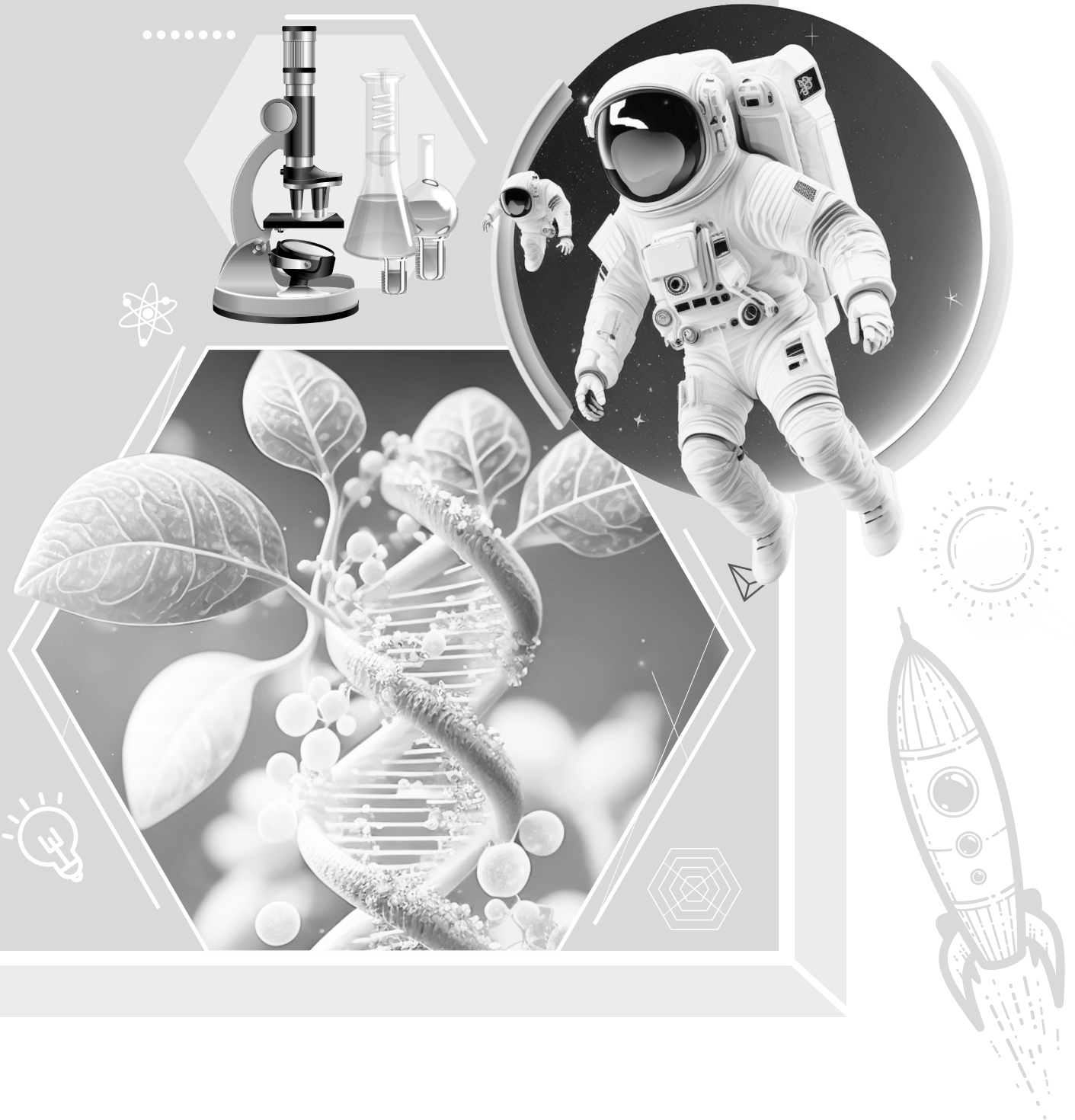


Sense & Science



8
GRADE



1. Plants and Their Production

Exercise

- A. 1. (d) 2. (c) 3. (d) 4. (c) 5. (c)
- B. 1. Weeds are unwanted plants that grow along with the crops.
2. The technique used for developing new varieties of crops by cross breeding two different varieties is called hybridization.
3. The process of converting free nitrogen gas of the atmosphere into nitrogen compounds is called nitrogen fixation.
4. The plants absorb the nitrates from the soil, and convert them into plant proteins. This way, nitrogen passes from plants to herbivores that eat them, and then to carnivores that eat the herbivores. This process of conversion of inorganic nitrogen compounds into organic compounds that become a part of living organisms is called nitrogen assimilation.
5. The breeding, feeding and caring of domestic animals for food and other purposes is called animal husbandry.
- C. 1. Kharif crops are sown at the beginning of the south-west monsoon, during June/July. They are harvested after the monsoon, in September/October. Two kharif crops are maize and soya bean.
Rabi crops are sown at the beginning of the winter season and harvested by March/April. Two rabi crops are wheat and gram.
2. Seeds should be planted at a proper distance from each other because if they are too close, they will not get enough water, sunlight and nutrients. If they are too far apart, it will be wastage of field space.
3. Farmers normally use a mixture of manure and fertilizers in their fields to increase the yield and production of crops. Manure is good for plants as it provides them with organic nutrients but it lacks some important nutrients like nitrogen, phosphorous and potassium.
4. When too much water is given to the crop, it stands in the field and accumulates around the roots. This is called waterlogging. It damages the crops because of the following two reasons :
(i) Waterlogging replaces the air in the soil with water, which reduces the supply of air to the roots of plants.
(ii) It also increases the amount of salt in the soil which is harmful for the crops.
Waterlogging can be prevented by providing the right amount of water to the crops and having adequate drainage system in irrigated fields.

5.	Insecticides	Rodenticides	Fungicides
	Insecticides are chemicals used to kill insects like locustus.	Rodenticides are chemicals used to kill rodents like rats.	Fungicides are chemicals used to destroy fungi.

Insects, rodents and fungi are pests. So, insecticides, rodenticides and fungicides are all pesticides.

- D. Do it yourself. E. Do it yourself.
 F. Do it yourself.



2. Microorganisms

Exercise

- A. 1. (c) 2. (a) 3. (c) 4. (b) 5. (d)
- B. 1. Organisms that are small and can be seen only through a microscope are called microorganisms.
 2. Yeast is used to make bread soft and fluffy.
 Fermentation is the process of breaking down of sugar forms alcohol and gives out carbon dioxide. The bubbles of carbon dioxide make the dough rise. This dough is used to make bread. When this dough is baked, more gas bubbles are formed due to the heat. As the gas escapes, the bread rises and becomes soft and fluffy.
 3. Fermentation is the process of breaking down of sugar forms alcohol and gives out carbon dioxide. This process is used in the preparation of alcoholic beverages like beer and wine. Beer is produced by the fermentation of sugar in germinating barley and wine is prepared by fermentation of sugar in grapes.
 4. Sometimes, microorganisms growing on food produce toxic substances and makes it poisonous. Consuming such food causes a serious illness called food poisoning.
 5. Pasteurisation is the process of sterilisation of milk in which the milk is heated at high temperature, around 70°C for about half minute and then cooling it quickly.
- C. 1. When a virus enters the living cell of an organism, it is able to reproduce by using the energy of host cells for its reproduction. After thousands of viruses are formed, the host cells often dies. As the host cell bursts, new viruses spread and invade other cells. Since a large number of host cells die, the person fall ill.
 2. Viruses are considered to be on the borderline of living and non-living because they show both the characteristics of a living and non-living.

