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Exploring Science

A Main Course Book of Science

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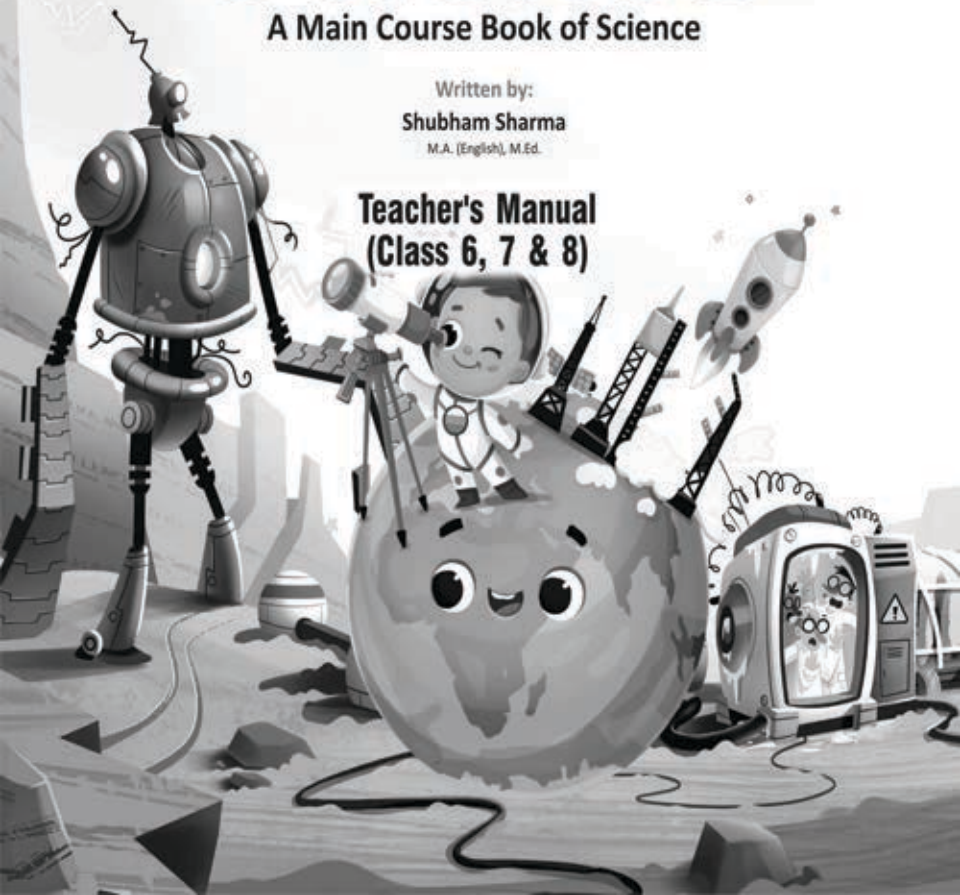
Teacher's Manual
(Class 6, 7 & 8)



Teacher's Help Book
Science (Class-6)

CHAPTER 1 : SOURCES OF FOOD

A. 1. (c) 2. (c) 3. (c) 4. (c) 5. (b) **B.** 1. energy 2. cereals, pulses, vegetables, fruits etc. 3. Omnivores 4. Scavengers 5. four **C.** 1. T 2. T 3. T 4. T 5. F **D.** 1. grass → zebra →lion 2. Food is needed for growth and repair for proving energy and to maintain a healthy body. 3. Scavengers usually consume dead animals. Thus they contribute to decomposition and ecosystem. 4. **Pulses :** peas, urad, arhar and cereals : wheat, barley, maize. 5. Parasites are animals that depends on other living animals for their food. 6. First of all food chain and food web concepts were introduced in a book published in year 1927 by Charles Elton. **E.** 1. A food chain is a series of organisms depending on next one to feed upon. This chain is generally shown by arrow links from prey to its predator. Basically a food chain starts from a plant that eat no other organisms in the chain and ends at a species that is not eaten by any other species. For example, you could write the food chain for a lion like this : **grass → zebra → lion** 2. A scavenger is an organism that mostly consumes decaying meat. Scavengers are a type of carnivore, which is an organism that eats meat. While most carnivores hunt and kill their prey. Scavengers usually consume animals that have either died of natural causes or been killed by another carnivore. They contribute to decomposition and the ecosystem. Some scavengers are vultures, raccoons, and yellow jackals etc. **Parasites :** Parasites are animals that depend on other living animals for their food .Some parasites such as mosquito, leech and flea suck the blood of animals including humans. A parasite lives in a close relationship with another organism, its host, and causes it harm. The parasite is dependent on its host for its life functions. For example, viruses are common parasites. The parasite has to be in its

