

As per the rationalized syllabus

Practice & More

Science



ANSWERS



Ratna Sagar

Answer Key

1. Crop Production and Management

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|------|------|
| 1. a | 2. a | 3. c | 4. c |
| 5. d | 6. b | 7. d | 8. a |
| 9. d | 10. d | | |

B. Fill in the blanks.

- | | |
|-----------------------|-------------------------|
| 1. agricultural | |
| 2. tilling, ploughing | 3. manures, fertilizers |
| 4. irrigation | 5. weeds |
| 6. weedicides | 7. harvested |
| 8. harvester | 9. husbandry |
| 10. silos, granaries | |

C. Write True or False. Rewrite the false statements correctly.

1. True
2. False. Activities necessary for cultivation of crops are not similar to activities carried out by a gardener to grow ornamental plants in houses.
3. False. A few centimetres of the top soil supports plant growth.
4. True
5. True
6. False. Continuous cultivation of crops makes the soil poor in nutrients.
7. False. Microorganisms help to make manures.
8. False. Excessive use of fertilizers can make the soil less fertile.
9. False. Weedicides are harmful to humans.
10. True

D. Answer in one or two words only.

- | | |
|---------------------|------------------------------|
| 1. Paddy, maize | 2. Wheat, linseed |
| 3. Crumbs | 4. Tractor-driven cultivator |
| 5. Seed drill | 6. Crop rotation |
| 7. <i>Rhizobium</i> | 8. Drip irrigation system |
| 9. Weeding | 10. 3 to 4 months |

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. Green plants make their own food by using sunlight, carbon dioxide, water and minerals.
2. Animals including humans get their food from plants, animals, or both.
3. We need to eat food to get energy for carrying out various body functions.
4. We can provide food to the large number of people in our country by regular production of crops, proper management and distribution.
5. Paddy needs a lot of water to grow. So, paddy cannot be grown in the winter season.
6. Loosening of soil allows the roots to breathe easily as the air enters easily through the loose soil.
7. Turning and loosening allow the roots to penetrate

deep into the soil. The loosened soil allows the roots to breathe easily even when they go deep into the soil. The loosened soil helps in the growth of earthworms and microbes present in the soil. These organisms further turn and loosen the soil and add humus to it.

8. Seeds that float on water are damaged seeds. Damaged seeds become hollow and are thus lighter.
9. In a nursery, small plants are kept in small bags so that they can be easily carried and planted in a garden.
10. Plants that grow in soil that has been sufficiently manured grow better than the ones growing in soil that has not been sufficiently manured.
11. Fertilizers are man-made inorganic salts. Manures are natural substances obtained by the decomposition of cattle dung and plant wastes. Fertilizers are prepared in factories but manures are prepared in fields.
12. The frequency of watering of plants is higher in summer than in other seasons. Due to the intense heat of the sun, the rate of evaporation of water from the soil and the leaves increases during summer.
13. Yes, spraying of weedicides may affect the health of the person handling the weedicide sprayer. So she/he should cover the nose and mouth with a piece of cloth during spraying of these chemicals.
14. Sometimes dried neem leaves are put into iron drums containing wheat to protect them from pests and microorganisms.

B. Answer in one or two sentences only.

1. The name of the implement is hoe. It is a simple tool which is used for removing weeds and for loosening the soil.
2. A farmer separates healthy seeds from damaged ones by keeping the seeds in water. Damaged seeds become hollow and are thus lighter. Therefore, they float on water.
3. The seed drill sows the seeds uniformly at equal distance and depth. It ensures that seeds get covered by the soil after sowing. This protects seeds from being eaten by birds. Sowing by using a seed drill saves time and labour.
4. Appropriate distance between the seeds is necessary to avoid overcrowding of plants. This allows plants to get sufficient sunlight, nutrients and water from the soil.
5. Excessive use of fertilizers harm the soil by making it porous. Excess fertilizers get washed into water bodies and harm aquatic animals.
6. a. In a drip irrigation system, the water falls drop by drop directly near the roots. It is the best technique for watering fruit plants, gardens and trees.
b. Water is not wasted at all. It is a boon in regions where availability of water is poor.

7. a. Weeds are unwanted plants that grow along with the crops.
- b. Weeding is necessary since weeds compete with the crop plants for water, nutrients, space and sunlight. Thus, they affect the growth of the crop.
8. Harvested grains have moisture in them. If freshly harvested grains (seeds) are stored without drying, they may get spoilt or attacked by microorganisms, making them unfit for use or for germination.
9. The breeding, feeding and caring of domestic animals for food and other purposes is called animal husbandry.

C. Answer in detail in your notebook.

1. The steps involved in crop production, in sequential order are as follows:
 - i. Preparation of soil
 - ii. Seed selection and sowing
 - iii. Manuring
 - iv. Irrigation
 - v. Weeding
 - vi. Protection from pests and diseases
 - vii. Harvesting, threshing and winnowing
 - viii. Storage
2. Kharif crops
 - i. These crops are sown at the beginning of south-west monsoon.
 - ii. They are grown during June to October.
Examples: Paddy and maize.

Rabi crops

- i. These crops are sown at the beginning of the winter season.
- ii. They are grown during November to April.
Examples: Wheat and pea.

Manures	Fertilizers
These are natural organic substances.	These are inorganic salts made by humans.
These are rich in humus but not in inorganic nutrients.	These are rich in inorganic nutrients but do not contain humus.
These are prepared in fields.	These are prepared in factories.

4. The use of fertilizers helps farmers to get better yield of crops such as wheat, paddy and maize. But excessive use of fertilizers can make the soil less fertile. Fertilizers have also become a source of water pollution. The use of manures improves soil texture as well as its water retaining capacity. This is why manures are considered better than fertilizers.
5. Water is important for proper growth and development of plants. Water is absorbed by the plant roots. Along with water, minerals and fertilizers are also absorbed. Plants contain nearly 90% water. Water is essential because germination of seeds does not take place under dry conditions. Nutrients dissolved in water are transported to each part of the plant. Water also protects the crop from both frost and hot air currents.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. Manures are rich in organic nutrients but not in some inorganic nutrients like nitrogen, phosphorous and potassium. Fertilizers are rich in these inorganic nutrients, but not in organic nutrients. Also, the use of manures improves soil texture and its water retaining capacity. That is why farmers use a mixture of manures and fertilizers.
2. When plants of the same kind are cultivated at one place on a large scale, it is called a crop. For example, crop of wheat means that all the plants grown in a field are that of wheat. I have grown a few wheat plants in my garden. So I am not growing a wheat crop.
3. Freshly harvested wheat grains have more moisture than that we buy from the market. These wheat grains are stored after drying in the sun to reduce the moisture in them. This prevents the attack by insects, pests, bacteria and fungi.

2. Microorganisms: Friend and Foe

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|-------|------|
| 1. d | 2. d | 3. d | 4. d |
| 5. a | 6. d | 7. b | 8. b |
| 9. d | 10. c | 11. c | |

B. Fill in the blanks.

- | | |
|-----------------------------|-------------------|
| 1. microorganisms, microbes | 2. protozoa |
| 3. viruses | 4. fermentation |
| 5. antibodies | 6. pasteurization |
| 7. fixers | 8. preservatives |
| 9. carriers | 10. carriers |

C. Write True or False. Rewrite the false statements correctly.

1. False. Viruses can also cause serious diseases such as polio.
2. False. Viruses are also microscopic.
3. True
4. True
5. True
6. True
7. True
8. False. Microbes cannot decompose plastics and convert them into manure.
9. True
10. False. Malaria and dengue are spread by female mosquitoes.

D. Answer in one or two words only.

- | | | |
|---------------------------|--------------------------|-------------------------|
| 1. Bacteria | 2. Root | 3. Carbon dioxide |
| 4. Pathogen | 5. Fungus | 6. <i>Lactobacillus</i> |
| 7. Fungi | 8. Communicable diseases | |
| 9. Chemical preservatives | | |
| 10. Microbiology | | |

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. Curd contains several microorganisms. Of these, the bacterium, *Lactobacillus* promotes the formation of

curd. It multiplies in milk and converts it into curd. This is why a little curd is added to warm milk to set curd for the next day.

2. Curd contains the bacteria, *Lactobacillus* which when mixed with *suji* or flour makes them very soft, smooth and fluffy.
3. The four diseases against which children are given vaccinations are: Tuberculosis, Poliovirus, Diphtheria, and Measles.
4. We can prevent the spread of malaria and dengue by using mosquito net and repellents. We should spray insecticides and control breeding of mosquitoes by not allowing water to collect in the surroundings.
5. Microorganisms that grow on our food sometimes produce toxic substances. These make the food poisonous causing serious illness such as food poisoning.
6. Spoiling of food is a chemical reaction.
7. Milk that comes in packets is pasteurized so that it is preserved for a long time. Pasteurization destroys all the pathogens and microbes.

B. Answer in one or two sentences only.

1. The four major groups into which microbes are classified are bacteria, fungi, protozoa and algae. Viruses are also microscopic but are different from other microorganisms.
2. Viruses are different from other microorganisms because they reproduce only inside the cells of the host organism, which may be a bacterium, plant or animal.
3. Some microorganisms cause diseases in human beings, plants and animals. Such disease-causing microorganisms are called pathogens.
4. Yeast uses sugar for food. In the process of breaking down sugar, alcohol is formed and carbon dioxide is given off. This process is known as fermentation. The bubbles of carbon dioxide given off cause the dough to rise. When this dough is baked to make bread, more bubbles of gas are formed due to heat. As the gas escapes, the bread rises and becomes soft and fluffy.
5. The medicines that kill or stop the growth of the disease-causing microorganisms are called antibiotics. Streptomycin, tetracycline and erythromycin are three names of antibiotics.
6. When a disease-carrying microbe enters our body, the body produces antibodies to fight the invader. The body also remembers how to fight the microbe if it enters again. So, if dead or weakened microbes are introduced in a healthy body, the body fights and kills them by producing suitable antibodies. The antibodies remain in the body and we are protected from the disease-causing microbes. This is how a vaccine works.
7. Some bacteria and blue green algae are able to fix nitrogen from the atmosphere to enrich soil with nitrogen and increase its fertility. These microbes are commonly called biological nitrogen fixers.
8. Microorganisms growing on food sometimes produce toxic substances. These make the food poisonous. Consuming such food can cause a serious illness called food poisoning.