3. There are three important ways in which bacteria are useful to us :
- (i) Bacteria are helpful in food preparation like idli, curd etc.
 - (ii) Bacteria act as a decomposer and degrade the harmful substance to a simpler form.
 - (iii) Bacteria is used in making medicines and vaccines.
- There are three important ways in which bacteria are harmful to us :
- (i) They are harmful in causing communicable diseases like cholera, typhoid, tuberculosis, etc.
 - (ii) Bacteria may cause food poisoning.
 - (iii) Bacteria may also cause diseases in plants.
4. The diseases that can be spread from a diseased person to a healthy person are called communicable diseases. These can spread through water, air, food, direct contact or by sharing the things. Various ways through which these diseases spread are as follows :
- (i) **Through air** : A person who suffers from common cold, flu or cough can spread the disease causing microbes when he coughs or spits. When he coughs or speaks the germs are released into the air and a healthy person breathing in the same air can get infected. The disease that spread through air are cold, chicken pox, tuberculosis, measles and polio.
 - (ii) **Through food and water** : Diseases like Cholera, typhoid or hepatitis can spread by the consumption of contaminated food that contains the harmful microbes.
 - (iii) **Through direct contact** : Diseases like ringworm, chicken pox or sexually transmitted diseases can spread through direct contact with the affected person.
 - (iv) **Through insects** : The insects that spread the disease causing microbes are called vectors or carriers of germs. Example : *Anopheles* mosquito can spread the Malaria causing protozoan, or the Dengue causing virus into human blood during mosquito bite.
 - (v) **Through cuts and wounds** : The tetanus causing bacteria called *Mycobacterium tetani* enters the body through cuts and wounds.
5. Some common methods of food preservation are as follows :
- (i) Heating food to a high temperature kills microbes. For example, milk and water are boiled to kill microbes. Ultra-heat treatment (UHT) is the partial sterilization of milk by heating it for a short time, around 1–2 seconds, at a temperature exceeding 135°C. UHT milk available in tetrapacks has a shelf life of 6 months or more, until opened.
 - (ii) Pasteurization of milk, invented by Louis Pasteur, consists of heating it to a high temperature of 70°C for about half a minute and then cooling it quickly. This kills most of the bacteria without affecting the flavour.

- (iii) Cooling food prevents microbes from growing and reproducing, and hence preserves food. A refrigerator keeps food at about 5°C , and prevents it from spoiling for a few days. A deep freezer preserves food at below -18°C , and prevents it from getting spoilt for a few months. But, once the food is taken out of the freezer and warmed, microorganisms start growing again and so the food must be consumed immediately.
 - (iv) Chemical preservatives like sodium benzoate and sodium metabisulphite control microbial growth and so, are used to preserve jams, squashes and ketchups.
- Other preservatives that are commonly used are :
- (i) Salt checks the growth of bacteria by forcing microorganisms to lose water by a process called osmosis. It is used for preserving meat, fish, pickles, chips, etc.
 - (ii) Sugar also makes microbes lose water by osmosis and inhibits the growth of bacteria and is used as a preservative in jams, jellies and squashes.
 - (iii) Oil and vinegar provide an environment in which microorganisms cannot grow and so, are used to preserve pickles, vegetables, fruits, fish and meat.
 - (iv) Drying or dehydration of food consists of removing water from it. This stops microorganisms from growing as they cannot grow without water. Cereals, pulses, spices and dry fruits are preserved by this method.
 - (v) **Canning** : Canning consists of sterilizing the food and then sealing it in airtight containers. This prevents it from getting spoilt for over a year.

D. Do it yourself.

E. Do it yourself.

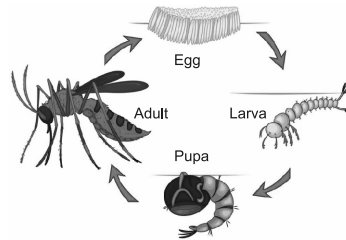


3. Reproductive System

Exercise

- A. 1. (c) 2. (a) 3. (d) 4. (a) 5. (c)
- B. 1. Reproduction is necessary because it is the process of producing new individuals of the same kind.
2. If the ovum is not fertilized by a sperm, it is expelled from the uterus along with some uterine muscles and blood in a process called menstruation.

3. Metamorphosis is the complete change of form of an animal as it develops from a young one into an adult.
4. After fertilization, the zygote moves down the oviduct and divides over and over again, to form a large number of cells in a process called cell division.
5. In mosquito, when the eggs hatch, a worm-like larva comes out of each egg. In about two weeks, it changes into an encased form called pupa with the shape of a comma (,). This pupa changes into a mosquito inside the case, and in about a week, the mosquito wriggles out.



Life cycle of a mosquito

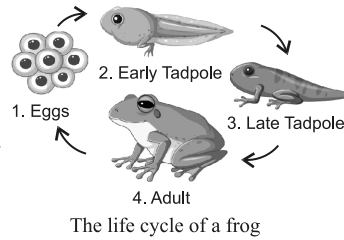
- C. 1. **External fertilization** : Sea animals, such as jellyfish and starfish, gather in large groups in water and lay their eggs and sperms on the surface of the water. The sperms fuse with the eggs to form zygotes. These zygotes develop into new individuals in the water. Such fertilization is called external fertilization as it occurs outside the animal's body. Animals living in or near ponds and lakes also have external fertilization.
- Internal fertilization** : In birds, reptiles and mammals, the male deposits the sperms inside the reproductive system of the female. Fertilization occurs and the zygote is formed inside the female's body. Such fertilization which takes place inside the body of the female is known as internal fertilization.
2. If the ovum is not fertilized by a sperm, it is expelled from the uterus along with some uterine muscles and blood in a process called menstruation.
 3. The onset of sexual maturity occurs in boys at the age of 11–16 years, and in girls at the age of 10–15 years. This is called puberty. In boys, puberty is marked by the voice becoming deeper, hair growth on the face and body, development of muscles and production of sperms by the testes. In girls, breasts become bigger and hips get more rounded. Such changes are caused by hormones that are different in boys and girls.
 4. **Development of Embryo** : After fertilization, the zygote moves down the oviduct and divides over and over again, to form a large number of cells in a process called cell division. The cells then begin to form different groups which finally develop into different tissues and organs of the body. This developing structure for the first eight weeks is called the embryo. It gets embedded in the wall of the uterus, where further development takes place.

During the development, the different cell groups change their size and shape, and turn into particular types of cells which perform specific functions, such as muscle cells, nerve cells and blood cells. This is called cell differentiation or cell maturation. Different tissues and organs develop from these differentiated cells.

Different body parts such as head, hands, legs, etc. develop with time. Foetus is the stage at which all the body parts of the embryo can be recognized. In humans, this stage is reached after about eight weeks of fertilization. The foetus keeps developing further. When all body parts gain the right size and forms, the development is complete and the individual is born.

5. A frog passes through three stages during its development from an egg to an adult frog :

Egg → tadpole (larva) → adult frog
 The tadpole which hatches out of the egg looks very different from an adult frog. It undergoes various changes to become a frog.



- D. Do it yourself.
 E. Do it yourself.