host to live, grow, and multiply. Parasites rarely kill their hosts. A common, well-known type of a parasite is a hookworm. It is possible for humans or their pets to get them. Hookworms attach themselves in the lining of the small intestine, and cause diseases, and malnutrition as well as they eat the nutrients and keep them from going to the host. 3. There are three main eating habits of all animals. Animals that eat only plants, grass, leaves etc. are called "**herbivorous animals"**. Animals that eat only other animals are called "**carnivorous animals"**. Examples of these would be lions, tigers, snakes etc. That leads us to the group of animals that like to eat both plants and animals. In fact some of them like the rat, can eat almost anything. This group of animals are called **"omnivorous animals"**. 4. Producers are the plants that utilize solar energy for photosynthesis and use air, soil for making their food. All food chains must start with a producer. 5. As we all know that all living beings need food to grow and stay alive, though the food requirement of one type of organism is differ from other. For example, plants need air, water and sunlight for making their food and insects depend on plants for their food, where some other species eat insects etc.

CHAPTER 2 : COMPONENTS OF FOOD

A. 1. (c) 2. (b) 3. (c) 4. (a) 5. (a) **B.** 1. balanced 2. scurvy 3. starch 4. faeces 5. K **C.** 1. (d) 2. (a) 3. (c) 4. (e) 5. (b) **D.** 1. F 2. F 3. T 4. F 5. T **E.** 1. Vitamin C 2. Carbohydrates 3. It helps us by providing fibre in our diet which helps in bowel movement. 3. Malnutrition can be defined as the insufficient, excessive or inbalanced consumption of nutrients. 5. Calcium **F.** 1. Vitamins help in protecting our body against diseases. Vitamins also help in keeping our eyes, bones, teeth and gums healthy. 2. Cellulose is the cell wall material and cannot be digested by humans. It provides the roughage in the diet. It helps us by providing fibre in our diet which helps in bowel movement. 3. Life processes cannot occur without water. Water is one of the most important nutrients

mainly because it is extremely important for our survival. 4. Diet is the food on which an individual lives. A balanced diet may be defined as the one which contains all the essential nutrients, like carbohydrates, fats, minerals and vitamins in correct proportion for normal grow and development of the body. 5. A disease which arises due to lack of nutrients like carbohydrates, fats, proteins, minerals or vitamins in our diet is called **deficiency disease**. The deficiency diseases are also called nutritional disorders. People who do not get the right amounts of all nutrients from their food suffer from deficiency diseases. **Vitamins :** Vitamin A (Retinol), Vitamin B1 (Thiamine), Vitamin B2 (Riboflavin), Vitamin B6 (Pyridoxine), Vitamin B12 (Coalmine) **Minerals :** Calcium, Phosphorus, Sodium, Potassium.

CHAPTER 3 : SEPARATION OF SUBSTANCES

A. 1. (b) 2. (c) 3. (c) 4. (b) 5. (c) **B.** 1. condensation 2. soluble 3. saturated 4. Water 5. Winnowing **C.** 1. F 2. F 3. T 4. T 5. T **D.** 1. A saturated solution is a solution in which the maximum amount of solute has been dissolved. 2. Handpicking allows the good grains to be separated from the waste and impurities. Handpicking is the basic method for separation of substances. 3. Sieving is a method of separating substances that are of different sizes. This method is used in separating solid particles of different sizes with the aid of sieve of a given mesh size. 4. It can be done by hand, by cattle or by machines. Traditionally, threshing was done by hand, but cattle helps to do the job quickly. Now a days, threshing machines are also used to separate large quantities of grain quickly. 5. Filtration removes impurities by filtering water. **E.** 1. Do it yourself 2. The components present in the mixture do not loose their identity. These components can usually be separated by simple physical methods. Milk or curd is churned to separate the butter from the water. Common salt that is used in our kitchen is prepared from sea water by separating salt from water. 3. Do it yourself.