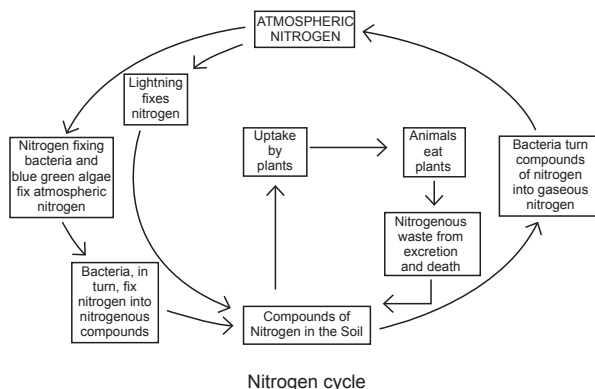
9. a. Pasteurization of milk consists of heating it to a high temperature of 70 °C for about half a minute and then cooling it quickly. This kills most of the bacteria without affecting its flavour.
b. Because this kills most of the bacteria without affecting the flavour and also can be preserved for a long time.
10. Spoiled food emits bad smell and has a bad taste and colour change.
11. Mangoes rot after some time, but mango pickle does not. This is because mango pickles are made by using common preservatives such as salt, sugar and oil.
12. Certain bacteria and blue green algae present in the soil fix nitrogen from the atmosphere and convert it into compounds of nitrogen. Once nitrogen is converted into these usable compounds, it can be utilized by plants from the soil through their root system.
13. A preservative is a common chemical such as salts and edible oils that is generally used to check the growth of microorganisms.
14. Salting, heating, cooling, using chemicals and drying are five methods of food preservation.
15. 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.
16. a. *Chlamydomonas* – algae
b. *Amoeba* – protozoa
c. *Penicillium* – fungi
d. Bacilli – bacteria
e. Coronavirus – virus

C. Answer in detail in your notebook.

1. a. Microorganisms are used in the preparation of curd, bread and cake. Curd contains several microorganisms. Of these, the bacterium, *Lactobacillus* promotes the formation of curd. It multiplies in milk and converts it into curd. Bacteria are also involved in the making of cheese, pickles and many other food items. Yeast reproduces rapidly and produces carbon dioxide during respiration. Bubbles of the gas fill the dough and increase its volume. This is the basis of the use of yeast in the baking industry for making breads, pastries and cakes.
b. Microorganisms such as yeast are used for commercial production of alcohol and wine. For this purpose, yeast is grown on natural sugars present in grains like barley, wheat, rice, crushed fruit juices, etc.
c. Whenever you fall ill, the doctor may give you some antibiotic tablets, capsules or injections such as of penicillin. The source of these medicines is microorganisms. These medicines kill or stop the growth of the disease-causing microorganisms. Such medicines are called antibiotics. These days a number of antibiotics are being produced from bacteria and fungi. Streptomycin, tetracycline and erythromycin are some of the commonly known antibiotics which are made from fungi and bacteria. Antibiotics are even mixed with the feed of livestock and poultry to check microbial infection in

animals. They are also used to control many plant diseases.

2. Microorganisms are harmful in many ways. Some of the microorganisms cause diseases in human beings, plants and animals. Such disease-causing microorganisms are called pathogens. Some microorganisms spoil food, clothing and leather. Pathogens enter our body through the air we breathe, the water we drink or the food we eat. They can also get transmitted by direct contact with an infected person or carried through an animal. Microbial diseases that can spread from an infected person to a healthy person through air, water, food or physical contact are called communicable diseases. Several microorganisms not only cause diseases in humans and plants, but also in other animals. For example, anthrax is a dangerous human and cattle disease caused by a bacterium. Foot and mouth disease of cattle is caused by a virus. Several microorganisms cause diseases in plants like wheat, rice, potato, sugarcane, orange, apple and others. The diseases reduce the yield of crops.
 3. a. Common salt has been used to preserve meat and fish for ages. Meat and fish are covered with dry salt to check the growth of bacteria. Salting is also used to preserve *amla*, raw mangoes, tamarind, etc.
 - b. Jams, jellies and squashes are preserved by sugar. Sugar reduces the moisture content which inhibits the growth of bacteria which spoil food.
 - c. Use of oil and vinegar prevents spoilage of pickles because bacteria cannot live in such an environment. Vegetables, fruits, fish and meat are often preserved by this method.
 - d. You must have observed your mother boiling milk before it is stored or used. Boiling kills many microorganisms. Pasteurized milk can be consumed without boiling as it is free from harmful microbes. The milk is heated to about 70° C for 15 to 30 seconds and then suddenly cooled and stored. By doing so, it prevents the growth of microbes. This process was discovered by Louis Pasteur. It is called pasteurization.
4. Our atmosphere has 78% nitrogen gas. Nitrogen is one of the essential constituents of all living organisms as part of proteins, chlorophyll, nucleic acids and vitamins. The atmospheric nitrogen cannot be taken directly by plants and animals. Certain bacteria and blue green algae present in the soil fix nitrogen from 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. Nitrogen is then used for the synthesis of plant proteins and other compounds. Animals feeding on plants get these proteins and other nitrogen compounds. When plants and animals die, bacteria and fungi present in the soil convert the nitrogenous wastes into nitrogenous compounds to be used by plants again. Certain other bacteria convert some part of them to nitrogen which goes back into the atmosphere. As a result, the percentage of nitrogen in the atmosphere remains more or less constant. This is called the nitrogen cycle.



Nitrogen cycle

5. Antibiotics should be taken only on the advice of a qualified doctor. Also you must complete the course prescribed by the doctor. If you take antibiotics when not needed or in wrong doses, it may make the drug less effective when you might need it in future. Also antibiotics taken unnecessarily may kill the beneficial bacteria in the body. Antibiotics, however, are not effective against cold and flu as these are caused by viruses.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. The microbes that are injected in a person's blood to treat a disease are either killed or weakened prior to their administration. This ensures that the microbe do not cause any harmful effects in the body. The process of injecting microbes in the body to prevent diseases is called vaccination or immunization.
2. Nitrogen is used to inhibit growth of bacteria, which keeps the chips fresh for a longer time.

3. Coal and Petroleum

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|------|------|
| 1. d | 2. a | 3. c | 4. d |
| 5. a | 6. b | 7. d | 8. b |
| 9. d | 10. a | | |

B. Fill in the blanks.

- | | |
|----------------------|--------------|
| 1. resources | 2. carbon |
| 3. fossil | 4. coal |
| 5. inexhaustible | 6. petroleum |
| 7. refining | 8. coal tar |
| 9. carbon dioxide | 10. kerosene |
| 11. carbon, hydrogen | |

C. Write True or False. Rewrite the false statements correctly.

1. False. Petrol, kerosene, diesel oil and lubricating oil are obtained from petroleum.
2. True
3. True
4. False. Fossil fuels are exhaustible natural resources.
5. True
6. False. Dead plants get converted to coal under high pressure and temperature in millions of years.
7. True

8. False. Bitumen is widely used these days for metalling roads.
9. True 10. True

D. Answer in one or two words only.

1. Carbonisation 2. Dead sea animals
3. Petroleum gas (LPG) 4. CNG
5. Coal 6. Coke
7. Petroleum refinery
8. Compressed natural gas (CNG)
9. Coal tar 10. Sun

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. Air, water and soil cannot be exhausted by human activities as they are inexhaustible natural resources.
2. This is because oil and gas are lighter than water and do not mix with it.
3. No, their formation is a very slow process and conditions for their formation cannot be created in the laboratory.

B. Answer in one or two sentences only.

1. Inexhaustible natural resources are present in unlimited quantity in nature and are not likely to be exhausted by human activities. Examples are: Sunlight and air.
Exhaustible natural resources are limited in nature. They can be exhausted by human activities. Examples are: Forests and wildlife.
2. Exhaustible natural resources like coal, petroleum and natural gas that were formed from the dead remains of living organisms (fossils) are called fossil fuels.
3. The slow process of conversion of dead vegetation into coal is called carbonisation.
4. a. Coal tar is a black, thick liquid with an unpleasant smell obtained from coal. It is a mixture of about 200 substances.
b. Synthetic dyes, drugs, explosives, perfumes, plastics, paints and naphthalene balls.
5. a. The process of separating the various constituents/ fractions of petroleum is known as refining.
b. Petroleum gas, petrol, diesel and paraffin wax.
6. Natural gas is less polluting and easy to transport through pipes.
7. It is necessary to conserve fossil fuels to ensure their availability for a longer period of time.

C. Answer in detail in your notebook.

1. About 300 million years ago the earth had dense forests in low lying wetland areas. Due to natural processes, like flooding, these forests got buried under the soil. As more soil deposited over them, they were compressed. The temperature also rose as they sank deeper and deeper. Under high pressure and high temperature, dead plants got slowly converted to coal.
2. Petroleum was formed from organisms living in the sea. As these organisms died, their bodies settled at the bottom of the sea and got covered with layers of sand and clay. Over millions of years, absence of air, high temperature and high pressure transformed the dead organisms into petroleum and natural gas.

S. No.	Constituents of Petroleum	Uses
1.	Petroleum Gas in Liquid form (LPG)	Fuel for home and industry
2.	Petrol	Motor fuel, aviation fuel, solvent for dry cleaning
3.	Kerosene	Fuel for stoves, lamps and for jet aircrafts
4.	Diesel	Fuel for heavy motor vehicles, electric generators
5.	Lubricating oil	Lubrication
6.	Paraffin wax	Ointments, candles, vaseline, etc.

4. Some steps to save petrol and diesel while driving are as follows.
a. Drive at a constant and moderate speed as far as possible.
b. Switch off the engine at traffic lights or at a place where you have to wait.
c. Ensure correct tyre pressure.
d. Ensure regular maintenance of the vehicle.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. Coke. This is because it is an almost pure form of carbon.
2. a. Petroleum is lighter than water.
b. Petroleum does not mix with water.
3. There has been a rapid increase in our energy consumption in the past hundred years due to the increase in population and increase in our energy needs.