4. Biodiversity and Its Conservation

Exercise

- A. 1. (c) 2. (c) 3. (c) 4. (a) 5. (c)
- B. 1. Biodiversity is the variety of plants, animals and microorganisms generally found in an area.
2. Some animals become endangered because they cannot adjust to environmental changes, resulting in their population very small.
3. Endemic species are those species of plants and animals that are found exclusively in a particular area and are not naturally found anywhere else.
4. Wildlife conservation is closely related to forest conservation. When a forest is destroyed, many animals become extinct or endangered. So, it is necessary to protect the forests in order to conserve the habitat of endangered animals.

5. The Government has set aside permanent protected areas for conservation of biodiversity in that area to effectively implement the methods of conserving forests and wildlife. These are called biosphere reserves. A large protected area set aside for conserving biodiversity as well as the traditional lifestyle of the tribals living in that area is called a biosphere reserve.

Wildlife sanctuaries are protected forests to preserve wildlife. They provide protection and suitable living conditions for wild animals. The animals can breed and multiply in these areas.

A biosphere reserve may have national parks and wildlife sanctuaries within it. For example, the Pachmarhi Biosphere Reserve in Madhya Pradesh contains one national park (Satpura National Park) and two wildlife sanctuaries (Bori, Pachmarhi) within it.

- C. 1. Forests are useful to us due to the following :
- (i) They protect wildlife by providing them food and shelter.
 - (ii) They help to maintain the balance between carbon dioxide and oxygen in the atmosphere, as plants take in carbon dioxide and give out oxygen during photosynthesis.
 - (iii) They regulate the temperature of the earth.
 - (iv) They maintain the water cycle in nature, by releasing water during transpiration, which cools the atmosphere.
2. Deforestation increases in soil erosion. As the top soil is eroded, the lower hard and rocky soil with less humus gets exposed. This soil is less fertile. Over time, continued soil erosion converts the land into a desert. So, deforestation leads to desertification.
3. Some methods to conserve forests are as follows :
- (i) Planned harvesting, i.e. cutting only some of the trees in an area. The uncut trees prevent erosion and produce seeds so that new trees may grow.
 - (ii) Afforestation (or Reforestation) means renewing a forest by planting seedlings or small trees of the same species as found in the forest. Afforestation takes place naturally also—if we let the area remain undisturbed, the trees grow back and the forest gets reestablished.
 - (iii) Protection from forest fires by spraying fire extinguishing solutions from aircrafts or by changing the direction of the wind by using strong blowers.
 - (iv) Protection from overgrazing to protect growing plants, by providing pastures which can be used by rotation.
 - (v) Protection from insects and pests by using insecticides and fungicides and removing infected trees.

4. Deforestation has an adverse effect on the environment and its consequences are as follows :
- (i) It causes an increase in carbon dioxide in the atmosphere. Its consequence is global warming as carbon dioxide traps the heat rays reflected by the surface of the earth. The consequent increase in the atmospheric temperature can affect the water cycle and may result in lower rainfall. This can cause droughts.
 - (ii) It causes reduction in groundwater due to decreased water absorption capacity of the soil. The reduction in absorption of water into the soil can result in floods.
 - (iii) It increases in soil erosion. As the top soil is eroded, the lower hard and rocky soil with less humus gets exposed. This soil is less fertile. Over time, continued soil erosion converts the land into a desert. This is called desertification.
 - (iv) It causes shortage of forest products.

5. The steps to be taken to conserve wildlife are as follows :

Habitat preservation : Preserving the habitat of wildlife helps in their conservation. Preventing deforestation is an important method of habitat preservation while afforestation provides food and shelter for the wildlife.

Hunting regulations : Government regulations related to hunting and their effective implementation is very important for wildlife conservation. The hunting of endangered species is completely banned by law. Illegal hunting of animals is called poaching.

D. Do it yourself.

E. Do it yourself.

F. Do it yourself.

G. Do it yourself.



5. Adolescence

Exercise

- A. 1. (b) 2. (b) 3. (b) 4. (a) 5. (a)
- B. 1. The function of endocrine system is to release the hormones as and when required on the perception of stimulus or feed back mechanisms. These hormones travel by blood and control the metabolic activities at the sites of different tissues.
- It is made up of many ductless glands, such as adrenal glands, pancreas, thyroid gland, ovary (female), testes (male), pituitary gland, etc.
2. The hormone secreted by adrenal gland is adrenalin. It helps in defence of the body in emergency situations.

3. The pituitary gland is referred to as the 'master gland' as it produces hormones that stimulate other glands of the body to secrete hormones.
 4. Puberty is that stage of life when the body becomes capable of reproduction. It is normally 11-16 years in boys and 10–15 years in girls. But it may vary from person to person.
 5. The final height achieved by an individual is primarily governed by the genes that they inherit from their parents. The hormones help in achieving the normal adult height.
- C. 1. Functions of the pituitary gland :
- (i) It regulates many body functions through the hormones it releases.
 - (ii) It influences the functioning of the other glands.
- Hormones released by pituitary gland and their functions :
- (i) Growth hormone (GH) : It is involved in the development of the body.
 - (ii) Thyroid-stimulating hormone (TSH) : It stimulates the thyroid gland to release thyroxine.
2. During adolescence, there is a sudden increase in height which is brought about by the bones of the arms and legs becoming longer. During this period, different body parts do not grow at the same rate. For example, the arms and legs often grow faster than other parts, making them appear oversized and awkward. But it is temporary and soon the body regains its normal proportions. While the final height of an individual is primarily controlled by genes, hormones control the way the height increases. It is important that the body gets proper nutrition during adolescence so as to ensure healthy growth of bones, muscles and other parts.
 3. The cycle of producing and releasing a mature egg, the thickening of the uterus wall, and its shedding if fertilization does not occur is known as the menstrual cycle.
 4. When an ovum and sperm fuse, the zygote gets 23 pairs of chromosomes. One chromosome in each pair comes from the mother, the other from the father.
 - (i) If a sperm containing an X chromosomes fertilizes the egg, the zygote will have two X chromosomes and would develop into a female.
 - (ii) If a sperm containing a Y chromosome fertilizes the egg, the zygote will have one X and one Y chromosome and would develop into a male.
 - (iii) So, it is clear that the sex chromosomes of the father and not the mother, determine the sex of the child.

5. For proper physical health, a person needs :
A balanced diet with the right amounts of proteins, carbohydrates, fats, vitamins and minerals. It should contain adequate amounts of cereals for carbohydrates; milk, meat, nuts and pulses for proteins; controlled amounts of butter/ghee/oils and sugars for energy; and fruits and vegetables for protection against diseases.
- (i) **Physical exercise** : Walking, jogging, outdoor games, aerobics, etc., are good for the growing adolescents. Discontinuing exercises to concentrate on studies is not a good practice and may lead to health problems.
 - (ii) **Personal hygiene** : Due to increased activity of sweat and sebaceous glands, proper personal hygiene is of utmost important for adolescents. Taking a bath every day and cleaning all parts of the body is essential, otherwise body odour and bacterial infection may result. Girls should be especially careful about hygiene during menstruation.
- D. Do it yourself.
E. Do it yourself.
F. Do it yourself.