CHAPTER 4 : FIBRE TO FABRIC

A. 1. (c) 2. (c) 3. (b) 4. (c) 5. (d) **B.** 1. wool 2. summer 3. chemical 4. Mahatma Gandhi 5. spinning **C.** 1. F 2. T 3. T 4. F 5. F **D.** 1. rope and sac 2. Yarns are made up of a number of fibres twisted together. Fibres are thin and small and cannot be made into a fabric directly. 3. Fibre is the basic unit of fabric. Fibres are thin and small and cannot be made into a fabric directly. 4. Synthetic fibre are made from petroleum product. These fibres catch fire easily and can stick to the body, they show not be warm while working in the kitchen and near a flame. 5. 1. They are stronger. 2. They do not wrinkle easily. 3. They are easy to wash and maintain and they dry easily. 4. They are easy to maintain and dried easily. 5. They are not easily attacked by moths and moults. **E.** 1. The process by which yarns are obtained from fibres is known as spinning. Many simple instruments were used in the olden days to make yarns from cotton. Nowadays, spinning is done with the help of machines. These machines are very fast and efficient. 2. Natural fibres are obtained from living things. Plants give us cotton and jute. Animals give us wool and silk. Synthetic fibres are obtained mainly from petroleum. 3. Fabrics made from wool are soft, smooth, absorbent and do not wrinkle easily. These do not allow the body heat to go out and act as insulates. That's why the fabric made out of these fibres is used as winter wear.

CHAPTER 5 : SORTING MATERIALS INTO GROUPS

A. 1. (a) 2. (c) 3. (b) 4. (c) 5. (b) **B.** 1. classification 2. sinks, floats 3. transparent 4. solids, gases 5. soluble **C.** 1. (v) 2. (iv) 3. (i) 4. (iii) 5. (ii) **D.** 1. It has mass and if occupies space. It has shape. These are the merits of matter. So it is also a matter. 2. **Transparency** (also called **pellucidity** or **diaphaneity**) is the physical property of allowing light to pass through the material without being scattered. If almost all the light can pass through an object, it is called transparent. We can see through a transparent materials.

If no light can pass, it is called **opaque**. We cannot see through an opaque material. If light can pass partially, it is called **translucent**. We cannot see through a translucently material. 3. All materials are made up of matter. All solids, liquids and gases around us are made of matter. **E.** 1. Density is defined as the mass contained in unit volume of substances. 2. Liquids like alcohol, vinegar, lemon juice and milk, which dissolves in mixed with water are called miscible in water.

Liquids like kerosene oil, mustard oil, groundnut oil, coconut oil and petrol are insoluble in water. These liquids are immiscible in water. 3. The process of grouping of objects based on some known criteria is called classification. There are various ways in which the objects can be classified. But before we learn more about classification of objects, let us first understand their nature and constituent.

4.

State of matter	volume	Density	Shape	Fluidity	Compressibility
solid	Has fixed volume	High	Has definite shape	Does not flow	Negligible
Liquid	Has fixed volume	Lower as compared to liquids	Has no definite shape	Flow smoothly	Very small
Gas	Has no fixed volume	Low	Has no definite shape	Flow smoothly	Highly compressible

5. This is also distinguishing property of matter. It is the capability of matter dissolve in solvent. For example, sugar dissolves in water. Another physical property of a substance describes how well a substance dissolves in another substance. Dissolving is a physical process. If an object dissolves, that substance is soluble. Solubility is a measure of how easily the substance dissolves in water. Liquids like alcohol, vinegar, lemon juice and

milk, which dissolve when mixed with water are called **miscible** in water. Liquids like kerosene oil, mustard oil, groundnut oil, coconut oil and petrol are **insoluble in water.** These liquids are immiscible in water. Similarly some gases , such as oxygen and carbon dioxide are soluble in water. Ammonia is a gas which is very soluble in water. Gases like nitrogen, carbon monoxide, hydrogen and methane are insoluble in water.

In each state, some materials are soluble in water whereas some others are insoluble. Materials in each state can therefore be classified on the basis of their solubility in water.