4. Combustion and Flame

Section 1: Objective Questions

A. Choose the most appropriate answer.

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

B. Fill in the blanks.

1. combustible 2. rapid
3. ignition 4. carbon monoxide
5. explosion 6. middle
7. carbon dioxide 8. respiratory
9. acid 10. kilojoule per kg (kJ/kg)

C. Write True or False. Rewrite the false statements correctly.

1. True
2. False. All combustible substances cannot be used as fuels.
3. False. If carbon monoxide is produced on burning a substance, it means that the substance is undergoing incomplete combustion.
4. False. If a substance catches fire on its own on

- exposure to air, it is not a very good fuel.
- False. Substances that have very low ignition temperature and can easily burn are inflammable.
 - False. The most practical way of extinguishing a fire in a building is to cut off the supply of air.
 - False. Carbon dioxide is very effective in extinguishing fire in an electrical equipment.
 - True
 - False. Not all combustible substances burn with a flame.
 - True

D. Answer in one or two words only.

- Combustion
- Ignition temperature
- Spontaneous combustion
- Coal
- Kerosene
- Carbon dioxide
- Sulphur dioxide
- Outermost zone
- Innermost zone
- Sulphur dioxide and oxides of nitrogen
- Calorific value
 - Kilojoule per kg (kJ/kg)
- Ignition temperature

Section 2: Subjective Questions

A. Answer in one word or one sentence.

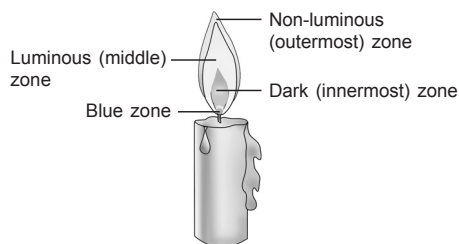
- Cow dung, wood and LPG
 - Coal, natural gas, diesel and LPG
 - Petrol, Diesel and CNG
- Candle burns with a flame whereas coal burns without a flame.
- Coal, leaves, wax and LPG are some combustible substances.
- No. In the sun, heat and light are produced by nuclear reactions.
- If the clothes of a person catch fire, the person is covered with a blanket to stop the supply of air (oxygen).
- The matchstick starts burning on rubbing it on the side of the matchbox.
 - Yes
 - No
 - The ignition temperature of wood or coal is higher than that of paper or kerosene. This is why a paper or kerosene is used to start a wood or coal fire. They catch fire first that helps wood or coal to attain their ignition temperature and start burning.
 - Different substances catch fire at different temperatures.
- A matchstick does not catch fire on its own because its ignition temperature is higher than the room temperature.
 - The head of the matchstick is rubbed on the side of the matchbox to produce enough heat to ignite the substance in it and start the combustion.
- Yes
 - This is because if kerosene oil is heated a little, it will catch fire.
- The three essential requirements to produce a fire are fuel, air (to supply oxygen) and heat (to raise the temperature of the fuel beyond the ignition temperature).
- Blue
 - Yellow

- Goldsmiths use the outermost zone of a flame for melting gold because this part of the flame is the hottest.
- I will choose LPG. This is because it has the highest calorific value in all and does not cause pollution on burning.

B. Answer in one or two sentences only.

- A chemical process in which a substance reacts with oxygen to give off heat is called combustion.
- The conditions necessary for combustion are the presence of fuel, air (to supply oxygen) and heat (to raise the temperature of the fuel beyond its ignition temperature).
- The substances that vapourise during burning, give flames. This is why wax that melts, rises through the wick and gets vapourised during burning gives a flame. Coal, on the other hand, does not vapourise and so does not produce a flame.
- The ignition temperature of a fuel is the lowest temperature at which it catches fire.
- This is because kerosene has a lower ignition temperature than coal. If kerosene is heated a little, it will catch fire.
- The substance will start burning on its own. The type of combustion that will occur is called spontaneous combustion.
- When a cracker is ignited, a sudden reaction takes place with the evolution of heat, light and sound. A large amount of gas formed in the reaction is liberated. Such a reaction is called explosion.
- The amount of heat energy produced on complete combustion of 1 kg of a fuel is called its calorific value.
- A fire can be extinguished by cutting off the supply of air, or to bring down the temperature of the fuel, or to eliminate the fuel.
- Water helps in bringing down the temperature of the combustible substance below its ignition temperature. Water vapours also surround it and cut off the supply of air.
- If an electrical appliance is on fire, water may conduct electricity and harm those trying to douse the fire.
- Sulphur dioxide is an extremely suffocating and corrosive gas. Moreover, it dissolves in rain water and forms acids. Such rain is called acid rain which is very harmful for plants, crops, buildings and soil.

13.



C. Answer in detail in your notebook.

- When a fuel burns rapidly and produces heat and light, it is known as rapid combustion. The type of combustion in which a material suddenly bursts into flames, without the application of any apparent cause is called spontaneous combustion. When a cracker is ignited, a sudden reaction takes

- place with the evolution of heat, light and sound. A large amount of gas formed in the reaction is liberated. Such a reaction is called explosion.
- The properties of a good fuel are as follows.
 - It is readily available.
 - It is cheap.
 - It burns easily in air at a moderate rate.
 - It produces a large amount of heat.
 - It does not leave behind any undesirable substances.
 - The harmful effects of burning fuels are as follows.
 - Carbon fuels like wood, coal, petroleum release unburnt carbon particles. These fine particles are dangerous pollutants causing respiratory diseases, such as asthma.
 - Incomplete combustion of fuels gives carbon monoxide gas. It is a very poisonous gas.
 - Combustion of most fuels releases carbon dioxide in the environment. Increased concentration of carbon dioxide in the air is believed to cause global warming.
 - Burning of coal and diesel releases sulphur dioxide gas. It is an extremely suffocating and corrosive gas.
 - Oxides of sulphur and nitrogen dissolve in rain water and form acids. Such rain is called acid rain. It is caused by burning of coal, diesel and petrol. Acid rain is very harmful for plants, crops, buildings and soil.
 - Global warming is the rise in temperature of the atmosphere of the earth. This results in the melting of polar glaciers, which leads to a rise in the sea level, causing floods in the coastal areas. Low lying coastal areas may even be permanently submerged under water.
 - Carbon dioxide, being heavier than oxygen, covers the fire like a blanket. Since the contact between the fuel and oxygen is cut off, the fire is controlled. The added advantage of CO_2 is that in most cases it does not harm the electrical equipment. Carbon dioxide is stored at high pressure as a liquid in cylinders. When released from the cylinder, it expands enormously in volume and cools down. So, it also brings down the temperature of the fuel.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- This means that there is incomplete combustion of the gas. This may be due to blockage of burner holes.
- Kerosene and petrol are combustible substances and can easily catch fire. It is therefore dangerous to carry them in an aeroplane.
- Gases produced in a flame are hot, hence lighter. Therefore they rise up. So a flame always points upwards.
- Yes. Physical change.
 - No. Chemical change.

5. Conservation of Plants and Animals

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|------|------|------|
| 1. a | 2. c | 3. d | 4. b |
| 5. c | 6. d | 7. c | 8. b |

B. Fill in the blanks.

- | | |
|---------------------------|--------------------|
| 1. fauna | 2. endemic |
| 3. carbon dioxide, oxygen | 4. desertification |
| 5. global | 6. extinct |
| 7. endangered | 8. ecosystem |
| 9. biosphere | 10. reforestation |
| 11. Red Data Book | 12. culture |

C. Write True or False. Rewrite the false statements correctly.

- True
- False. All living things along with the non-living components in a region make up an ecosystem.
- False. Biodiversity refers to the variety of living organisms in an ecosystem.
- True
- False. Deforestation also occurs due to natural causes such as forest fires and severe droughts.
- True
- True
- True
- True
- False. Small animals are in greater danger of becoming extinct than large animals.
- True
- True

D. Answer in one or two words only.

- | | |
|-----------------------|-------------------|
| 1. Yes | 2. Carbon dioxide |
| 3. Wildlife sanctuary | 4. Biodiversity |
| 5. Endangered species | 6. Renewable |
| 7. Biosphere reserve | 8. Flora |
| 9. Species | 10. Project Tiger |
| 11. Extinct | 12. Migration |

Section 2: Subjective Questions

A. Answer in one word or one sentence.

- The purpose is to protect our flora and fauna and their habitats.
- Deforestation leads to reduction of trees that leads to the disturbance in the water cycle, hence reducing rainfall. It also leads to a decrease in the water holding capacity of the soil. The movement of water from the soil surface into the ground (infiltration rate) is reduced, resulting in floods.
- Yes. We will face shortage of forest products if we continue cutting trees.
- Deforestation leads to the loss of shelter and food for many animals.
- A zoo encloses a small area where animals are kept and protected in cages. However, a wildlife sanctuary encloses a large area where animals are protected and free to move anywhere in their natural habitat.
- Animals will be comfortable in their natural habitat.
- No, small animals are much more in danger of becoming extinct than the bigger animals.
- Yes, Red Data Book.
- No. There are no alternatives to wood and paper.
- The solution to the problem of deforestation is reforestation.

B. Answer in one or two sentences only.

- Deforestation is done for procuring land for cultivation, for building houses and factories, and for making furniture or using wood as fuel.
- Two natural causes of deforestation are forest fires and severe droughts.

3. Deforestation disturbs the water cycle and may reduce rainfall, resulting in droughts. It also leads to a decrease in the water holding capacity of the soil, resulting in floods.
4. Deforestation results in soil erosion. Removal of the top layer of the soil exposes the lower, hard and rocky layer which is less fertile. Gradually the fertile land gets converted into deserts.
5. A biosphere reserve is a large area of protected land for conservation of wildlife, plant and animal resources and traditional life of the tribals living in the area.
6. Endemic species are those species of plants and animals that are found exclusively in a particular area. For example, the Indian giant squirrel and flying squirrel are endemic to the Pachmarhi Biosphere Reserve.
7. An ecosystem consists of all the plants, animals and microorganisms in an area along with the non-living components such as climate, soil, river deltas and so on.
8. Biodiversity of an area is the variety of plants, animals and microorganisms found in the area.
9. Some animals cannot adjust to the environmental changes or disturbances in their natural habitat. They become endangered as their population decreases.
10. Saving paper means saving trees, and saving energy and water needed to manufacture paper. Moreover, the amount of harmful chemicals used in paper making will also be reduced.
11. The aim of Project Tiger is to ensure the survival and maintenance of the tiger population in our country.
12. Forests yield valuable products, maintain the balance between oxygen and carbon dioxide, maintain the water cycle in nature and regulate the temperature of the earth.
13. Species is a group of population that is capable of interbreeding and the members of which have common characteristics.
14. World Wide Fund for Nature (WWF) and International Union for Conservation of Nature and Natural Resources (IUCN)

C. Answer in detail in your notebook.

1. The consequences of deforestation are as follows.
 - a. Deforestation leads to fewer trees, which would mean that less carbon dioxide will be used up resulting in its increased amount in the atmosphere. This will lead to global warming as carbon dioxide traps the heat rays reflected by the earth. The increase in temperature on the earth disturbs the water cycle and may reduce rainfall. This could cause droughts.
 - b. Fewer trees result in soil erosion. Removal of the top layer of the soil exposes the lower, hard and rocky layers. This soil has less humus and is less fertile. Gradually the fertile land gets converted into deserts. It is called desertification.
 - c. It also leads to a decrease in the water holding capacity of the soil. The movement of water from the soil surface into the ground (infiltration rate) is reduced. So, there are floods. The other properties of the soil like nutrient content, texture, etc., also change because of deforestation.

- d. It causes shortage of products we get from forests.
2. A wildlife sanctuary is an area where animals are protected from any disturbance to them and their habitat.

A national park is an area reserved for wildlife where they can freely use the habitats and natural resources. A biosphere reserve is a large area of protected land for conservation of wildlife, plant and animal resources and traditional life of the tribals living in the area.
3. Reforestation is important because it is the only solution to deforestation. Reforestation can be done by planting seedlings or small trees of the same species as found in the forest. At least as many trees as we cut should be planted. It can also take place naturally – if we let the area remain undisturbed, the trees grow back and the forest reestablished itself.
4. If all trees in a forest are cut, it causes an increase in soil erosion. As the top soil gets eroded, the lower, hard and rocky soil with less humus gets exposed. This soil is less fertile. Over time, continued soil erosion can convert the land into a desert. This is called desertification.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. No, dinosaurs did not become extinct because of environmental changes caused by humans as they lived millions of years before humans. They have become extinct because they might not have been able to adjust to the environmental changes at that time.
2. A zoo encloses a small area where animals are kept and protected in cages. However, a wildlife sanctuary encloses an area where animals are protected from any disturbance to them and their habitat. Animals will be happier in a wildlife sanctuary.