6. Fossil Fuels

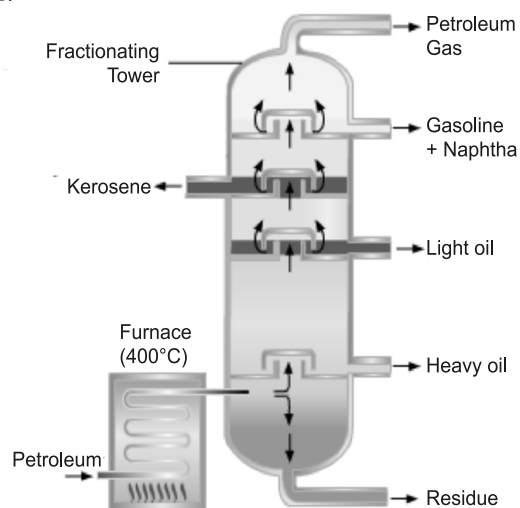
Exercise

- A. 1. (d) 2. (d) 3. (b) 4. (a) 5. (c)
- B. 1. Yes, if a resource is renewable, it can still get exhausted if we use it at a faster rate than it is renewed. It may also get exhausted if we disturb its natural method of renewable.
- Examples** : Groundwater is a renewable resource. However, today it is being used faster than it is renewed. This is the reason why the level of groundwater is going down.
- Oxygen is a renewable resource of energy and it is getting used up faster than it is renewed. Plants maintain the oxygen cycle by means of photosynthesis. An increase in population and industrialisation leads to deforestation which cause the depletion of oxygen in the atmosphere.
2. We need to conserve more today than our ancestors did because of the following reasons :
- (i) The world's population has increased manifold. There are more people on the earth, and they use more resources to feed, clothe and house themselves.

- (ii) With human progress, their needs have increased. Their energy needs, for example, have increased several-fold. The average resources consumed per person have, therefore, increased considerably.
3. The important uses of coke are as follows :
 - (i) It is most commonly used as fuel.
 - (ii) It is used to reduce metal oxides, like iron and zinc oxides, to get the metals.
 4. Petroleum is believed to have formed, over a period of millions of years, from organisms that lived in the sea at that time. When these organisms died, their bodies settled on the seabed, and got covered with sand and clay. Over millions of years, extreme heat and pressure changed the dead organisms into petroleum hydrocarbons.
 5. Judicious use of energy has two main advantages :
 - (i) It will delay the energy crisis, and
 - (ii) It will give our scientists more time to develop more efficient alternate sources of energy.
- C. 1. Destructive distillation of coal is carried out by heating coal strongly to 1000°C in the absence of air. This yields various useful organic and inorganic products. These products are as follows :
- (i) **Coke** : The residue left behind after destructive distillation of coal is coke. It is an almost pure form of carbon. It is a good fuel and burns with no smoke. It is also used to reduce metal oxides, like iron and zinc oxides, to get the metals.
 - (ii) **Coal gas** : It is a mixture of hydrogen, methane, carbon monoxide and other gases. It was earlier used for domestic cooking and lighting, but is not much used anymore.
 - (iii) **Coal tar** : Coal tar is a thick and viscous liquid which is mainly used for road construction. It contains several carbon compounds. It is also used to make explosives, pesticides, perfumes, synthetic fibres, naphthalene balls to repel moths and insects, dyes and paints. However, today these compounds are mostly obtained from petroleum.
 - (iv) **Ammonium compounds** : These are given off during the destructive distillation of coal. When dissolved in water, they give ammoniacal liquor. It is used for making nitrogenous fertilizers.
2. **Refining of Petroleum** : Various hydrocarbons of petroleum have different boiling points. This property is used to separate the different components by fractional distillation. The components with different boiling points are known as fractions, and the process of separating the fractions by fractional distillation is known as refining. It is carried out in a petroleum refinery.

Crude oil is first heated to about 400°C in a furnace. The vapours formed are passed into a tall fractionating tower. The hydrocarbons with the highest boiling points condense first and get collect near the base of the fractionating tower.

As the vapour rises, the hydrocarbons with lower boiling points condense at different heights and get separated in the fractionating tower to form different fractions. The hydrocarbons with 1-4 carbon atoms, which are gases, do not condense and escape from the top of the tower.



Fractional distillation of petroleum

The important products obtained from the various fractions of petroleum are petrol, kerosene, diesel, LPG, paraffin wax and lubricating oil.

3. The five things that we can do to help in preventing on energy crisis is as follows :
- Switching off lights, fans, etc., when not in use. Using air coolers, air conditioners, room heaters, geysers, etc., only when needed.
 - Reducing the flame while cooking and when the water starts boiling to save fuel.
 - Using public transport instead of private vehicles as much as possible; walking or cycling along small distances.
 - Using pressure cookers for cooking.
 - Using efficient smokeless chulhas in houses instead of kerosene, coal or wood for cooking.

4. Natural gas is found along with petroleum in underground reservoirs. It is mainly made up of methane, though butane and propane are also present in small proportions. It can be easily transported through pipes and is a clean and non-polluting fuel. It is stored under high pressure as compressed natural gas (CNG).
- (i) In some parts of India, CNG is supplied to homes and factories through pipes and directly used as a fuel.
 - (ii) CNG is used as a non-polluting fuel for vehicles.
 - (iii) CNG is used for power generation.
 - (iv) Natural gas is used as a starting material for the manufacture of a number of chemicals and fertilizers.

E. Do it yourself.

F. Do it yourself.



7. Combustion and Flame

Exercise

- A. 1. (a) 2. (a) 3. (d) 4. (d) 5. (c)
- B. 1. Combustion is the process in which a substance burns in air or oxygen to produce heat and light.
2. It is more difficult to burn some combustible substances than others because different substances catch fire at different temperatures. Some substances have a long ignition temperatures; therefore, they can catch fire more easily than others.
3. Ignition temperature of kerosene is lower than coal, so it can catch fire more easily than coal. Therefore more care is needed to store kerosene than coal though both are fuels.
4. When we light a firecracker, it explodes, giving out heat, light and sound. This is a combustion reaction that occurs suddenly with the evolution of a large amount of gas. Such a reaction is called an explosion.
5. Water is not suitable for extinguishing a fire in an electrical appliance because it is a good conductor of electricity. It can cause electric shock and can harm the person who is trying to put it off.
- C. 1. Calorific value of a fuel is the amount of heat produced when one kilogram of the fuel is burnt completely in a sufficient supply of air. It is expressed in J/kg or kJ/kg.
- Hydrogen has the highest calorific value. Still, it is not used as a fuel because it causes transportation problems. It is explosive and difficult to store.

2. Combustion of fossil fuels adds carbon dioxide to the environment which leads to the greenhouse effect, that causes global warming.
3. A candle flame has four major regions/zones with different colours.
 - (i) The non-luminous zone or the zone of complete combustion is the hottest part of the candle flame. It is the outermost zone of the flame. As oxygen supply is adequate, complete combustion takes place. The flame appears blue. But, it is very thin and may not be visible.
 - (ii) The luminous zone or the zone of incomplete combustion is moderately hot. It is the middle zone of the flame. The wax vapours do not burn completely as the oxygen supply is inadequate. The carbon particles produced because of incomplete combustion glow and give this zone its bright yellow colour. The flame leaves black soot on an object placed in the zone.
 - (iii) The dark zone or the zone of no combustion is the least hot. It is the innermost zone of the flame, in the area surrounding the wick. Here the wax vapours do not come in contact with oxygen, and hence do not burn.
 - (iv) The blue zone is a small region at the base of the wick. Here the carbon monoxide produced in the inner zones due to incomplete combustion burns with a blue colour.
4. **Characteristics of a Good Fuel** : The heat released by a fuel is measured in kilojoules.

