, get attracted to the negatively charged cathode and move towards it. On the other hand, anions, being negatively charged, get attracted towards the positively charged anode and move toward it.
- (b) **Electrolytic refining** : Electrolysis is used in the refining of pure metals from the impure one by a process called electrolytic refining. Metals like silver, nickel, gold and copper are refined by this method.

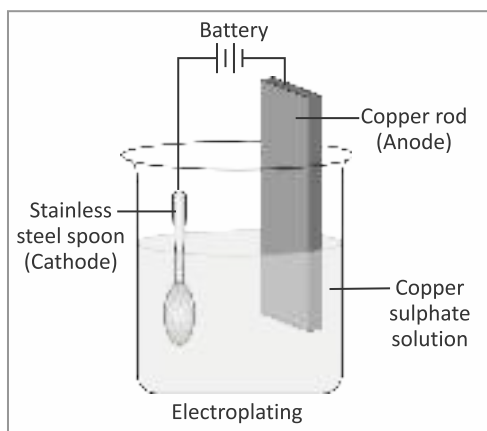
In this method, an electric current is passed through a solution called electrolyte that contains dissolved metal ions. This causes the dissolved metals ions to deposit onto the negatively charged cathode.

4. To observe the electroplating of copper on stainless steel.

Materials Required : Copper sulphate solution, copper strip or copper rod, two wires, a battery, beaker, and an object to be electroplated (stainless steel spoon).

Procedure:

- (i) Take copper sulphate solution in a beaker.
- (ii) Connect the spoon to be electroplated (acts as the cathode) to negative terminal of the battery using a connecting wire.
- (iii) Similarly, connect the copper rod (acts as the anode) to the positive terminal of the battery using a connecting wire to form a circuit.
- (iv) Now, dip them in the copper sulphate solution in a beaker and record your observation.



Observation: Once the circuit is connected, the process gets started and after sometime, it is seen that the spoon gets a coating of copper.

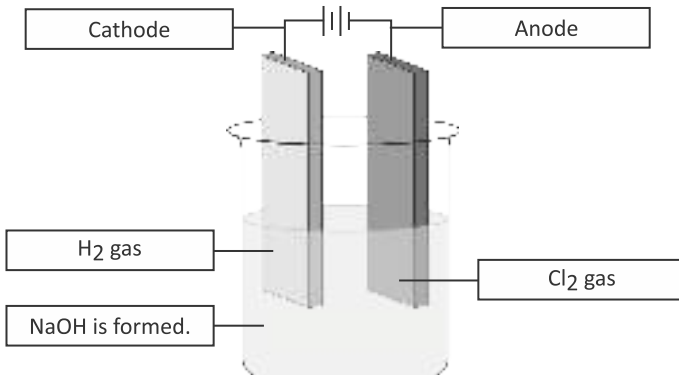
Conclusion: The positively charged copper ions move towards the cathode and the spoon is electroplated.

5. Take an impure copper rod as anode and a thin sheet of pure copper as cathode, as an electrolytic cell containing acidified solution of copper sulphate as electrolyte.

On passing an electric current through the electrolyte, the impure copper dissolves into the solution and pure copper metal gets deposited at the cathode. The impurities that collect below the anode are collectively called as anode mud. Thus, pure copper is obtained at the cathode.



A. Picture talk :



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.



Some Natural Phenomena



EXERCISE

A. Tick (✓) the correct option :

1. (a) 2. (a) 3. (b) 4. (c) 5. (d) 6. (d)
7. (b) 8. (a)

B. Fill in the blanks :

1. attract 2. positive 3. electroscope
4. Lightning 5. sound 6. Earthquake
7. magma

C. State whether the following statements are True or False :

1. False 2. True 3. True 4. True 5. True 6. False
7. True 8. False

D. Match the following columns :

1. (f) 2. (c) 3. (b) 4. (a) 5. (e) 6. (d)

E. Answer the following questions in brief :

1. An earthquake is a sudden shaking or trembling in the crust and upper layer of the mantle of the Earth.
2. An earthquake causes the movement of a series of shock waves on the Earth's surface.
3. The strength or magnitude of an earthquake is measured using the Richter scale.
4. To protect such tall buildings from the destructive effects caused by lightning, a safety device called as lightning conductor.
5. The two types of charges are positive and negative.
6. Electroscope is used for the detection and measurement of electric charge.
7. The affected areas in India include all of North–Eastern parts of India, parts of North–Western Bihar, Eastern section of Uttaranchal. The kangra Valley in Himachal Pradesh, Jammu and Kashmir, Rajasthan, Western and Central Himalayas, Rann of Kutch in Gujarat and the Indo Gangetic Plane. Some areas of south India also fall in the danger zone.