6. Reproduction in Animals

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|------|------|
| 1. d | 2. a | 3. a | 4. a |
| 5. c | 6. d | 7. c | 8. a |
| 9. c | 10. a | | |

B. Fill in the blanks.

- | | |
|-----------------------|----------------------------|
| 1. sexual | 2. testes, ovary |
| 3. fertilization | 4. embryo |
| 5. external, internal | 6. oviparous |
| 7. metamorphosis | 8. binary fission, budding |
| 9. asexual | |

C. Write True or False. Rewrite the false statements correctly.

1. False. Proper working of the reproductive system in an organism is not necessary for it to stay alive.
2. False. Reproduction does not always require a male and a female.
3. False. Each sperm consists of three parts – head, middle piece and tail.
4. False. Ovaries in humans produce single ovum every month.

5. True
6. True
7. True
8. True
9. True
10. True
11. False. External fertilization is common in aquatic animals.
12. False. All the eggs laid by fish and frogs do not develop into adults.

D. Answer in one or two words only.

- | | |
|---------------------|---------------|
| 1. Sperm, ovum | 2. Dog, frog |
| 3. Test-tube babies | 4. Viviparous |
| 5. Butterfly, frog | 6. Zygote |
| 7. Tail | 8. Embryo |
| 9. 3 weeks | 10. Buds |

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. Human – baby Cat – kitten
Dog – puppy Butterfly – caterpillar
Hen – chick Cow – calf
Frog – tadpole
2. a. Chicks: By laying eggs
b. Caterpillars: By laying eggs
c. Kittens and puppies: By giving birth to young ones
3. The young ones mentioned in Question 2 look the same when they grow up as they look when they are born except the caterpillar.
4. The male and female reproductive parts of plants that reproduce sexually are stamens and pistil.
5. Yes, sperm is a single cell.
6. The tail in a sperm helps in its movement.
7. Frogs and fish lay hundreds of eggs for the survival of their species. This is because their fertilization is external and a large number of the eggs, that hatch in the open, get eaten by predators.
8. Fertilization results in the formation of zygote which begins to develop into an embryo. The zygote divides repeatedly to give rise to a ball of cells. The cells then begin to form groups that develop into different tissues and organs of the body. This developing structure is termed an embryo and the embryo continues to develop to become a big individual.
9. No, hens do not give birth to babies like humans and cows.
10. No, humans do not undergo metamorphosis as in frogs and moths.

B. Answer in one or two sentences only.

1. Reproduction is very important as it ensures the continuation of similar kinds of individuals, generation after generation.
2. Sexual reproduction involves the production of new organisms by two parents, one male and the other female. It requires two sexes.
Asexual reproduction involves the production of new organisms by just one parent. It doesn't require two sexes.
3. The fertilization which occurs outside the animal's body is known as external fertilization. Examples: Frog, fish, star fish, jelly fish, etc.
The fertilization which occurs inside the female's body is known as internal fertilization. Examples: Birds, reptiles and mammals.
4. Viviparous animals
 - i. The animals that give birth to young ones are called

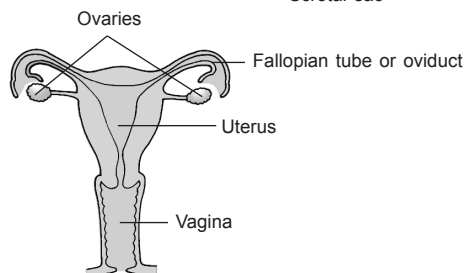
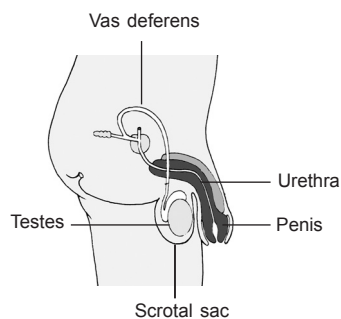
viviparous animals. Example: Except platypus all mammals.

- ii. Embryo is developed inside the mother's womb.

Oviparous animals

- i. The animals that lay eggs are called oviparous animals. Examples: Fish and birds.
 - ii. Embryo is developed inside a hard shell outside the mother's body. Example: Hen's egg.
5. a. Testes: Testes produce the male gametes or sperms in millions.
b. Ovaries: The ovaries produce the ovum. Usually one ovum is released from one of the ovaries every month.
 6. a. Zygote: During sexual reproduction, the sperm and ovum fuse together to form a third cell known as the zygote.
b. Embryo: After fertilization, the zygote begins to divide repeatedly to give rise to a ball of cells. The cells then begin to form groups that develop into different tissues and organs of the body. This developing structure is termed an embryo.
c. Foetus: The embryo continues to develop in the uterus. It gradually develops body parts such as hands, legs, head, eyes, ears, etc. The stage of the embryo in which all the body parts can be identified is called a foetus.
 7. The transformation of the young one (larva or tadpole) into an adult through drastic changes is called metamorphosis. A frog has different stages of development between hatching of the eggs and formation of the individual. It undergoes changes to finally become a frog.
 8. During spring or rainy season, when the male and female come together in water, the female lays hundreds of eggs. Unlike hen's egg, frog's egg is not covered by a shell and it is comparatively very delicate. A layer of jelly holds the eggs together and provides protection to the eggs.
As the eggs are laid, the male deposits sperms over them. Each sperm swims randomly in water with the help of its long tail. The sperms come in contact with the eggs. This results in fertilization.

9.



C. Answer in detail in your notebook.

- When sperms come in contact with an egg, one of the sperms may fuse with the egg. Such fusion of the egg and the sperm is called fertilization. Fertilization takes place in the fallopian tube. This results in the formation of a fertilised egg or zygote.

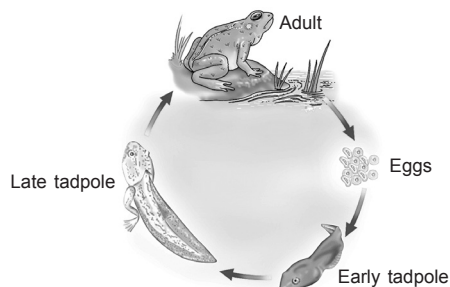
After fertilization, the zygote travels down the oviduct and divides over and over again, to form a ball of cells. This is known as cell division. The cells then begin to form different groups that finally develop into different tissues and organs of the body. This developing structure is called the embryo. It gets embedded in the wall of the uterus, where further development occurs.

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

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

- In a hen, the process of development is different. After fertilization, the zygote divides repeatedly and travels down the oviduct as in humans. However, as it travels down, many protective layers are formed around it. The hard shell of a hen's egg is one such layer. After the hard shell is formed around the embryo, the hen lays the egg. The hen then sits on the egg to keep it warm. Development of the chick takes place inside the shell. It takes about 3 weeks for the embryo to develop into a chick. After its development is complete, the chick comes out by bursting open the egg shell.
- Hydra*: *Hydra* reproduce by budding. In *Hydra*, a bud appears on the body wall which grows into a full *Hydra* in a day or two and separates from the parent.
 - Amoeba*: *Amoeba* is a single-celled organism. It begins the process of reproduction by the division of its nucleus into two nuclei. This is followed by division of its body into two, each part receiving a nucleus. Finally, two *Amoebae* are produced from one parent *Amoeba*. This type of asexual reproduction in which an animal reproduces by dividing into two individuals is called binary fission.

4.



Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- No, the process of a child changing into an adult cannot be called metamorphosis because the basic body structure does not change.
- Most of the eggs, tadpoles and young frogs get eaten by predators. That is why their population is much smaller than the number of eggs they lay.
 - Since humans are protected from predators and also have good health facilities, mortality of infants is very low as compared to animals. Therefore, if they gave birth to a large number of babies at the same time, their population would have become very high and unsustainable.

7. Reaching the Age of Adolescence

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|------|------|
| 1. a | 2. c | 3. b | 4. d |
| 5. d | 6. a | 7. c | 8. a |
| 9. a | 10. a | | |

B. Fill in the blanks.

- | | |
|-----------------|-----------------|
| 1. adolescence | 2. puberty |
| 3. height | 4. Adam's apple |
| 5. endocrine | 6. secondary |
| 7. testosterone | 8. target |
| 9. menstruation | 10. thyroid |
| 11. insect | 12. balanced |

C. Write True or False. Rewrite the false statements correctly.

- True
- True
- True
- False. Endocrine glands do not have ducts, they release their secretions into the blood stream.
- True
- True
- True
- True
- True
- False. HIV can spread through sexual contact.

D. Answer in one or two words only.

- | | |
|-----------------------|---------------|
| 1. Male | 2. Boys |
| 3. XX | 4. Larynx |
| 5. Testes and ovaries | 6. Estrogen |
| 7. Pituitary | 8. Menarche |
| 9. Chromosomes | 10. Pituitary |

Section 2: Subjective Questions

A. Answer in one word or one sentence.

- Humans can reproduce only when they reach reproductive maturity, after reaching a certain age.
- This period of changes lasts up to 18 or 19 years of age.
 - This period is known as adolescence.
- Hormones initiate the changes that the body undergoes during puberty.
- Yes.
 - Yes.
 - Yes.

B. Answer in one or two sentences only.

- The endocrine system secretes different types of hormones which in turn control different processes in the body.

2. The four endocrine glands and the hormones they secrete are as follows:
 - a. Pituitary gland (or master gland): Growth hormone
 - b. Adrenal gland: Adrenalin
 - c. Pancreas: Insulin
 - d. Thyroid gland: Thyroxine
3. Endocrine glands do not have ducts and release the hormones directly into the blood. This is why they are called ductless glands.
4. The adrenal glands secrete the hormone adrenalin when a person is angry or afraid. It prepares the body to fight or to run away.
5. The stage of life when the body becomes capable of reproduction is known as puberty. It is normally 11–16 years in boys and 10–15 years in girls. However, the period may vary from person to person.
6. The female hormone or estrogen is released in girls and the male hormone or testosterone is released in boys at the onset of puberty.
7. 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.
8. At around 45–50 years of age, the menstrual cycle stops and the female is no longer capable of reproduction. The stoppage of menstruation is known as menopause.
9. During adolescence, different parts of the body do not grow at the same rate. For example, the arms and legs often grow faster than other parts. This makes the bodies appear disproportionate and awkward.
10. There is increase in the activity of sweat and sebaceous (oil) glands in adolescents. The skin becomes oilier. This often leads to appearance of acne and pimples on the face.