A fuel is considered good if it:

 - (i) has a low ignition temperature,
 - (ii) has a moderate rate of combustion,
 - (iii) produces a large quantity of heat, that is, its calorific value is high,
 - (iv) is safe to store, handle and transport,
 - (v) leaves behind little or no residue after being burnt,
 - (vi) does not cause pollution,
 - (vii) is cheap and easily available.
5. The increasing energy consumption has a harmful impact on the environment. The main impacts, due to the burning of fuels, are as follows :
 - (i) Burning of carbon-containing fuels releases ash and fine particles of unburnt carbon in the air. These fine particles, called SPM (Suspended Particulate Matter) are dangerous pollutants.
 - (ii) Combustion of fuels adds carbon dioxide to the environment which leads to the greenhouse effect, that causes global warming. This can result in melting of the Polar ice caps and rise in sea levels, leading to flooding of large portions of land on the sea coasts.

- (iii) Coal contains sulphur, which produces sulphur dioxide on burning. Besides being a poisonous gas, it dissolves in rain to form sulphuric acid. This gives rise to acid rain, which is very harmful for soil, crops, buildings, etc.
- (iv) The oxides of nitrogen given off from exhausts of engines of vehicles are poisonous gases. Many vehicles now use catalytic converters to convert these to harmless gases.
- (v) Lead compounds are released in exhausts of vehicles. They are poisonous. Increasing use of unleaded petrol is expected to reduce lead pollution.
- (vi) Carbon monoxide produced when fuels containing carbon burn in insufficient supply of air, is a very dangerous pollutant and can cause death if breathed in.

D. Do it yourself.

E. Do it yourself.

F. Do it yourself.

G. Do it yourself.



8. Force, Its Types and Pressure

Exercise

- A. 1. (b) 2. (b) 3. (a) 4. (a) 5. (d)
- B. 1. The difference between mass and weight is that mass is the amount of matter in a material, while weight is a measure of how the force of gravity acts upon that mass.
2. A magnet can act from a distance because it is surrounded by an invisible field of magnetic force.
3. The force acting on a unit area of a surface is called pressure. It acts perpendicular to the surface on which pressure is exerted. It depends on two factors :
- (i) The magnitude of force applied.
 - (ii) The area over which the force is applied, i.e. the area of contact between the two objects.
4. Atmospheric pressure is the force forced on a surface by the air above it as gravity pulls it to earth. It is caused by the weight of the atmosphere pushing down on itself and on the surface below it.
5. It is difficult to cut vegetables with a blunt knife because it has more area compared to a sharp knife, which means that the pressure exerted by the blunt knife is less than that of the sharp knife.

- C. 1. Force is a push or pull upon an object results from the interaction of the object with another object and change in their position.
The effects of force are as follows :
- (i) Force can make a stationary object move or can change its position of rest.
 - (ii) Force can change the speed of a moving object.
 - (iii) Force can change the direction of motion of a moving object.
 - (iv) Force can change the shape or size of an object.
2. Non-contact forces are forces that can be applied to a body without any direct contact. Examples of such forces are magnetic, electrostatic and gravitational forces.
Contact forces on the other hand are the exact opposite of non-contact forces as they can only be applied to a body by coming in direct contact with the body. Examples of such forces are muscular and frictional forces.
3. Friction is the force that slows things down or prevents them from moving. For example, when we stop pedalling a bicycle, it slows down and stops after some time. This is because of the frictional force.
4. Following are the effects of force on an object :
- (i) **Force can make a stationary object move, or can change its position of rest :** When we kick a stationary football, we make it move. When we pick up a glass of milk, we change its position of rest.
 - (ii) **Force can change the speed of a moving object :** A goalkeeper applies force to stop a football and bring down its speed to zero. If he is not able to collect the ball cleanly, it may only slow down and not come to a position of rest. When a player kicks a moving football, it begins to move faster.
A goalkeeper slows down or stops a football by applying force in the opposite direction in which the football is moving. On the other hand, to make the ball move faster, the player applies a force in the same direction in which the ball is moving.
 - (iii) **Force can change the direction of motion of a moving object :** When a batter hits a ball, he applies force to change the direction of the motion of the ball. If we let a moving ball hit the palm of our hand, a force is exerted on the ball which changes its direction of motion.
 - (iv) **Force can change the shape or size of an object :** If we squeeze a sponge, its shape changes. If we pull a rubber band, it becomes longer. We can use the force of our hand to change the shape of plasticine or an inflated balloon.
5. Take a plastic bottle. Put some boiling water in it. The steam coming out of the water will expel most of the air from inside the bottle. After

about two minutes, screw the cap tightly on the bottle. Put the bottle in a trough and pour some cold water mixed with ice on it. You will observe that the bottle gets crushed and becomes irregular in shape. This is because the cold water condensed the steam inside the bottle to water. This left no air inside the bottle. Thus, the pressure inside the bottle became much lesser than that on the outside. The air pressure from outside acted on the bottle from all directions and crushed it.

This experiment shows that air exerts pressure in all directions.

- D. Do it yourself. E. Do it yourself.
F. Do it yourself.



9. Friction and Its Uses

Exercise

- A. 1. (a) 2. (a) 3. (b) 4. (b) 5. (c)
- B. 1. Friction is a force that slows things down or prevents things from moving.
2. Ball bearings work on the principle of rolling friction.
3. A lubricant forms a thin layer between two surfaces in contact and it decreases the irregularities between the surfaces. Thus friction is reduced.
4. Friction generates heat which, at times, may be harmful. The heat produced in a fast-moving machine is very high. Proper arrangements have to be made to cool the machine, otherwise it can get damaged. If the cooling arrangement in a car does not work properly, the engine can get jammed.
- C. 1. Effect of friction on motion :
(i) The force of friction always opposes the motion of an object and it tends to stop a moving object.
(ii) It also tends to prevent a stationary object from moving.
2. Streamlining is a design that offers the least resistance to the flow of a fluid, especially air or water. Friction is minimum for a streamlined shape, which is rounded in the front and narrow at the back.
3. Three situations in daily life where friction is an advantage :
(i) Without friction, it would be impossible for us to walk because friction between our feet or shoes and the ground enables us to walk by pushing our feet against the ground. Without friction, we would slip as soon as we try to walk. It is very difficult to walk on ice or on a very smooth and polished floor because the friction between our shoes and such surfaces is very little.

- (ii) Cars and buses are able to move safely on the road because of friction between the treaded tyres and the surface of the road.
 - (iii) Brakes on cycles or cars work because of friction. When brakes are applied, the brakes 'shoes' rub against the wheels. The friction between them reduces the speed.
4. Friction has many disadvantages such as :
- (i) Friction leads to wastage of energy because any object that moves has to overcome the force of friction.
 - (ii) Friction wears out the rubbing surfaces. The soles of our shoes wear out in a few months due to friction. The moving parts of a machine wear out with time because of friction.
 - (iii) Friction generates heat which, at times, may be harmful. The heat produced in a fast-moving machine is very high. Proper arrangements have to be made to cool the machine, otherwise it can get damaged. If the cooling arrangement in a car does not work properly, the engine can get jammed.
5. The four methods by which friction between two solid surfaces in contact can be reduced are :
- (i) **By polishing** : Polishing a rough surface smoothens it and reduces friction.
 - (ii) **By lubrication** : Lubricating surfaces with oil, grease or graphite reduces friction. The sliding surfaces get a thin layer of the lubricant between them. Graphite is used as a lubricant in machines where the moving parts reach very high temperatures. While playing carrom, we put the fine talcum powder on the carrom board to reduce friction.