CHAPTER 6 : CHANGES AROUND US

A. 1. (c) 2. (c) 3. (a) 4. (a) 5. (c) **B.** 1. irreversible change 2. strength 3. chemical change 4. reversible 5. new substances **C.** 1. F 2. T 3. T 4. F 5. T **D.** 1. (ii) 2. (iii) 3. (i) 4. (iv) **E.** 1. **Physical change :** 1. Drying of wet clothes. 2. Freezing water to get ice. **Chemical changes :** 1. Digestion of food 2. Rusting of iron 2. Changes that take place in hours, days, years etc. are slow changes. Example : 1. Germination of seeds 2. Growth of a child 3. Curdling of milk 4. Ripening of fruits etc. Changes that take place in a minute, second etc. are called fast changes. Example : 1. Burning of paper 2. Bursting of crackers 3. Opening of drawers 4. Dropping an object from the top of a building etc. 3. Boiling, evaporation and condensation are all examples of reversible changes. 4. Changes take place around us all the time. However, all changes are not the same. We get back the original substance in some, and can't get them back in others. Some are slow while some are fast, some occurs on regular basis. 5. A chemical reaction between two substances can only take place only when they are brought in close contact with each other. The closer the contact, the better is the chemical reaction. **F.** 1. Do it yourself 2. Some other examples of reversible changes are the melting of ice, folding a paper and blowing a balloon. Conversion of water into clouds is a natural reversible change. The clouds get converted into water, when it starts raining. Increase of

temperature on the earth in the day time and cooling in the night time is also a reversible natural change. 3. Do it yourself.

CHAPTER 7 : LIVING AND NON-LIVING

A. 1. (c) 2. (b) 3. (b) 4. (c) 5. (a) **B.** 1. Carbon dioxide 2. Stimulus 3. Photosynthesis 4. Respiration 5. Wood **C.** 1. F 2. T 3. F 4. F 5. T **D.** 1. Respiration 2. Life span 3. Photosynthesis 4. cell 5. Species **E.** 1. Feeding and movement. 2. When living things feed they gain energy. Some of this energy is used in growth. 3. Plants also respond to stimulus for example, the leaves of mimosa have the capability to display thigmonasty (touch-induced movement). 4. Plants prepare their food by photosynthesis. 5. Do it yourself. **F.** 1. Do it yourself 2. Do it yourself.

CHAPTER 8 : PLANTS : FORM AND FUNCTIONS

A. 1. (a) 2. (c) 3. (c) 4. (c) 5. (b) **B.** 1. The carpel 2. Venation 3. main 4. pollination 5. Transpiration **C.** 1. T 2. F 3. T 4. T 5. T **D.** 1. Pollen grains are transferred from anther to stigma by a process called pollination. 2. After pollination, a male cell and a female cell fuse together in an ovule in a process called fertilization. 3. After fertilization, the ovules grow and become seeds. The ovary of a flower grows and becomes fruits (with seeds inside it). The fruit protects the seeds. The other parts of the flower dry up and fall off. 4. All the flowering plants have two main systems : **root system** and **shoot system**. 5. A leaf is borne on the stem at a node. It usually has a stalk called petiole. **E.** 1. **Functions of the stems : 1. Support :** It supports branches, leaves, flowers, fruits and buds. **2. Transportation :** It conducts water, nutrients and the products of photosynthesis to and from roots and leaves. It accommodates the transport system which is necessary for the vertical and lateral movement of water and sap within the plant body. **3. Food storage :** The stem also functions as the storehouse of food material as in the case of potato, garlic, ginger, onion etc. **4. Food manufacturing :** Young green stem

also performs a minor role in the production of food through the process of photosynthesis, but in some species (e.g. cactus) the stem is the chief photosynthesizing organ. 2. **Root system :** The root system of a plant constantly provides the stems and leaves with water and dissolved minerals. In order to accomplish this, the roots must grow into new regions of the soil. The growth and metabolism of the plant root system is supported by the process of photosynthesis occurring in the leaves. Photosynthesis from the leaves is transported via the phloem to the root system. Root structure aids in this process. **Shoot system :** Shoots target the above-ground business of the plant. Very young plants may possess only simple, undeveloped shoots. As a plant grows, however, these tender shoots develop into stems and leaves. So, stems and leaves are really part of the shoot system. Stems and leaves are so different and specialized that it is worth considering them separately. Overall, the shoot system enables a plant to grow taller to gain access to energy-giving light, and allows the plant to convert that light energy into the chemical energy of sugar. Like roots, shoots develop from ground, dermal, and vascular tissues. The shoot system includes organs such as leaves, buds, stems, flowers, and fruits and usually it develops above ground. 3. Do it yourself 4. Do it yourself 5. Do it yourself.