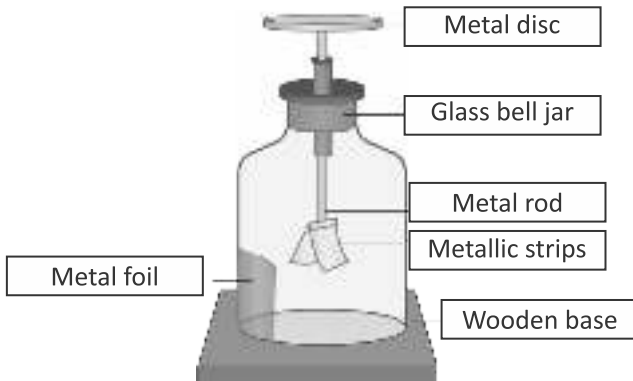
F. Answer the following questions in detail :

1. Electroscope is a device used to detect the presence of charge and its relative amount. An electroscope consists of a metal knob or disc attached to one end of the metal rod. The metal rod is suspended into the bell jar through a tightly fitted rubber stopper. The lower end of the metal rod has two metallic strips (or leaves) made up of copper, gold or brass. The glass bell jar protects the gold leaves from air currents. The bell jar rests on a wooden frame. Two strips of tin foil are fixed inside the glass bell jar, facing the gold leaves.
2. Tectonic plates are not always static but are in continual motion. An earthquake happens when two plates of the Earth suddenly slip past one another. The regions where one tectonic plate slides against another are referred to as fault zones, and these are the regions where an earthquake is likely to occur.
3. An electrically neutral object can be charged in three different ways. They are:
 - Charging by friction
 - Charging by conduction
 - Charging by induction

4. A basic seismograph is made of a rotating drum with paper on it, a spring, a supporting frame, a weight and a pen. The one end of the spring is attached to the frame that is bolted to the ground. The weight is put on the other end of the spring and the pen is stuck to the weight. The drum with paper on it presses against the pen and turns constantly. When there is an earthquake, everything in the seismograph moves except the weight with the pen on it. As the drum and paper shake next to the pen, the pen makes squiggly lines on the paper, creating a record of the earthquake.
5. • Move to an open area immediately where falling objects are unlikely to strike you. Move away from buildings, electric poles, trees, sign boards, bridges or any other structure that can crumble.
- If inside, stand in a strong doorway or get under a sturdy desk, table or bed and hold on. Do not use elevators. It is safer to use the staircase. Move away from windows, mirrors, glass doors, pictures, bookcases, hanging paints and heavy objects. Switch off gas stove or pipelines and electric mains.
- If you are travelling in a motor vehicle, bring it to a stop as quickly as possible. Avoid stopping on or under bridges and overpasses or under power lines, trees and large sign boards. Stay in your car.

Learning With Fun

A. Picture talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.

**EXERCISE****A. Tick (✓) the correct option :**

1. (a) 2. (b) 3. (a) 4. (a) 5. (a) 6. (a)
7. (c) 8. (d)

B. Fill in the blanks :

1. reflection 2. equal 3. irregularities
4. 3×10^8 5. spectrum 6. concave
7. 63

C. State whether the following statements are True or False :

1. False 2. False 3. False 4. True 5. False 6. False
7. False

D. Match the following columns :

1. (f) 2. (d) 3. (c) 4. (e) 5. (g) 6. (b)
7. (a)