C. Answer in detail in your notebook.

1. In boys, the shoulders become broader and the chest becomes wider. The muscles grow more in boys. In girls, the pelvic region widens, hips broaden, breasts develop and increase in size. Mammary glands develop inside the breasts.
The voice box or the larynx begins to grow. It becomes bigger in boys than in girls. This is why boys develop a deep voice whereas girls have a high pitched voice.
2. Each gamete has only one sex chromosome. An egg has an X chromosome. A sperm may have an X or a Y chromosome.
 - a. If a sperm containing an X chromosome fertilizes the egg, the zygote would have two X chromosomes and would develop into a female.
 - b. If a sperm containing a Y chromosome fertilizes the egg, the zygote would have one X and one Y chromosome and would develop into a male.
 Therefore, the sex of a baby is determined by which sperm, one containing the X or one containing the Y chromosome, fertilizes the egg.
3. During reproductive period in women, one of the two ovaries produces an egg (or ovum) every 28–30 days. This process is known as ovulation. During this period, the walls of the uterus become thick to receive

the egg. If the egg is fertilized, it results in pregnancy and the fertilized egg begins to develop. If fertilization does not occur, the egg and the lining of the uterus are shed, accompanied by blood. The bleeding lasts for 4–6 days and is known as menstruation or menstrual period.

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. During adolescence, there is rapid mental and physical growth. Therefore, looking after physical and mental health at this stage is of utmost importance. For proper physical health, an adolescent needs to have a balanced diet containing the right amounts of proteins, carbohydrates, fats, vitamins and minerals. Fast food which is tasty but does not have adequate nutrition, should not be used as substitute for meals. Due to increased activity of sweat and sebaceous glands, proper personal hygiene is very important for adolescents. Taking a bath every day and cleaning all parts of the body is essential. Girls should be especially careful about hygiene during menstruation. Walking, jogging, aerobics, outdoor games, etc., are good for the growing adolescent body. Since adolescence is also a stage of insecurity and confusion, it is easy for the adolescent mind to be led astray by wrong company or advice, and fall prey to drug and alcohol abuse. When confused, confide in parents and teachers and seek their guidance, as they are your well-wishers and have passed through the same stage.
5. Intellectual development occurs during adolescence to transform the individual from a child to an adult. As a result of trying to adjust to the changes in the body and mind, adolescents often find themselves feeling confused, insecure and self conscious. This is a natural part of growing up and is experienced by everyone. Therefore, there is no reason to feel insecure.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. The pelvic area in girls broadens at puberty to accommodate the uterus, and later the growing baby in it.
2. We specially emphasize that adolescents should avoid drugs because adolescence is a stage of insecurity and confusion. Thus, it is easy for adolescents to get addicted to drugs and ruin their whole life.

HALF-YEARLY TEST PAPER
(Competency-Based Assessment)

Section 1

A. Choose the most appropriate answer.

- | | | | |
|------|------|------|------|
| 1. d | 2. c | 3. d | 4. b |
| 5. d | 6. a | 7. c | 8. c |

B. Fill in the blanks.

- | | | |
|----------------|---------------------|------------|
| 1. milk | 2. a. Algae | b. Viruses |
| 3. sea animals | 4. carbon, hydrogen | |

C. Give one-word answers.

1. Manures
2. Dead sea animals
3. CNG
4. Microbiology
5. Pituitary gland
6. Fungus
7. Renewable
8. SPM
9. External
10. Animals
11. 3–4 months
12. Eggs → Larva → Pupa → Adult

Section 2

A.

1. This is done so that grains are available in plenty even if there is a shortfall in production in a particular year, for example, due to monsoon failure.
2. If I live in a dry area with shortage of water, I will use drip irrigation method. In drip irrigation, water is allowed to fall drop by drop from a pipe, just near the roots of plants. This minimizes wastage of water.

B. The most reasonable conclusion is 4, because of the following reasons.

1. The new fertilizer has been tested against only one other fertilizer so we cannot conclude that it causes faster growth than other 'fertilizers'.
2. We do not have data beyond 10 days so this conclusion cannot be drawn.
3. There is no data on growth without fertilizer – so we do not know if the new fertilizer actually influences growth.
4. This is obvious from the graphs.

C.

1.

S. No.	Constituents of Petroleum	Uses
1.	Petroleum Gas in Liquid form (LPG)	Fuel for home and industry
2.	Petrol	Motor fuel, aviation fuel, solvent for dry cleaning
3.	Kerosene	Fuel for stoves, lamps and for jet aircrafts
4.	Diesel	Fuel for heavy motor vehicles, electric generators
5.	Lubricating oil	Lubrication
6.	Paraffin wax	Ointments, candles, vaseline, etc.

- a. Drive at a constant and moderate speed as far as possible.
 - b. Switch off the engine at traffic lights or at a place where you have to wait.
2. No, the process of a child changing into an adult cannot be called metamorphosis because the basic body structure does not change.

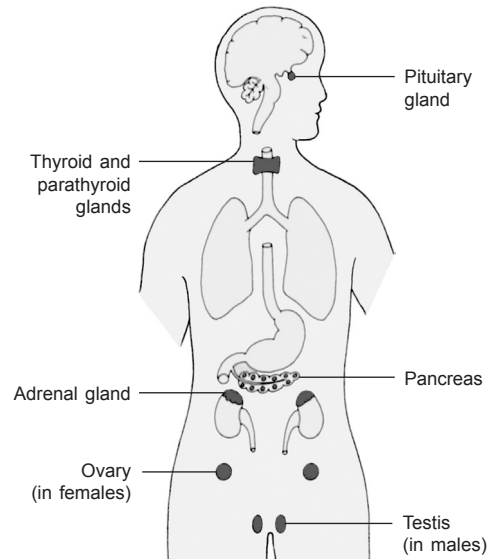
D.

1. Viruses cannot reproduce by themselves. However, when a virus enters the living cell of an organism, it is able to reproduce. It uses the energy of the host cells for this purpose. After the formation of thousands of

viruses, the host cell often dies.

2. Vaccines consist of dead or weakened microbes. When these are swallowed or injected into the body of a patient, the body produces antibodies to fight them. The antibodies remain in the body and protect it from any future attack of the disease germs.
3. Wildlife conservation is closely related to forest conservation. When a forest is destroyed, a large number of animals become extinct or endangered. So, to conserve the habitat of endangered animals, it is necessary to protect the forests.

E.



F.

1. The matchstick was not able to raise the temperature of wood to the ignition temperature.
2. Kerosene has a much lower ignition temperature than wood and would have caught fire very quickly. The resulting flame would have heated wood to its ignition temperature.
3. Since dry leaves have no water in them, they have a lower ignition temperature than green leaves and catch fire easily.
4. Petroleum jelly is a combustible substance with a low ignition temperature. It vaporizes on heating and the vapour burns with a flame.

CASE-BASED QUESTIONS

Answer the following questions.

1. b
2. d
3. d
4. d
5. a

ASSERTION-REASON TYPE QUESTIONS

1. c
2. a
3. a
4. a
5. d
6. a
7. c

8. Force and Pressure

Section 1: Objective Questions

A. Choose the most appropriate answer.

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

B. Fill in the blanks.

1. force.
2. interact
3. resultant
4. motion
5. muscular
6. contact
7. friction
8. non-contact
9. Atmospheric
10. weight

C. Write True or False. Rewrite the false statements correctly.

1. True
2. False. A force acting on an object does not always bring about a change in the shape of the object.
3. False. The speed of a moving object cannot change without the application of a force.
4. True
5. True
6. True
7. True
8. False. The effect of a force on an object depends on the magnitude of the force and the area over which it acts.
9. True
10. True
11. True
12. False. The atmospheric pressure on the body of a mountaineer decreases as he climbs higher.

D. Answer in one or two words only.

1. Their difference
2. Non-contact
3. Pressure
4. Magnetic force
5. Electrostatic force
6. Frictional force
7. Muscular force
8. Increase
9. Gravitational force
10. On both

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. We can decide whether an object is moving faster than the other object by calculating its speed.
2. The distance moved by an object in unit time is called the speed of the object.
3. Yes.
4. a. Yes. b. Push.
5. Yes. If two forces acting on a body in opposite directions are equal, the net force on the object is zero.
6. Yes. When a batsman hits a ball with her/his bat, there is a change in the direction of motion of the ball.
7. Not always.
8. a. No b. No c. Muscular force
9. a. Force of friction
b. Yes
c. The direction is opposite to the direction of motion.
10. No, a magnet can exert a force on another magnet without bringing in contact with it.
11. a. No, this cannot happen without a force acting on it.
b. Force of gravity
12. Cutting a vegetable with a sharp knife is easier.
13. Shoulder bags are provided with broad straps to increase the surface area on which force is acting so that pressure decreases. This makes it easier to carry them.
14. The smaller the area, larger the pressure on a surface for the same force. This is why tools meant for cutting and piercing always have sharp edges.
15. a. When we inflate a balloon, we have to close its mouth, because air inside the balloon exerts pressure on the inner wall of the balloon in all directions. So air cannot escape from the mouth of the balloon.
b. When we open the mouth of an inflated balloon, air rushes out.

- c. Air inside the balloon exerts pressure on the inner wall of the balloon in all directions. Therefore, we will not be able to inflate a balloon with holes.
- d. Air inside a bicycle tube exerts pressure on the inner wall of the tube in all directions. When it has a puncture, air rushes out and the tube will deflate.

B. Answer in one or two sentences only.

- a. A pull or a push on an object is called a force.
b. A force can be described by stating its magnitude and the direction in which it acts.
2. The speed of the object; the direction of motion of the object.
3. Some forces act on bodies only when they are in contact with the body. These are known as contact forces. Examples are muscular force and frictional force. Some forces can also act on bodies which are not in contact. These are non-contact forces. Examples are gravitational force, magnetic force and electrostatic force.
4. The force responsible for changing the state of motion of objects is the force of friction. A ball rolling along the ground gradually slows down and finally comes to rest because of friction.
5. If several forces act in different directions on a body, the effect on the object is due to the magnitude and direction of the net force acting on it.
6. Making chapati from dough is an example where force changes the shape of an object.
7. Pressure is defined as the force exerted per unit area. Pressure depends on two factors:
a. The amount of force applied.
b. The area over which the force is applied, i.e., the area of contact between the two objects.
8. The pressure exerted by air is called atmospheric pressure. It is caused by the air above us which presses down on us with a force equal to that exerted by a mass of 1 kilogram, on every square centimetre.
9. When we press the sucker, most of the air between its cup and the surface escapes out. The sucker sticks to the surface because the pressure of atmosphere acts on it. To pull the sucker off the surface, the applied force should be large enough to overcome the atmospheric pressure.
10. The pressure exerted by a liquid increases with increasing depth.
11. The pressure exerted by the atmosphere decreases with height above the ground.
12. This shows that the pressure in a liquid increases with increasing depth.