CHAPTER 9 : ORGANISMS AND THEIR SURROUNDINGS

A. 1. (a) 2. (c) 3. (c) 4. (c) 5. (a) **B.** 1. energy 2. grains, fruits, vegetables, etc 3. Omnivores 4. Decomposers 5. four **C.** 1. T 2. F 3. T 4. F 5. F **D.** 1. Human beings, Tiger 2. Soil, water, air, minerals 3. Gills & Lungs **E.** 1. The environment means everything that surrounds us—our house, garden, town, shops, hills, rivers, ocean, the air, soil, sunlight etc. and also the plants and animals around us. 2. The marine biome has the most biodiversity of all the biomes. Many of the animals, such as fish, have gills that allow them to breathe the water. Other animals are mammals that need to come to surface to breathe, but spend much of their lives in

the water. Another type of marine animal is the mollusk which has a soft body and no backbone. Terrestrial habitats include forests, grasslands, deserts and rainforests. They are typically defined by factors such as plant structure (trees and grasses), leaf types (e.g. broadleaf and needle leaf), plant spacing (forest, woodland, savanna) and climate. 3. Producers are organisms which are able to manufacture their own food. Green plants are able to do this by means of photosynthesis, where the sun provides the necessary energy. Therefore, these green plants are the autotrophic (auto meaning self and troph meaning food) organisms or primary producers in most ecosystems. 4. Do it yourself 5. Streamlined body helps to minimize water resistance which makes them easy to live in water. **F.** 1. **Rainforest habitats :** Rainforests are very dense, warm, wet forests. They are havens for millions of plants and animals. Rainforests are extremely important in the ecology of the Earth. The plants of the rainforest generate much of the Earth's oxygen. These plants are also very important to people in other ways; many are used in new drugs that fight disease and illness. A variety of animals live in the grasslands. These include prairie dogs, wolves, turkeys, eagles, weasels, bobcats, foxes, and geese. A lot of smaller animals hide down in the grasses such as snakes, mice, and rabbits. 2. Decomposers are organisms that break down dead or decaying organisms, and in doing so carry out the natural process of decomposition. 3. **Desert :** Deserts are characterized by dry conditions and a wide temperature range. These are defined as regions that has a less than 254 mm of annual rainfall or precipitation. 4. Adaptation, is the process by which a living thing becomes better suited to its environment. An organism that is well-adjusted to different conditions of its habitat will breed and flourish. Plants and animals usually have features that help them to survive in a particular type of habitat. These are known as adaptations. For example, the powerful forelegs and out-turned palms of the mole are structural adaptations for burrowing.

CHAPTER 10 : THE BODY MOVEMENT

A. 1. (b) 2. (c) 3. (a) 4. (c) **B.** 1. locomotion 2. 206 3. system 4. backbone 5. waste **C.** 1. F 2. T 3. F 4. F 5. T **D.** 1. Tissues combine to form an organ. Each organ performs some important function for the body. For example, heart is an organ that pumps blood to all parts of the body. 2. Locomotion helps animals in several ways. It helps them to : • Find their food and water. • Protect themselves from their predators or enemies. • Move from unfavourable to favourable environment. 3. The sweeping of the tail is due to the contraction and relaxation of the myotome (muscles in fishes) on either side of body. 4. During swimming, the tail is swept from side to side to bend the body on either side alternately and produce a thrust that propels the fish for forward. 5. A group of similar cells specialised to perform a function make up a tissue. For example, muscle tissues are a group of cells, specialized to contract and expand for the movement of body parts. **E.** 1. Skeletal system or the skeleton forms the bony framework of the body providing support and protection for some of the soft organs, particularly in the skull and pelvis; acting as levers in movements and providing surfaces for the attachment of the skeletal muscles. In certain parts, the framework is supplemented by cartilage. 2. The vertebral column acts as levers that operate for the movement of the fish. Fish that swims actively in the water has a streamlined body shape which allows it to move easily through the water with minimal frictional drag. During swimming, the tail is swept from side to side to bend the body on either side alternately and produce a thrust that propels the fish for forward. The sweeping of the tail is due to the contraction and relaxation of the **myotome** (muscles in fishes) on either side of body. 3. Brain, spinal cord, nerves, nerve cells, neurons, hypothalamus 4. **Flexion :** Bending parts at a joint so that the angle between them decreases and the parts come closer together (bending the lower limb at the knee). **Extension :** Straightening parts at a joint so that the angle between them increases and the

parts move farther apart (straightening the lower limb at the knee). **Abduction :** Moving a part away from the midline (lifting the upper limb horizontally to form a right angle with the side of the body). **Adduction :** Moving a part toward the midline (returning the upper limb from the horizontal position to the side of the body). 5. Twelve pairs of rib bones wrap around the body to protect organs such as the heart and the lungs. There are 12 pairs of ribs attached to the thoracic vertebrae at the back of the chest. • Only the upper 7 opposing pairs are attached in front to the blade– shaped **breastbone** situated in the midline of chest wall. • 3 of the remaining 5 pairs are attached by the cartilage to the rib immediately above. • The last two are unattached. The ribs protects the heart and lungs.