By streamlining to reduce fluid friction : Fluids such as water and air also exert friction on objects moving through them. This frictional force is called drag. It depends on the nature of the fluid, the shape of the object and the speed of the object with respect to the fluid. Friction is minimum for a streamlined shape, which is rounded in the front and narrow at the back. Birds and fish have streamlined bodies. The bodies of aeroplanes, missiles, rockets, cars are also made streamlined to reduce friction with air, called air resistance. Ships also have streamlined shapes to reduce friction with water.

By using wheels and ball bearings—rolling friction : When a spherical or cylindrical object rolls on a surface, the resistance it encounters is called rolling friction. The resistance that an object encounters when it slides over a surface is called sliding friction. It is easier to roll an object than to slide it. Rolling friction is less than sliding friction. That is why vehicles are equipped with

wheels. These days, luggage trolleys are also equipped with wheels much easier to roll along than to carry or slide them.

- D. Do it yourself. E. Do it yourself.
 F. Do it yourself.



10. Sound and Noise

Exercise

- A. 1. (d) 2. (c) 3. (a) 4. (b) 5. (a)
 B. 1. Sound is produced by rapid to-and-fro movements called vibrations.
 2. Difference between ultrasonic and infrasonic waves.

	Infrasonic Waves	Ultrasonic Waves
(i)	The sound of frequency less than 20 Hz are called infrasonic waves.	The sound of frequency more than 20000 Hz are called ultrasonic waves.
(ii)	These sounds have a frequency below the lower limit of human hearing range.	The sounds have a frequency above the upper limit of human hearing range.

3. The time taken by a vibrating object to complete one vibration is called its time period.
 4. The maximum distance to which an oscillating or vibrating object moves from its central position is called amplitude.
 5. The number of oscillations made by a vibrating object in one second is known as frequency.
- C. 1. If we strike a drum softly, it produces a soft sound. If we strike it hard, its skin vibrates with greater amplitude and a louder sound is produced. This shows that loudness of the sound produced by a vibrating object depends on the amplitude of vibration. Loudness is proportional to the square of the amplitude. This means that if the amplitude is doubled, the loudness increases four times.
 2. Quality of sound is the property by which we can distinguish between two sounds of same pitch and loudness. It is determined by frequencies present in it and their relative loudness.
 3. When an object vibrates, it makes the molecules of the adjacent air vibrate with the same frequency. These transfer their vibrations to the neighbouring molecules, and this process goes on. This way, waves of vibrations from the vibrating object travel all around. When these vibrations reach our ear, they are collected by the pinna and funnelled

into the eartube. These then strike the eardrum, which starts vibrating with the same frequency, causing the delicate bones of the middle ear to vibrate. These bones amplify the vibrations and transmit them to the inner ear. The vibrations stimulate tiny hair cells in the hearing organ which send a signal to the auditory nerve of the nervous system. The auditory nerve takes the signal to the brain and we can then hear the sound.

4. Excessive noise in our surroundings is known as noise pollution. It is caused by traffic on the road, mixers and grinders, vacuum cleaners, air coolers, machines in factories, etc. Even loud music causes noise pollution. Noise pollution is harmful to us in many ways.
5. Some ways to control noise pollution are as follows :
 - (i) Reducing noise emissions by developing low-noise products, for example, better silencers for automobiles.
 - (ii) Planning land use to reduce noise: for example, making tree-lined buffer zones between residential colonies and roads with heavy traffic; locating noise-producing factories far away from cities.
 - (iii) Measures such as screens and enclosures around machinery to obstruct the path of noise. This helps people working in and living near factories. Ear plugs for people working in high noise-producing industries.

D. Do it yourself.

E. Do it yourself.

F. Do it yourself.



11.

Reflection

Exercise

- A. 1. (d) 2. (a) 3. (c) 4. (d) 5. (a)
- B. 1. We are able to see non-luminous objects, when part of a part of light falling on it bounces back. We can see the object when this light reaches our eyes. This bouncing back of light by objects is called reflection of light.
2. The second law of reflection states that the incident ray, the normal and the reflected ray all lie in the same plane.
 3. When the image of an object is erect but is inverted in the lateral side, it is called lateral inversion.
 4. Draw it yourself.
 5. The function of a periscope in a submarine is to show objects and enemy ships on the surface of the sea.

- C. 1. Characteristics of an Image Formed with a Plane Mirror :**
- (i) The image formed is erect.
 - (ii) The image is of the same size as the object.
 - (iii) The image is laterally inverted, i.e., the right side of the object appears as the left side of the image.
- 2. Uses of Plane Mirrors :**
- (i) We generally use plane mirrors in our homes to look at our reflection. In beauty parlours, plane mirrors kept at an angle are used to view the side of the head. Plane mirrors parallel to each other are used to view the back of the head.
 - (ii) They are also used in solar cookers to reflect light on the food being cooked.
 - (iii) They are used in periscopes. From a submarine under the sea, a sailor uses a periscope to see objects and enemy ships on the surface of the sea.
3. When two mirrors are placed at right angles and observed the images of an object placed between them, we can see multiple images, precisely three images. This is because, the image formed by the first mirror acts as an object for the other mirror, besides the original object's image. This phenomenon is called as multiple reflection.
4. The required number of images = $(360/10) - 1$
 $= 36 - 1 = 35$
5. A kaleidoscope consists of three plane mirrors inclined at an angle of 60° to each other. This arrangement is kept in a cylindrical cardboard box with some pieces of coloured glass at one end. The mirrors form multiple images of these glass pieces, leading to in beautiful patterns when seen from the other end. On rotating the cylindrical box, the patterns continuously change as the position of the glass pieces shifts. It is based on the principle of forming multiple images when mirrors are inclined at an angle, which is referred to as multiple reflection.
- D.** Do it yourself.
- E.** Do it yourself.



12. Refraction and Dispersion

Exercise

- A.** 1. (a) 2. (b) 3. (a) 4. (a) 5. (c)
- B.** 1. Refraction occurs because light travels at lower speed in an optically denser medium.

2. The splitting up of the light into its constituent colours while passing from one medium to the other is called dispersion.
3. The mixture of seven colours of light namely violet, indigo, blue, green, yellow, orange and red is known as white light.
4. **Near point of the eye :** The action of the ciliary muscles in a normal eye stops when the object is at a distance of about 25 cm. The focal length of the eye lens cannot be reduced any further. So, a normal eye cannot clearly see objects closer than 25 cm. Then the image is formed behind the retina and the object appears hazy. This least distance at which the eye can see an object clearly is called the near point of the eye.

Far point of the eye : The far point of the eye is the maximum distance at which it can see clearly. For a normal eye, it is at infinity.

5. The region of the retina at the junction of the optic nerve and the retina is called the blind spot. It has no sensory cells, so any image formed here is not seen.

- C. 1. The rays falling on a concave lens, after refraction, always diverge. Therefore, no matter where the object is kept, a diverging lens always forms a virtual image, which is erect and smaller in size than the object. It is formed between the optical centre and the focus, on the same side of the lens as the object.