C. Answer in detail in your notebook.

1. A force applied on an object can have various effects on it. Some of them are listed below:
a. Force can make a stationary object move, or can change its position of rest.
b. Force can change the speed of a moving object.
c. Force can change the direction of motion of a moving object.
d. Force can change the shape or size of an object.
2. The force responsible for changing the state of

motion of objects is the force of friction. It is the force of friction between the surface of an object and the ground that brings the moving object to rest. Similarly, friction between water and the boat brings it to a stop once we stop rowing.

The force of friction always acts on all the moving objects and its direction is always opposite to the direction of motion. Since the force of friction arises due to contact between surfaces, it is also an example of a contact force.

3. A ball thrown up slows down and then falls down towards the earth because of the gravitational force. Water begins to flow towards the ground as soon as we open a tap. Water in rivers flows downward due to the force of gravity. Objects or things fall towards the earth because it pulls them. This force is called the force of gravity. This is an attractive force. The force of gravity acts on all objects. The force of gravity acts on all of us all the time without our being aware of it.
4. Take a plastic container and make four holes in it at different heights. Fill the container with water, and let water keep flowing into it from a tap. Notice the force with which water comes out of the holes. You will find that water comes out with greater force from the holes at greater depth. Water from the bottom-most hole will be spurted out the farthest from the container. This shows that the pressure in a liquid increases with increasing depth.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. When a rubber sucker is pressed against a rough surface there will be many gaps between the rubber sucker and the surface, through which air can get in. Since a vacuum will not develop inside the sucker, it will not stick to the rough surface.
2. The gravitational force is so small that it cannot be felt unless one of the bodies is huge – like the earth. The gravitational force between me and a building is too small to be felt.
3. The force of gravity on the moon is smaller than the force of gravity on the earth. That is because the earth is more massive than the moon.

9. Friction

Section 1: Objective Questions

A. Choose the most appropriate answer.

1. d 2. c 3. d 4. d
5. a 6. b

B. Fill in the blanks.

1. Friction 2. drag
3. streamlined 4. force
5. irregularities 6. sliding
7. lubricants 8. rolling
9. Rolling 10. Static

C. Write True or False. Rewrite the false statements correctly.

1. True 2. True 3. True 4. True
5. False. Ball bearings are used in machines to decrease

friction between moving parts.

6. False. Air also exerts frictional force.
7. True
8. False. Friction is advantageous also.
9. False. Brakes on cars will work best if the friction between the brake shoes and wheels is more.
10. True

D. Answer in one or two words only.

1. In the opposite direction 2. Contact force
3. Rough surface 4. Static friction
5. Static friction 6. Ball bearings
7. Friction 8. Reduces friction
9. Rough

Section 2: Subjective Questions

A. Answer in one word or one sentence.

1. A vehicle slows down when we apply the brakes because of friction.
2. If we step on a banana peel, the friction between the surface and the feet suddenly decreases and we slip.
3. Because layer of water reduces friction and the foot cannot make a proper grip on the floor.
4. To move a heavy box is easier when it is already in motion.
 5. a. It is easier to hold a clean glass tumbler than one with a thin layer of cooking oil on it.
 - b. No. c. No. d. No.
6. When we rub our hands together for a few minutes, heat is generated.
7. It is done to provide the shoes better grip on the floor, so that we can move safely.
8. We sprinkle fine powder on a carrom board to reduce friction.
9. No, friction can never be entirely eliminated.
10. When a body rolls over the surface of another body, resistance to its motion is called rolling friction which reduces friction. So, it is easier to pull a piece of luggage with wheels fitted to it.
11. Yes. Both of them have streamlined shape.

B. Answer in one or two sentences only.

1. a. Friction is a force that slows things down or prevents things from moving.
- b. It tends to stop a moving object. It also tends to prevent a stationary object from moving.
2. Friction occurs due to interlocking of irregularities in the surfaces.
3. On rough surfaces, there are a larger number of irregularities. So, the force of friction is greater if a rough surface is involved. So, we need more effort to keep a body moving on a rough surface than on a smooth surface.
4. a. Rolling friction: Friction encountered by a spherical or cylindrical object rolling on a surface is called rolling friction.
- b. Sliding friction: Friction encountered by an object when it slides on a surface is called sliding friction.
- c. Static friction: The force required to overcome friction when an object starts moving from rest is a measure of static friction.
- d. Drag: The frictional force exerted by fluids is also called drag.

5. It is not easy to walk on a smooth floor on which some oil has been spilt because the friction between our feet and these surfaces is very little.
6. Interlocking of irregularities is reduced to a great extent by using lubricants. Thus, movement becomes smooth.
7. The frictional force on an object in a fluid depends on its speed with respect to the fluid. The frictional force also depends on the shape of the object and the nature of the fluid.
8. The principle that rolling friction is less than sliding friction is made use of in ball bearings which contain steel balls or rollers.
9. It is sometimes desirable to increase friction to avoid slipping. Friction can be increased by making the surfaces rough.
 - ◆ Tyres have designs and patterns with grooves on the surface to increase friction with the road. This prevents slipping of the tyres on a wet road.
 - ◆ Spikes are provided in the soles of shoes used by players and athletes to increase friction so that they get a firm grip on the ground.
10. Advantages:
 - a. It is because of friction between our feet or shoes and the ground that we are able to walk by pushing our feet against the ground.
 - b. Brakes on cycles or cars work because of friction.
 Disadvantages:
 - a. Friction wears out the rubbing surfaces. The soles of our shoes wear out in a few months due to friction.
 - b. Friction generates heat.
11. The shape of aeroplanes are streamlined to reduce friction with air, called air resistance. Ships also have streamlined shape to reduce friction with water.

C. Answer in detail in your notebook.

1. Disadvantages of friction:
 - a. Friction causes wastage of energy. This is because any object that moves, has to overcome the force of friction.
 - b. 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.
 - c. Friction generates heat. Sometimes this can 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.
2. The three situations in life where friction is an advantage are discussed below:
 - a. It would be impossible for us to walk without friction. It is because of friction between our feet or shoes and the ground that we are able to walk by pushing our feet against the ground.
 - b. Brakes on cycles or cars work because of friction. When brakes are applied, the 'shoes' of the brakes rub against the wheels. The friction between them reduces the speed.
 - c. One would not be able to write on paper without friction between the pencil or pen and paper.
3. Since friction is due to roughness of surfaces, any process that makes the contact surfaces smooth will reduce friction.

- a. By polishing: Polishing a rough surface smoothens it and reduces friction.
 - b. By lubricating: Friction is decreased by lubricating surfaces with oil, grease or graphite. The sliding surfaces then have a thin layer of the lubricant between the surfaces.
 - c. By streamlining to reduce fluid friction: Friction is minimum for a streamlined shape, which is rounded in the front and narrow at the back.
 - d. By using wheels and ball bearings: It is easier to roll an object than to slide it. Rolling friction is therefore less than sliding friction. That is why vehicles are equipped with wheels.
4. Friction is a necessary evil because, though friction causes loss of energy, and wear and tear, we would not be able to perform several daily activities without friction, for example, it is not possible to walk or write without friction.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

1. A boat is made narrow in front and broad at the back. The drag will be more when it is moving forward.
2. Air resistance will be less 10 km above the ground as compared to 1 km above the ground because the more is the altitude the less is the air resistance.

10. Sound

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | |
|------|-------|------|------|
| 1. d | 2. c | 3. c | 4. a |
| 5. d | 6. d | 7. d | 8. c |
| 9. d | 10. c | | |

B. Fill in the blanks.

- | | | |
|----------------|----------------------|--------------|
| 1. vibrates | 2. 1000 | 3. pollution |
| 4. Time period | 5. noise | 6. musical |
| 7. 20 | 8. larynx, voice box | |
| 9. Stringed | 10. Percussion | |

C. Write True or False. Rewrite the false statements correctly.

1. False. The vibrations in objects producing sound cannot be seen in most cases.
2. False. Drums produce sound by vibration of stretched skin or membrane.
3. False. In a sitar, the vibrations of the stretched strings produce sound.
4. True 5. True 6. True 7. True
8. False. Musical sounds are pleasing if not loud.
9. True 10. True
11. False. We cannot hear the sound of all vibrating objects.
12. True

D. Answer in one or two words only.

- | | |
|----------------------|-------------------|
| 1. Vibration | 2. 20 to 20000 Hz |
| 3. Frequency | 4. Eardrum |
| 5. Manjira (Cymbals) | 6. Larynx |
| 7. Vocal cords | 8. Yes |

9. Inner ear, brain
11. Wind instruments
10. Amplitude, frequency
12. Ultrasound

Section 2: Subjective Questions

A. Answer in one word or one sentence.

- We know this when we hear the sound of the school bell.
 - The blindfolded person is able to guess this by hearing that player's voice.
- We can feel the bell vibrating when it is ringing.
- | Musical instrument | Vibrating part producing sound |
|--------------------|--------------------------------|
| Veena | Stretched string |
| Tabla | Stretched membrane |
| Flute | Air-column |
| Sitar | Stretched string |
| Violin | Stretched string |
| Mridangam | Stretched membrane |
| Shehnai | Air-column |
- Manjira, Ghatam, Kartal.*
- Yes. We feel vibrations on our throat.
- 20 Hz.
- Amplitude and frequency make them different.
- The sound of a baby is shriller than that of an adult.
- The frequency of the sound of children is higher than that of adults.
- No. 11. a. No. b. Yes.
- Noise. 13. No.
- Sounds of vehicles, bursting of crackers, machines and loudspeakers are some sources of noise pollution.
 - TV and radio at high volumes, sound of some kitchen appliances, desert coolers and vacuum cleaners.

B. Answer in one or two sentences only.

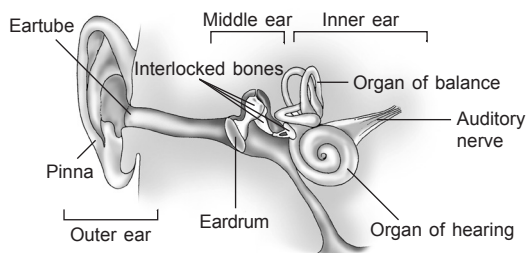
- Sound is produced by rapid to-and-fro movements called vibrations.
- The to-and-fro motion of an object is called vibration.
 - The maximum distance to which an oscillating or vibrating object moves from its central position is called amplitude.
 - The time taken for one complete vibration or oscillation is called its time period.
 - Sound is produced by rapid to-and-fro movements, called vibrations or oscillations. The number of oscillations per second is called frequency of the oscillating body.
- Pitch of sound is a measure of how much high or low a sound is.
 - The pitch of sound depends on its frequency.
- Vibrations in metal strings or wires – Sitar; vibrations in stretched skin – Tabla; vibrations in air columns – Flute.
- Sound is produced in our throat by the voice box or the larynx.
- Women have shorter vocal cords (about 15 mm long) than men (about 20 mm long). Thus, the frequency

of women's voice is higher than that of men and their voice is found to be shrill.