CHAPTER 11 : MEASUREMENT AND MOTION

A. 1. (c) 2. (c) 3. (c) 4. (b) 5. (b) **B.** 1. kilometre 2. periodic 3. millimetres 4. common 5. oscilatory **C.** 1. F 2. T 3. F 4. T 5. T **D.** 1. If a body changes its position with respect to time, it is said to be in **motion**. 2. Rectilinear Motion, Circular Motion, Periodic Motion, Oscillatory motion, 3. If a body does not change its position with respect to time, it is said to be at **rest**. If a body changes its position with respect to time, it is said to be in **motion**. There are different types of motion. **Rest** and **motion** are relative terms. If you consider a passenger in a moving train, he is at rest with respect to his co-passengers, but is in motion with respect to an observer on the ground. 4. Till few years back, different countries use their own different units of measurement. But that gave birth to many practical problems. Let say for example if two countries are using two different methods of measurement, each as a standard unit of length. 5. Do it yourself **E.** 1. So in 1960, the General Conference of Weights and Measures recommended that a common system should be used all over the world. This system was called SI system. SI is the abbreviation of 'System International's Unites' in French. 2. Since man inhabited the earth, he was on his own way to search for food, water, and a safe

place to live. In early and ancient days, walking was the most dependable mode of transportation. Then slowly man learned to domesticate animals and ride them for hunting and to move from one place to another. And around 3500 BC the wheel was invented which let to the discovery of revolutionized modern transport system. Combining the horse and the wheel, the early man discovered the chariot which was the cheapest mode of transport in the land. 3. Do it yourself. 4. The key to the subdivision of the metre is the prefx milli. Milli is related to the word mile. Mile was the distance it took a Roman soldier to step of 1000 paces, a pace being two steps. Since an average pace is approximately 5 feet (try it and see), a mile would be approximately 5000 feet.

The crucial point is the number 1000 as related to the word mile. Milli is the prefix for "1/1000 of". Thus, a millimetre is one-thousandth of a metre. (Is a millipede one tenth of a centipede?) The word mille has a similar history. The original defination of "mille" was the distance covered in 1000 paces (by a Roman soldier, I seem to recall). So 1000 paces was called a "mille." Over time, this became "mile." There are 1000 millimetres in a metre just as there are 1000 paces in a mile. In each case, we have a subunit that is one-thousandth of the main unit. The word mile is to remind us that there are 1000 paces in a mile.

CHAPTER 12 : ELECTRICITY

A. 1. (a) 2. (c) 3. (b) 4. (c) 5. (a) **B.** 1. negative and positive energy 2. positive, negative 3. complete 4. conductors 5. filament **C.** 1. T 2. T 3. F 4. T 5. T **D.** 1. battery 2. bulb 3. circuit **E.** 1. A circuit diagram indicates the arrangement of different circuit elements with their conventional symbols. Some of the most commonly used circuits diagrams. 2. In a circuit it is called closed or complete if current pass through it. 3. **Conductors :** Substances which allow electricity to pass through them easily are called conductors. These are made from materials which have low resistances. Some examples are metals like copper, aluminium, silver, iron, brass and also salt solutions. Silver is the best conductor

of electricity but it is not as a conductor becuse it is very expensive metal. **Insulators :** Substances which do not allow electricity to pass through them easily are called insulators. These are made from materials which have a high resistance. Some substances which are insulators are air, plastic, cotton, rubber, wood, paper, glass, pure water, etc. 4. The closed paths in which the current flows is called an **electric circuit**. In other words, the complete path from one terminal of an electric cell through the electric bulb and back to the other terminal of the electric cell is known as electric circuits. 5. The direction of flow of current in a circuit is taken to be from the positive terminal of the cell to the negative terminal. **F.** 1. **Conductors :** Substances which allow electricity to pass through them easily are called conductors. These are made from materials which have low resistances. Some examples are metals like copper, aluminium, silver, iron, brass and also salt solutions. Silver is the best conductor of electricity but it is not as a conductor becuse it is very expensive metal. **Insulators :** Substances which do not allow electricity to pass through them easily are called insulators. These are made from materials which have a high resistance. Some substances which are insulators are air, plastic, cotton, rubber, wood, paper, glass, pure water, etc. 2. Do it yourself 3. For this take an electric torch. You can switch it on by pressing its switch. What happens when you switch it on? The torch bulb glows ,giving light ? Does the front glass become warmth? Try to understand the conclusion from this about nature of electric current.