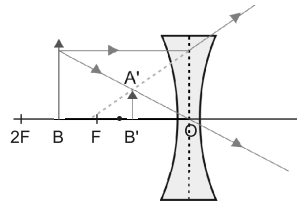


Image formed by a concave lens

2. The ability of the eye to alter the focal length of its lens so that it can clearly see all objects within a certain range is called accommodation of the eye. Ciliary muscles give power of accommodation to the eye.
3. Every character in the Braille code is based on an arrangement of one to six raised dots. Each dot has a numbered position in the Braille cell. These characters make up the letters of the alphabet, punctuation marks, numbers, and also special characters.

The letter 'A' is written with only 1 dot.

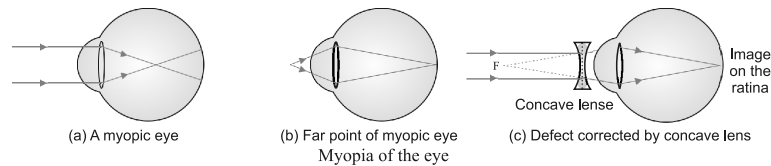
The letter 'D' has dots 1, 4, and 5.



4. When an image of an object is formed on the retina, it stays for about 1/16th of a second. This is called persistence of vision. In movies, successive still images are flashed before our eyes at a rate of more than 16 images per second. This allows us to watch the images as a movie.
5. **Myopia or Short Sightedness :** A person suffering from this defect can see nearby objects clearly but distant objects appear blurred. The

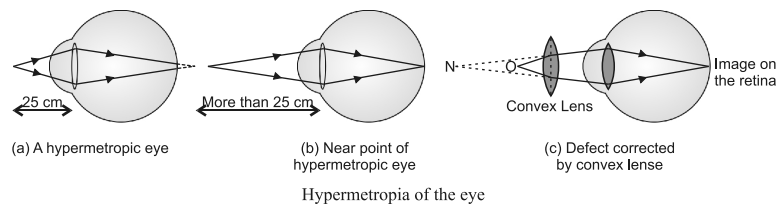
ciliary muscles do not relax sufficiently to make the eye lens thin when viewing distant objects. So, the image of a distant object is formed before the retina and cannot be clearly seen (Fig. a). For a person suffering from myopia, the far point is at a finite distance and not at infinity (Fig. b).

Spectacles with concave lenses of the required power are used to correct this defect. The concave lens diverges the parallel rays coming from a distant object in such a way that they appear to come from the far point of the defective eye.



The lens forms a virtual image of a far off object at the far point of the defective eye. The eye can then see the distant object clearly (Fig. c).

Hypermetropia or Long Sightedness : A person suffering from this defect can see distant objects clearly but nearby objects appear blurred. The ciliary muscles are unable to thicken the eye lens enough to see nearby objects clearly. This defect generally occurs in old age when the ciliary muscles become weak. The image of a near object is formed behind the retina and so, appears blurred (Fig. a). For a person suffering from hypermetropia, the near point is beyond 25 cm (Fig. b). Spectacles with convex lenses of the required power are used to correct this defect. The convex lens converges the rays from a near object in such a way that they appear to come from the near point of the defective eye. The lens forms a virtual image of the object at the near point of the defective eye. The eye then forms a sharp image of the object on the retina (Fig c).



- D. Do it yourself.
- E. Do it yourself.
- F. Do it yourself.



13. Electric Current and Electrolysis

Exercise

- A. 1. (b) 2. (d) 3. (a) 4. (c) 5. (d)
- B. 1. A continuous and directed flow of negative charges through a wire is called electric current.
2. Conventional current flows from a positively charged body to a negatively charged one, while the electronic current flows from a negatively charged body to a positively charged one. This is the difference between electronic current and conventional current.

	Conductors	Insulators
(i)	A conductor allows the electric current to flow through it when a potential difference is applied across its ends.	An insulator does not conduct electricity externally high potential difference is applied across its ends.
(ii)	A good conductor of electricity is generally a good conductor of heat.	Insulators do not conduct heat.

3. 4. An electrolyte is the substance which conducts electricity in the liquid state or when dissolved in water and breaks up chemically during the process.
5. Zinc is electroplated on iron to prevent the iron from rusting. Hence, iron electroplated with zinc has various applications in the construction and automobile industries.
- C. 1. When an electrolyte such as copper sulphate is dissolved in water, it breaks up into positively and negatively-charged particles called ions. Cations are positively-charged ions while anions are negatively-charged particles. Ions move about freely in aqueous solution. When electric current is passed through the solution, the cations move towards the negatively-charged electrode (cathode) whereas anions towards the positively-charged electrode (anode). This leads to a chemical change.
2. When electricity is passed through tap water, it conducts electricity because it is not pure water and has some salts dissolved in it.
3. Electroplating is the process of coating a thin layer of a metal, such as gold, silver, chromium, tin or nickel, over another cheaper metal. This is done either to protect the metal, or to make it look attractive.

To electroplate a metal object with copper in the laboratory : We need a glass beaker, a metal spoon, a thick copper wire, a battery cell, a solution of copper sulphate, connecting wires and a switch.

Fill around three-fourth of the beaker with the copper sulphate solution. Hammer the copper wire to flatten it out and connect it to the positive terminal of the battery. Connect the spoon through a switch to the negative terminal of the battery. Dip both of them in the copper sulphate solution, making sure that they do not touch each other. Put on the switch and let the current pass through the solution for about half an hour.

At the end of this experiment, you will observe a layer of copper formed over the spoon.

4. Chromium is a shiny metal that never corrodes and also resists scratches. Therefore, it is electroplated on iron to make it scratch-resistant and free from corrosion.
5. Four uses of electroplating are :
 - (i) Chromium is a shiny metal that does not corrode and resists scratches. It is deposited on other cheaper metals such as iron to make taps, car parts, bicycle handle bars, wheel rims, etc. This makes them more attractive and also resist corrosion.
 - (ii) Food kept in iron cans gets spoilt because of reaction with iron. To prevent this, iron is electroplated with tin, which is less reactive than iron, to make tin cans. They are used to store food.
 - (iii) Zinc is electroplated on iron used to make bridges and automobiles. The coating prevents iron from rusting.
 - (iv) Gold or silver is electroplated on jewellery made out of a cheaper metal to make it look attractive.

D. Do it yourself.

E. Do it yourself.

F. Do it yourself.



14. Natural Phenomena : Lightning and Earthquake

Exercise

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

B. 1. Two like charges repel each other and two unlike charges always attract each other.

2. An object may also be charged by touching it to a charged body. This happens because some charge from the charged body are moved to the uncharged body till both are equally charged. This is charging by conduction. In this case, the body being charged acquires the same kind of charge as on the charged body.

3. **Difference between conductors and non-conductors**

	Conductors	Non-conductors
(i)	Charges can flow through a conductor.	Charges cannot flow through a non-conductor.
(ii)	They conduct electricity.	They do not conduct electricity.
(iii)	Examples : Copper and silver.	Examples : Plastic wood.

4. An electroscope is a device that is used to detect, measure and find the nature of charge.
5. The process of transferring charges from a charged object to the earth is called earthing.

C. 1. **Difference between static and current electricity**

	Static electricity	Current electricity
(i)	Static electricity is the study of charges at rest.	Current electricity is the study of charges in motion.
(ii)	When a body is charged by rubbing, it acquires static electricity.	The flow of current in a conductor is called an electric current.