- Loudness of the sound produced by a vibrating object depends on the amplitude of vibration. Loudness is proportional to the square of the amplitude. Thus, if the amplitude is increased by three times, the loudness increases by nine times.
- Sound can travel through solid, liquid and gaseous mediums.
- An unpleasant sound is called noise.
 - Too much noise in our surroundings is harmful to us and is referred to as noise pollution. Traffic on the road, machines in factories, mixers and grinders, vacuum cleaners, air coolers, etc., cause noise pollution.
- Noise pollution causes a number of health related problems such as temporary or even permanent hearing loss, headaches, lack of sleep and high blood pressure.
- Sound wave C b. Sound wave C c. Sound wave A

C. Answer in detail in your notebook.

- A vibrating object causes air molecules to vibrate. When these vibrations reach our ear, they are collected by the pinna and funnelled 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. This stimulates tiny hairs in the hearing organ which, in turn, send a signal to the auditory nerve of our nervous system. The auditory nerve takes the signal to the brain and we can then hear the sound.



- Take a metal or glass tumbler. Make sure that it is dry. Place a cell phone in it. Ask your friend to give a ring on this cell phone from another cell phone. Listen to the ring carefully. Now, surround the rim of the tumbler with your hands. Put your mouth on the opening between your hands. Indicate to your friend to give a ring again. Listen to the ring while sucking air from the tumbler. The sound becomes fainter as we suck air. Remove the tumbler from your mouth. The sound becomes loud again. The decreasing amount of air in the tumbler results in decreasing loudness of the ring. If we had been able to suck all the air in the tumbler, we will not listen any sound. So, sound needs a medium to travel. Sound cannot travel through a vacuum.
- We can perform an activity by placing our ear at one end of a long wooden or metallic table and asking our friend to gently scratch the other end of the table. We can hear the sound of the scratching. This proves that sound travels through solids.

- b. Let us take a tub filled with water. Hold a bell in one hand and dip it in water. Keep one of your ears (caution: water should not enter your ear) gently on the surface of water and ring the bell inside the water. We will be able to hear the sound clearly. This shows that sound can travel through liquids also.
4. Irregular vibrations produce noise. Too much noise in our surroundings is harmful to us and is referred to as noise pollution. Traffic on the road, machines in factories, mixers and grinders, vacuum cleaners, air coolers, etc., cause noise pollution. In fact, even loud music causes noise pollution.

Two main reasons for noise pollution are:

- a. Road traffic b. Noise from industries
5. Three methods of controlling noise pollution are:
- a. Planning land use to reduce noise; for example, making tree-lined buffer zones between residential colonies and roads with heavy traffic.
- b. Reducing noise emissions by developing low-noise products, for example, better silencers for automobiles.
- c. Measures such as screens and enclosures around machinery to obstruct the path of noise. This will help people working in and living near factories.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- No. There is no air present there, and sound cannot travel through vacuum.
- No, sound is produced but we cannot hear it as its frequency is below 20 Hz.
- Light travels faster than sound. During a storm, thunder and lightning occur at the same time in the clouds. However, we hear the thunder a few seconds after we see the lightning.

11. Chemical Effects of Electric Current

Section 1: Objective Questions

A. Choose the most appropriate answer.

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

B. Fill in the blanks.

1. good 2. poor 3. chemical
4. electrode 5. hydrogen, oxygen
6. electroplating 7. anode 8. electrolyte

C. Write True or False. Rewrite the false statements correctly.

- True
- False. Pure water is a poor conductor of electricity.
- True 4. True
- False. Tin is deposited on food containers made of iron as tin is less reactive than iron.
- True 7. True 8. True

D. Answer in one or two words only.

1. Electrolysis 2. Cathode
3. LED 4. Liquids
5. No 6. Iron
7. Salt solution in water 8. No

Section 2: Subjective Questions

A. Answer in one word or one sentence.

- This is because water is a good conductor of electricity.
- When the material between the two ends of the tester conducts electricity, the circuit of the tester becomes complete. The current flows and the bulb glows.
- This is because the current may be too weak and the filament of the bulb does not get heated sufficiently to glow.
 - The compass needle shows deflection.
 - Yes.
- Yes.
- The opposite will happen. The metal electroplated will start dissolving into the solution.
- The copper ions will get deposited in one electrode and an equal amount of copper from the other electrode will get dissolved in the solution.

B. Answer in one or two sentences only.

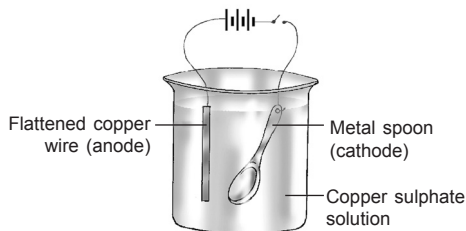
- This is because under certain conditions most materials can conduct.
- The passage of an electric current through a conducting solution causes chemical reactions. This is the chemical effect of electric current.
- The process of breaking up of an electrolyte chemically on passing an electric current through it is called electrolysis.
- This is because tap water conducts electricity.
- Chromium is a shiny metal that does not corrode and resists scratches. It makes iron look more attractive and also resist corrosion.
- Tin is less reactive than iron. Thus food does not come into contact with iron and is protected from getting spoilt.
- Iron can corrode and rust. A coating of zinc protects iron from corrosion and formation of rust.
- No. This is because may be through B, the current is weak. So the filament does not get heated sufficiently to glow. So she cannot conclude definitely that B does not conduct electricity.

C. Answer in detail in your notebook.

- Take two iron nails. Clean them with sand paper. Wrap one or two rounds of copper wire around them and connect the other ends of the wires to the two terminals of a battery. Take water in a beaker and add to it a little salt or a few drops of dilute sulphuric acid to make it conducting. Immerse the nails (called electrodes) in the solution. Observe the nails carefully. Can you see small bubbles of gases coming out from the water near the nails?
It can be checked that the gases evolved are hydrogen and oxygen. The gases come from water – electric current breaks up water into its constituent gases, hydrogen and oxygen. This observation, therefore, shows that electric current has a chemical effect on water. This experiment shows that an electric current can bring about a chemical change. This phenomenon is called electrolysis.
- When electric current is passed through the copper sulphate solution, copper sulphate dissociates into copper and sulphate. The free copper gets drawn to the electrode connected to the negative terminal

of the battery and gets deposited on it. From the other electrode, a copper plate, an equal amount of copper gets dissolved in the solution. Thus, the loss of copper from the solution is restored and the process continues. This means that copper gets transferred from one electrode to the other.

- Electroplating is the process of coating a thin layer of a metal (such as gold, silver, chromium, tin or nickel) over another cheaper metal (like iron) by the process of electrolysis. This is done either to protect the metal, or to make it look attractive.



Electroplating of copper

To electroplate a metal object with copper in the laboratory, we will need a glass beaker, a thick copper wire, a metal spoon, 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. A layer of copper gets deposited on the spoon.

- Advantages of electroplating:
 - Chromium is a shiny metal that does not corrode and resists scratches. It is deposited on other cheaper metals such as iron to make car parts, taps, bicycle handle bars, wheel rims, etc. This makes them look more attractive and also resist corrosion.
 - Gold or silver is electroplated on jewellery made out of a cheaper metal to make it look attractive.
 - 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.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- Mercury is a metal which is liquid at room temperature. It consists of mercury atoms and no ions are present. Hence it is not an electrolyte.
- Chromium is very expensive. So the objects like car parts, taps, cycle parts, etc. will not be affordable if made of chromium entirely.
- LED uses less electrical energy.

12. Some Natural Phenomena

Section 1: Objective Questions

A. Choose the most appropriate answer.

- c
- d
- a
- a
- d
- b
- 7.
- d
- c
- 9.
- c
10. d

B. Fill in the blanks.

- negative
- positive
- Unlike, like
- current
- electric discharge
- discharged
- lightning conductor
- Richter
- tectonic plates
- seismograph, seismic
11. fault/seismic

C. Write True or False. Rewrite the false statements correctly.

- False. There are two kinds of charges.
- True
- True
- True
- True
- False. Charges cannot flow through a PVC rod.
- True
- True
- False. The intensity of an earthquake of magnitude 10 on the Richter scale is 100000 times that of an earthquake of magnitude 5.
- True
- False. In the event of an earthquake, taking shelter under a big tree is unsafe.
- True

D. Answer in one or two words only.

- Electrostatic force
- Static electricity
- Electroscope
- Electric current
- Conductor
- Lightning
- Earthquake
- Seismic/Fault
- 10
- Upper

Section 2: Subjective Questions

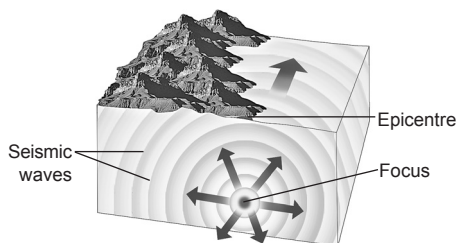
A. Answer in one word or one sentence.

- a. Yes. b. Yes.
- The metal strips lose charge to the earth through our body.
- Movement and collision of plates could cause a disturbance inside the earth to cause an earthquake.
- No. Scientists cannot predict when and where the next earthquake will strike.

B. Answer in one or two sentences only.

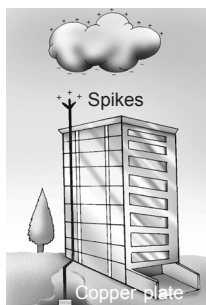
- a. Electric charges produce a kind of force which can attract as well as repel objects. We call this electrostatic force.
b. Flow of charges on a conductor constitutes electric current.
- Like charges repel and unlike charges attract.
- We will touch a charged body to discharge it. The process is known as earthing.
- Static electricity consists of charges at rest, whereas current electricity consists of charges in motion.
- a. An electroscope is a device used to detect and measure electric charge.
b. The metal strips receive the same charge from the charged body. The strips carrying similar charge repel and move away.
- a. Lightning is a very heavy flow of charge between clouds, or between clouds and the earth.
b. When the quantity of charge is very large, the air cannot resist their flow.
- a. An earthquake is a sudden shaking of the ground, which lasts for a very short time.
b. It is caused by a disturbance deep inside the earth's crust.
- The boundaries of the tectonic plates are known as fault zones.
- a. The Richter scale expresses the intensity of an earthquake.

- b. This is because the intensity of an earthquake with a magnitude 2 is 10 times greater than that with a magnitude 1.
10. a. A seismograph is an instrument that records the seismic waves produced by an earthquake.
b. It consists of a pendulum with a pen attached to it. The pen records the waves on a paper when tremors occur.
- 11.



C. Answer in detail in your notebook.

1. During the development of a thunderstorm, the air currents move upward while the water droplets move downward. These vigorous movements cause separation of charges. The positive charges collect near the upper edges of the clouds and the negative charges accumulate near the lower edges. There is accumulation of positive charges near the ground also. When the magnitude of the accumulated charges becomes very large, the air which is normally a poor conductor of electricity, is no longer able to resist their flow. Negative and positive charges meet, producing streaks of bright light and sound. We see streaks as lightning. The process is called an electric discharge.
2. 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 no damage is done to the building.