CHAPTER 13 : MAGNETS

A. 1. (a) 2. (a) 3. (a) 4. (b) 5. (c) **B.** 1. compass 2. Artifical magnet 3. repel, attract 4. field 5. two **C.** 1. F 2. T 3. T 4. F 5. F **D.** 1. • **Artificial magnets** are prepared by man to be used at any time and any place. These magnets are much stronger than natural magnets. • Artificial magnets are made in many shapes. They may be rods, flats—bars, U shaped or like a horseshoe. 2. Substances

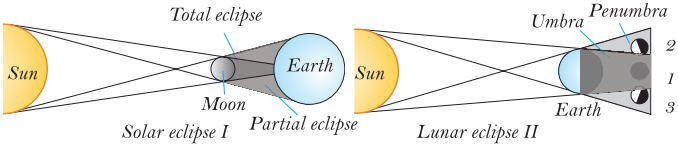
which are not attracted by a magnet are called **non-magnetic substances**. 3. (i) Magnets attract ferromagnetic objects. (ii) The magnetic field at the poles of a magnet is greater than at the middle of magnet. 4. A magnet can be demagnetised, i.e. made to lose its magnetism by : • Heating the magnet. • Hammering, dropping or rough handling of the magnet. • Keeping two magnets side by side with like poles next to each other. 5. • Magnets are used in magnetic compass, which is used for finding directions. • Electricity meters, refrigerator doors, and dynamos of bicycles and automobiles use magnets. • Magnet is used in toys etc. • Nuclear Magnetic Resonance (NMR) imaging is used to study the brain. **E.** 1. • Magnets are used in magnetic compass, which is used for finding directions. • Electricity meters, refrigerator doors, and dynamos of bicycles and automobiles use magnets. • Magnet is used in toys etc. • Nuclear Magnetic Resonance (NMR) imaging is used to study the brain. 2. **Single touch method** : A piece of any magnetic material, like iron or steel (a nail, knitting needle, bolt etc.) is take and placed on a bench or a table. A bar magnet is brought close to the magnetic material (say an iron piece AB). One end of the bar magnet is stroked against it, moving from end A to end B of the iron piece. When the bar reached end B, it is lifted and the stroke is repeated from A to end B. This procedure is repeated several times, keeping two things in mind : (a) The same pole of the bar magnet should be used every time. (b) Strokes should be in the same direction.

By stroking the iron piece with the north pole of the bar magnet, end A becomes the North Pole, and end B the South Pole. If you bring the South Pole of any magnet close to end A now, what will you observe? You will observe that the two attract, which simply proves that end A acquires the North Pole. 3. **Properties of Magnets :** 1. Magnets attract ferromagnetic objects. 2. The magnetic field at the poles of a magnet is greater than at the middle of magnet. 4. Substances which are attracted by a magnet are called **magnetic substances**. Iron, cobalt, nickel and their alloys are **magnetic substances**. Substances which are not

attracted by a magnet are called **non-magnetic substances**. Aluminium, copper, brass, stainless steel, wood, plastic, etc. are non-magnetic substances.

CHAPTER 14 : LIGHT

A. 1. (c) 2. (c) 3. (b) 4. (a) 5. (a) **B.** 1. Star 2. new moon 3. opaque 4. man-made 5. energy **C.** 1. F 2. F 3. T 4. T 5. T **D.** 1. An object which emits light is called a **source of light**. 2. A shadow is an area where direct rays from a light source cannot reach due to obstruction by an object. It occupies all of the space behind an opaque object with light in front of it. 3. Yes 4. Luminous 5. Substances which allow light to pass through them easily, and through which we can see clearly are called **transparent objects.** A transparent substance/object is called an **optical medium.** Glass, water and air are some examples of transparent objects. **E.** 1. **Principle of pinhole camera :** With a pinhole camera, light is passed through a very small hole (pinhole), such as one made by a needle, so that an image is formed on a film or sensitive paper (such as photographic paper) located at a distance place. 2. **Ray :** A very narrow beam of light is known as a Ray of light. It is represented by a straight line with an arrow which indicates the direction in which the ray is moving. 3. **Solar Eclipse :** A solar eclipse occurs when the moon goes in front of the Sun and blocks most of the sun's light from the Earth. During a total eclipse, all you can see from Earth is a ring of light around the moon which is part of the Sun the Moon did not cover. **Lunar Eclipse :** A lunar eclipse occurs when the Moon passes directly behind the Earth into its umbra (shadow). This can occur only when the Sun, Earth, and Moon are aligned exactly, or very closely so, with the Earth in the middle. Hence, a lunar eclipse can only occur the night of a full Moon.