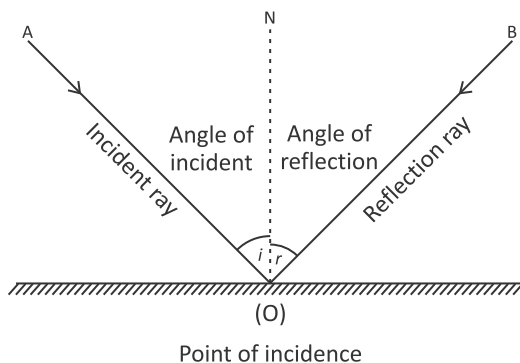
E. Answer the following questions in brief :

1. Light is form of energy which enables us to see different objects. when apart of light falling on an object bounces back and reaches our eyes, it makes an image of the object in our eyes. And thus we are able to see it.
2. Cataract comes with age, when the eye lens becomes foggy due to regular wear and tear for so many years.
3. Whenever light coming from an object suffers more than one reflection, it leads to the formation of multiple images.
4. Kaleidoscope is an arrangement based on the formation of multiple images by inclined mirrors.
5. The two main defects of vision are myopia and hypermetropia. Myopia is corrected by using glasses with concave lens. Hypermetropia is corrected by wearing glasses with convex lens.
6. Multiple reflection is used in Kaleidoscope.

7. The image formed by a plane mirror has the following characteristics :
- Erect and of the same size as the object.
 - At the same distance from the mirror as the objects is in front of the mirror.
8. The ray of light which strikes the reflecting surface is known as incident ray. An imaginary perpendicular line drawn from the point of incidence at the reflecting surface is known as normal. The ray of light which reflects back after the incident ray strikes the reflecting surface is known as the reflected ray.

F. Answer the following questions in detail :

- First Law :** The incident ray, the normal at the point of incidence and the reflected ray, all lie in the same plane. It means AO, ON and OB are in the same plane.



Second Law : The angle of incidence is always equal to the angle of reflection i.e., $\angle i = \angle r$.

- There are the following main parts of the eye:

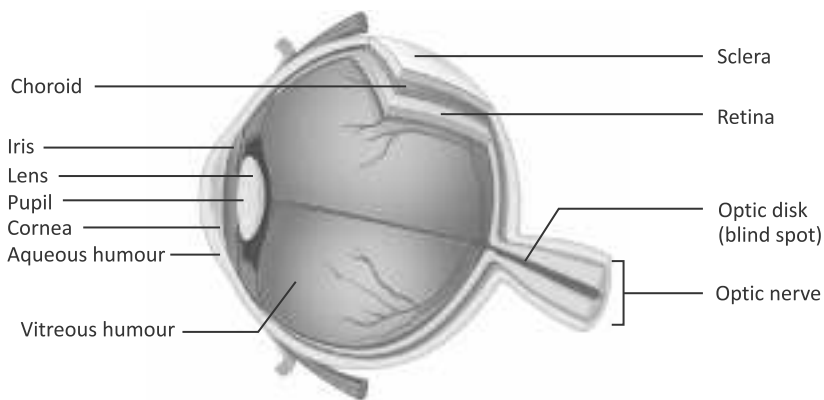
Cornea: It is the transparent front part of the eye that covers the iris, pupil and the anterior part of the eye.

Iris: It is a thin circular structure present in the eye in which pupil is located. It gives colour to our eyes.

Pupil: It is an opening located in the centre of the iris that allows the light to enter the eyes.

Eye lens: It is a transparent biconvex lens in the eye that helps to refract light so that it can be focused on the retina.

Retina: It is a light sensitive tissue in the eye on which the focused light forms the image of the object. It acts like a screen.



The main parts of the human eye

Optic nerve: The sensation of the image formed on the retina is sent to the brain through a nerve called optic nerve. Optic nerves transmit visual signals to the brain which interpret the image.