3. Precautions to be taken to save myself from a lightning strike during a thunderstorm are:
- a. Outside our house: A car or bus is safe. Shut the windows of the vehicle. Open vehicles, like motorbikes, tractors are not safe. If you are forced to take shelter under a tree, for example, if you are in a forest, choose a short tree. If in an open place, stay away from trees and poles. If you cannot find any shelter, squat low on the ground. Carrying an umbrella is not at all a good idea during thunderstorms.
- b. Inside our house: A building, especially one with a lightning conductor is safe. Inside the house, lightning can strike telephone cords, electrical wires and metal pipes. During a thunderstorm, contact with these should be avoided. It is safer to use mobile phones and cordless phones. Bathing should be avoided during thunderstorms to avoid contact with running water. Electrical appliances

- like computers, TVs, etc., should be unplugged.
4. The outermost layer of the earth is not a one piece. It is fragmented. Each fragment is called a plate. When the plates brush past one another, or when a plate goes under another due to collision, they cause disturbance in earth's crust. This disturbance shows up as earthquake.
5. The effects of earthquakes include deformation of ground surface, damage and destruction of human-made structures, towns and cities, loss of life, violent devastating fires, landslides, floods, etc.
6. Mud or timber is better than heavy construction material. Roofs should be as light as possible. Cupboards and shelves should be fixed to the walls. Tall building should have fire fighting system.
7. The following are some steps we should take if we are caught in an earthquake:
- a. If trapped in our home or a building, take shelter under a table and do not move till the shaking stops. Protect your head with your arms. Avoid using a lift. Do not stay near the windows, bookcases, mirrors, hanging pots, fans. Leave your home or school building and move to open areas.
- b. If outdoors, keep away from high-rise buildings, trees, signboards, poles and electric poles and electric wires. Do not sit inside a car or a bus.

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- There is no charge on A.
- Both plastic and metal comb will get charged when rubbed in the hair. However, since metal is a conductor, the charges will flow to earth through the body and it will lose its charge. If the metal comb has an insulating plastic handle, it will retain its charge.
- In humid conditions, when air holds a lot of moisture, it becomes conducting and the charges leak into the air. This does not happen in dry weather. Therefore charging by rubbing happens best in dry weather.

13. Light

Section 1: Objective Questions

A. Choose the most appropriate answer.

- | | | | | |
|------|------|------|------|-------|
| 1. d | 2. d | 3. c | 4. a | 5. d |
| 6. b | 7. d | 8. d | 9. a | 10. b |

B. Fill in the blanks.

- | | | |
|-----------------|-----------------|--------------|
| 1. regular | 2. Irregular | 3. reflected |
| 4. normal | 5. inversion | 6. straight |
| 7. kaleidoscope | 8. periscope | 9. cornea |
| 10. retina | 11. optic nerve | 12. cones |

C. Write True or False. Rewrite the false statements correctly.

- False. Reflection of light from most objects around us is irregular.
- False. The angle of incidence is the angle that an incident ray makes with the normal.
- False. If you go behind a mirror and place a screen there, the image of an object formed by the mirror cannot be obtained on it.

4. True
 5. False. The reflected ray and the incident ray lie in the same plane.
 6. True 7. True 8. True 9. True 10. True
 11. True 12. True

D. Answer in one or two words only.

1. Normal 2. Irregular
 3. 60° 4. 60°
 5. Blind spot 6. Towards the mirror
 7. 90° 8. Dispersion
 9. Convex lens 10. Vitamin A
 11. Myopia/short sightedness
 12. Hypermetropia/long sightedness

Section 2: Subjective Questions

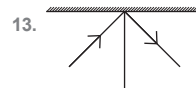
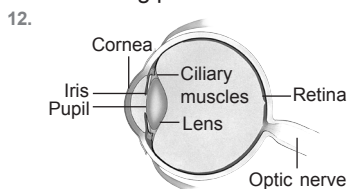
A. Answer in one word or one sentence.

1. This is because there is no light.
 2. a. Erect b. Yes c. Yes d. No
 3. a. Yes
 b. Reflection from two mirrors enables this.
 c. We see this by using two mirrors – one at front and the other at back.
 4. Convex lens.

B. Answer in one or two sentences only.

1. a. The light ray which strikes any surface is called the incident ray.
 b. The angle between the normal and the reflected ray is known as the angle of reflection.
 c. The line making an angle of 90° to the line representing the mirror at the point where the incident ray strikes the mirror is known as the normal.
 2. First Law – The angle of incidence is always equal to the angle of reflection.
 Second Law – The incident ray, the normal at the point of incidence and the reflected ray all lie in the same plane.
 3. 2 m.
 4. The path will be same as the incident ray but in opposite direction.
 5. a. In an image, the left of the object appears on the right and the right appears on the left. This is lateral inversion.
 b. **B | A**
 6. a. A kaleidoscope is a toy used to make beautiful patterns.
 b. It is based on the principle that a number of images are formed by mirrors placed at an angle to one another.
 7. a. Infinite.
 b. This is because the image formed by one mirror acts as an object for the other mirror and this goes on and on.
 8. Splitting of light into its colours is known as dispersion.
 9. a. Light goes into the eye through the pupil.
 b. The lens forms images of objects on retina.
 c. The retina contains nerve cells that sense the image formed on it.
 10. Rods and cones are types of nerve cells. Cones are sensitive to bright light and can detect colour. Rods are sensitive to bright light.
 11. An image stays in the retina for about 1/16 second.

So if images of a moving object are shown at a rate faster than 16 per second, then our eyes perceive this as moving picture.



C. Answer in detail in your notebook.

1. Characteristics of an image formed with a plane mirror:
 a. The image formed is erect.
 b. The image is of the same size as the object.
 c. The image is laterally inverted, that is, the right side of the object appears as the left side of the image.
 d. The image is as far behind the mirror as the object is in front of it.
 e. The image formed is virtual, that is, it cannot be caught on a screen. There is no actual meeting of the light rays (incident and reflected).
 2. Too little or too much light is bad for eyes. Insufficient light causes eyestrain and headaches. Too much light, like that of the sun, a powerful lamp or a laser torch can injure the retina. Do not look at the sun or a powerful light directly. Never rub your eyes. If particles of dust go into your eyes, wash your eyes with clean water. Always read at the normal distance for vision. Do not read by bringing the book too close to your eyes or keeping it too far. Include in the diet components which have vitamin A. Raw carrots, green vegetables (such as spinach) eggs, milk, curd, cheese, butter and fruits such as papaya and mango are rich in vitamin A.
 3. These are non-optical and optical aids.
 Non-optical aids include visual aids, tactual aids (using the sense of touch), auditory aids (using the sense of hearing) and electronic aids. Visual aids, can magnify words, can provide suitable intensity of light and material at proper distances. Tactual aids, including Braille writer slate and stylus, help the visually challenged persons in taking notes, reading and writing. Auditory aids include cassettes, tape recorders, talking books and other such devices. Electronic aids, such as talking calculators and computers, are also available for performing many computational tasks. Closed circuit television, also an electronic aid, enlarges printed material with suitable contrast and illumination. Nowadays, use of audio CDs and voice boxes with computers are also very helpful for listening to and writing the desired text.
 Optical aids include bifocal lenses, contact lenses, tinted lenses, magnifiers and telescopic aids. While the lens combinations are used to rectify visual limitations, telescopic aids are available to view chalkboard and class demonstrations.
 4. The Braille system employs groups of raised dots to represent printed letters and numbers.
 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
- | | | | |
|---|---|---|---|
| 1 | ● | ● | 4 |
| 2 | ● | ● | 5 |
| 3 | ● | ● | 6 |
- The Braille Cell

marks, numbers, and also special characters.
For example:

The letter "Y" has dots 1, 3, 4, 5, and 6.	•• ••
A "Period" is written with dots 2, 5, and 6.	•• •

Section 3: Reflective, Logical and Critical Thinking

Think and answer.

- If all objects around us reflect light in a regular way, each object would reflect light in only one direction. We will then be able to see that object only from that direction and not from other directions.
- It will be the same in both. The size of the image of an object formed on a plane mirror does not depend on the size of the mirror.

ANNUAL TEST PAPER (Competency-Based Assessment)

Section 1

A. Choose the most appropriate answer.

- c
- d
- d
- d
- d
- b
- d
- b

B. Fill in the blanks.

- lesser
- drag
- ignition
- 25
- 5
- puberty

C. Give one-word answers.

- Drip irrigation
- Violet
- Concave lens
- 20–20,000 Hz
- Salt solution
- Fault
- Kerosene
- Rough
- Lactobacillus*
- On both
- Biodiversity
- Boys

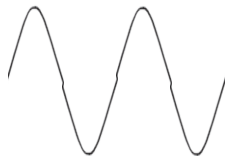
Section 2

A.

- Weight is a measure of the earth's gravitational pull on an object whereas mass is a measure of the quantity of matter in the object.
- If there was no friction, a moving object would continue moving with a uniform speed in a straight line for ever and will never stop.

B.

- Greater amplitude, same wavelength.



- Same amplitude, smaller wavelength.



- Greater amplitude, smaller wavelength.



C.

- The flow of electronic current is from negative to positive whereas the flow of conventional current is from positive to negative.
- Solid copper sulphate does not contain any free electrons or ions to conduct electricity. When it is dissolved in water, it breaks up into ions that can conduct electricity.

D.

- If the angle between the incident and reflected ray is 90° , the angle of incidence and reflection are 45° each, i.e. half of 90° .
- Sunlight is a mixture of light of several colours. It is known as white light.
- Rods and cones are types of nerve cells. Cones are sensitive to bright light and can detect colour. Rods are sensitive to bright light.

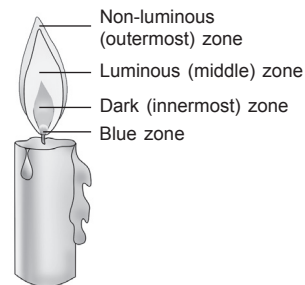
E.

- Static electricity consists of charges at rest, whereas current electricity consists of charges in motion.
- Lightning is a very heavy flow of charge between clouds, or between clouds and the earth. When the quantity of charge is very large, the air cannot resist their flow.

F.

- If several forces act in different directions on a body, the effect on the object is due to the magnitude and direction of the net force acting on it.
- The pressure exerted by a liquid increases with increasing depth.
- a. Petroleum is lighter than water.
b. Petroleum does not mix with water.

G.



H.

- No. An electrostatic precipitator can remove only tiny ash and soot particles.
- Static electricity
- Neutral in charge
- False. Fly ash is used to make bricks.

CASE-BASED QUESTIONS

- No
- One used to smash kidney stones as more energy is required in this case
- To save the girl child
- Ultrasound

ASSERTION-REASON TYPE QUESTIONS

- b
- a
- a
- a
- c
- b