2. A lightning conductor is fixed on tall buildings to protect them from damage by lightning. Benjamin Franklin developed this idea. A lightning conductor consists of a metal rod ending in spikes at the top. The lower end of the rod is attached to a copper plate buried deep in the earth. If lightning does strike the building, it flows harmlessly to the earth through the metal rod, and is not damaged.
3. Despite lightning being dangerous, it is also useful in some ways. The heat and light released during lightning makes the nitrogen of the air combine with oxygen to form nitrogen oxides. These get dissolved in water to form very dilute nitric acid, which comes down with rain. The acid reacts with salts in the soil to form nitrogenous compounds, which are essential for growth of plants. Lightning also enables ozone to be formed from oxygen. This ozone present stops the harmful ultraviolet rays of the sun from reaching us.
4. Earthquake occurs due to following reasons :
Shifting of Tectonic Plates : The Earth's lithosphere is divided into about 20 parts called tectonic plates. These plates float on the hot

magma below, and are therefore in relative motion to each other. When these plates collide and the rock at the joint is sufficiently slippery, the plates slide over each other, little by little. But, sometimes the rocks at the joints may interlock and get stuck, resisting pressure from within. For years, the forces pushing the plates build up until the strain rips the two plates apart. The rocks crack and shift, sending shock waves of energy in all directions. When these waves reach the surface, they are called earthquakes.

Volcanic Activity : Another main cause of earthquakes is volcanic activity. Almost each volcanic eruption is followed by earthquakes and many of the severe earthquakes cause volcanic eruptions.

The explosion of violent gases during a volcanic eruption moves upward which leads to severe tremors of high magnitude. These depend upon the intensity of the volcanic eruption.

5. We should do the following things during an earthquake :
 - (i) If trapped in home or a building, take shelter under a table and do not move till the shaking stops. Protect the head with arms. Avoid using a lift.
 - (ii) Do not stay near the windows, bookcases, mirrors, hanging pots, fans during or immediately after an earthquake.
 - (iii) Leave the home or school building and move to open areas.

D. Do it yourself.

E. Do it yourself.



Half-Yearly Model Test Paper

- A. 1. (d) 2. (a) 3. (c) 4. (c) 5. (a)
- B. 1. The process of converting free nitrogen gas of the atmosphere into nitrogen compounds is called nitrogen fixation.
2. Organisms that are small and can be seen only through a microscope are called microorganisms.
3. Reproduction is necessary because it is the process of producing new individuals of the same kind.
4. Puberty is that stage of life when the body becomes capable of reproduction. It is normally 11-16 years in boys and 10–15 years in girls. But it may vary from person to person.
5. Judicious use of energy has two main advantages :
 - (i) It will delay the energy crisis, and
 - (ii) It will give our scientists more time to develop more efficient alternate sources of energy.

- C. 1. When a virus enters the living cell of an organism, it is able to reproduce by using the energy of host cells for its reproduction. After thousands of viruses are formed, the host cells often die. As the host cell bursts, new viruses spread and invade other cells. Since a large number of host cells die, the person fall ill.
2. **External fertilization** : Sea animals, such as jellyfish and starfish, gather in large groups in water and lay their eggs and sperms on the surface of the water. The sperms fuse with the eggs to form zygotes. These zygotes develop into new individuals in the water. Such fertilization is called external fertilization as it occurs outside the animal's body. Animals living in or near ponds and lakes also have external fertilization.
- Internal fertilization** : In birds, reptiles and mammals, the male deposits the sperms inside the reproductive system of the female. Fertilization occurs and the zygote is formed inside the female's body. Such fertilization which takes place inside the body of the female is known as internal fertilization.
3. The cycle of producing and releasing a mature egg, the thickening of the uterus wall, and its shedding if fertilization does not occur is known as the menstrual cycle.
4. Natural gas is found along with petroleum in underground reservoirs. It is mainly made up of methane, though butane and propane are also present in small proportions. It can be easily transported through pipes and is a clean and non-polluting fuel. It is stored under high pressure as compressed natural gas (CNG).
- (i) In some parts of India, CNG is supplied to homes and factories through pipes and directly used as a fuel.
 - (ii) CNG is used as a non-polluting fuel for vehicles.
 - (iii) CNG is used for power generation.
 - (iv) Natural gas is used as a starting material for the manufacture of a number of chemicals and fertilizers.
5. **Characteristics of a Good Fuel** : The heat released by a fuel is measured in kilojoules.
- A fuel is considered good if it :
- (i) has a low ignition temperature,
 - (ii) has a moderate rate of combustion,
 - (iii) produces a large quantity of heat, that is, its calorific value is high,
 - (iv) is safe to store, handle and transport,
 - (v) leaves behind little or no residue after being burnt,
 - (vi) does not cause pollution,
 - (vii) is cheap and easily available.



Annual Model Test Paper

- A. 1. (a) 2. (c) 3. (c) 4. (c) 5. (a)
- B. 1. The difference between mass and weight is that mass is the amount of matter in a material, while weight is a measure of how the force of gravity acts upon that mass.
2. A lubricant forms a thin layer between two surfaces in contact and it decreases the irregularities between the surfaces. Thus friction is reduced.
3. The number of oscillations made by a vibrating object in one second is known as frequency.
4. The function of a periscope in a submarine is to show objects and enemy ships on the surface of the sea.

	Conductors	Insulators
(i)	A conductor allows the electric current to flow through it when a potential difference is applied across its ends.	An insulator does not conduct electricity externally high potential difference is applied across its ends.
(ii)	A good conductor of electricity is generally a good conductor of heat.	Insulators do not conduct heat.

- C. 1. Following are the effects of force on an object :
- (i) **Force can make a stationary object move, or can change its position of rest :** When we kick a stationary football, we make it move. When we pick up a glass of milk, we change its position of rest.
- (ii) **Force can change the speed of a moving object :** A goalkeeper applies force to stop a football and bring down its speed to zero. If he is not able to collect the ball cleanly, it may only slow down and not come to a position of rest. When a player kicks a moving football, it begins to move faster.
- A goalkeeper slows down or stops a football by applying force in the opposite direction in which the football is moving. On the other hand, to make the ball move faster, the player applies a force in the same direction in which the ball is moving.
- (iii) **Force can change the direction of motion of a moving object :** When a batter hits a ball, he applies force to change the direction of the motion of the ball. If we let a moving ball hit the palm of our hand, a force is exerted on the ball which changes its direction of motion.

- (iv) **Force can change the shape or size of an object** : If we squeeze a sponge, its shape changes. If we pull a rubber band, it becomes longer. We can use the force of our hand to change the shape of plasticine or an inflated balloon.
2. Effect of friction on motion :
- (i) The force of friction always opposes the motion of an object and it tends to stop a moving object.
- (ii) It also tends to prevent a stationary object from moving.
3. If we strike a drum softly, it produces a soft sound. If we strike it hard, its skin vibrates with greater amplitude and a louder sound is produced. This shows that loudness of the sound produced by a vibrating object depends on the amplitude of vibration. Loudness is proportional to the square of the amplitude. This means that if the amplitude is doubled, the loudness increases four times.
4. **Characteristics of an Image Formed with a Plane Mirror** :
- (i) The image formed is erect.
- (ii) The image is of the same size as the object.
- (iii) The image is laterally inverted, i.e., the right side of the object appears as the left side of the image.
5. **Difference between static and current electricity**

	Static electricity	Current electricity
(i)	Static electricity is the study of charges at rest.	Current electricity is the study of charges in motion.
(ii)	When a body is charged by rubbing, it acquires static electricity.	The flow of current in a conductor is called an electric current.