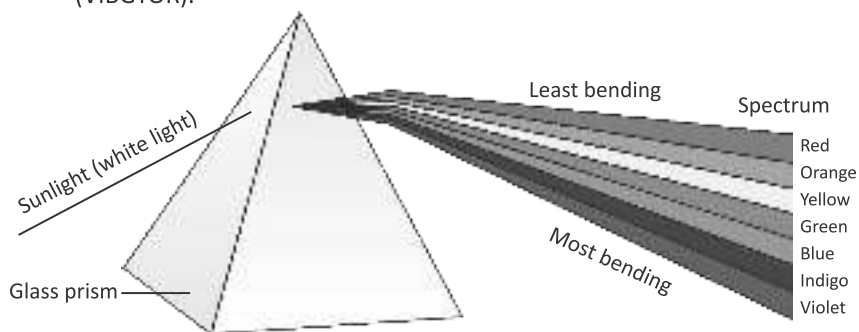
Yellow spot: A highly light sensitive spot is at the centre of the retina where image of an object is focused. It is called yellow spot.

Blind spot: At the junction of the retina and optic nerve, is present a non-sensory area. This is known as blind spot. It does not have any rods and cones cells.

3. (i) The periscope makes use of two plane mirrors to see objects which are not visible directly or not in direct line of sight such as to see ships on the surface of water from a submarine. Periscopes are also used by soldiers in bunkers and tanks to see outside.
- (ii) Our eyes have a wonderful ability to focus and see nearby as well as far off objects clearly by changing the thickness of the lens. This property is called accommodation power of eyes.
- (iii) If our eyes look at an object, the sensation of it remains in front of our eyes for $1/16$ th of a second. This phenomenon is called Persistence of vision.
4. (a) When reflection of light takes place from a smooth plane surface in which the reflected rays are parallel to one another, it is known as regular reflection.
When the reflection of light takes place from a rough surface in which the reflected rays are not parallel to each other, it is known as diffused reflection. The diffused reflection is caused due to the irregularities in the reflecting surface.
- (b) The process of bouncing back of light from a polished surface is called reflection of light. The reflection of light takes place effectively when light strikes against a polished surface.

The phenomenon bending of light when it travels from one medium to another is called refraction of light. Refraction occurs because light travels at different speeds through different transparent media.

5. The phenomenon of splitting sunlight or white light into seven colours is called dispersion of light. When light passes through a glass prism, it splits up into seven colours on account of refraction by glass. The band of seven colours that appears is called the spectrum. The seven colours of the spectrum are Violet, Indigo, Blue, Green, Yellow, Orange, Red (VIBGYOR).

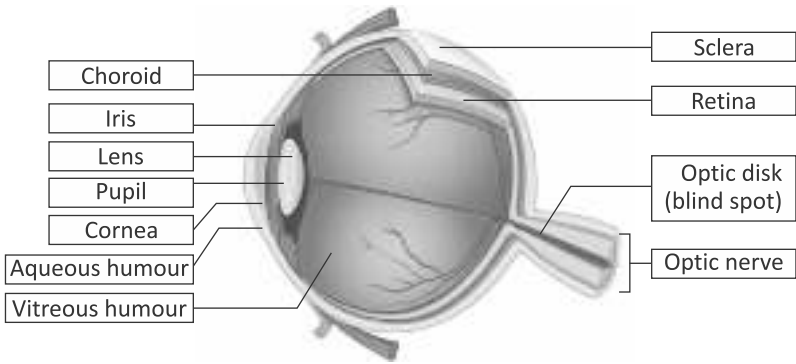


A prism splits white light coming from the sun into seven colours.

6. Our eyes are one of the most essential organs of our body. We only realize their importance if some kind of ailment develops. We can take care of them in the following manner:
- If any unwanted dust particles go into your eyes, it is advisable not to rub the eyes to remove them.
 - Splash cold water two to three times to wash your eyes.
 - If your eyes twitches, or becomes red and feels itchy, visit an eye specialist.
 - Take a vitamin A rich diet such as papaya, eggs, fish, milk, green vegetables and fresh fruits to make the eyes healthier. Deficiency of vitamin A causes nightblindness which makes it difficult to see in dim light or at night. Wash the eyes with cold water to remove dust and dirt.
 - If you stare continuously on a TV screen or a computer screen without blinking, you may hurt your eyes.
 - Don't overstrain your eyes by reading in dim light. Moreover, text shouldn't be very far or very close to our eyes when we are reading.



A. Picture talk



B. Research and Project :

Do yourself.

C. Activity :

Do yourself.

D. Group Discussion :

Do yourself.