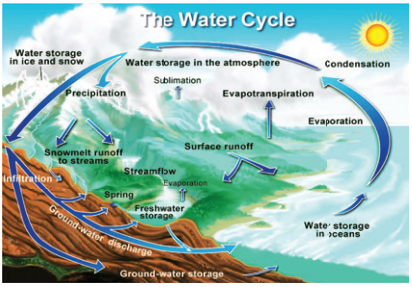


4. A **luminous** object is one that gives off light. In other words, it glows of its own accord. To be able to glow, the object must have its own source of energy. A torch shines because of the energy stored in its batteries, whereas all stars shine using energy created by nuclear fusion. Both of these are considered to be luminous objects. In order for us to see an object that is **non-luminous**, it must reflect some of the light it receives from a luminous source, such as the Sun. Most of the objects we see, such as cars, clouds or even the Moon, are non luminous; it is just that they reflect sunlight. 5. Light is a form of energy. Energy is what makes things move, grow, or change. Light helps the plants to grow. Most plants would die without light. All plants prepare their food in the presence of sun light during photosynthesis. During this process plants give out oxygen which we breathe. Fuels like coal, natural gas and petroleum are remains of plants and other living organisms that have been changed by nature over millions of years. Thus, we depend on light for food, oxygen and fuel.

CHAPTER 15 : WATER

A. 1. (b) 2. (c) 3. (a) 4. (c) 5. (a) **B.** 1. transpiration 2. evaporation 3. drought 4. natural 5. freezing **C.** 1. (v) 2. (iii) 3. (iv) 4. (ii) 5. (i) **D.** 1. F 2. F 3. F 4. F 5. T **E.** 1. Some ways by which we can conserve water are as follows : • Avoid wastage of water and recycling water wherever possible. • Planting trees and other vegetation as they help in absorption of water by soil. • Reducing and controlling water pollution by treating sewage and factory waste before disposing them. • Controlling flood and storing rainwater by building dams. 2. **Rainwater harvesting :** Rainwater harvesting is a technique used for collecting, storing, and using rainwater for landscape irrigation and other uses. The rainwater is collected from various hard surfaces such as roof tops and/ or other types of man-made above ground hard surfaces. This ancient practice is currently growing in popularity throughout our communities due to interest in reducing the consumption of

potable water and the inherent qualities of rainwater. 3. Rain is our main source of water. It rains when the water vapour in the air condenses. In India, large area of agriculture land depends on rainwater for irrigation. 4. Ice, water and vapour 5. Earth has the necessary features and substances. These substances and features of the Earth that allow the existence of life and satisfy the needs of living organisms are called **natural resources**. **E.** 1. Renewable resources are ones that can be replenished or reproduced easily. Some of them, like sunlight, air, wind, etc., are continuously available and their quantity is not affected by human consumption. Non-renewable resources are formed over very long geological periods. Minerals and fossil fuels are included in this category. 2. The **water cycle or hydrologic** is a continuous cycle where water evaporates, travels into the air and becomes part of a cloud, falls down to earth as precipitation, and then evaporates again. This repeats again and again in a never-ending cycle. Water keeps moving and changing from a solid to a liquid to a gas, over and over again. **Precipitation** creates **runoff** that travels over the ground surface and helps to fill lakes and rivers. It also **percolates** or moves downward through openings in the soil to replenish **aquifers** under the ground. Some places receive more **precipitation** than others do. These areas are usually close to oceans or large bodies of water that allow more water to **evaporate** and form clouds. Other areas receive less **precipitation**. Often, these areas are far from water or near mountains. As clouds move up and over mountains, the water vapour condenses to form precipitation and freezes. Snow falls on the peaks.



3. Pollution of water is a broad subject dealing with different types of pollutants entering the hydrological cycle. Surface flowing river water, underground water and vast sea water are included in a broad subject of water pollution. Out of them, drinking water pollution is most important, as such a pollution is directly connected with human health. 4. Water being indispensable part of human body, the daily intake of water is of utmost important for all physiological activities. If such daily used drinking water is polluted, the health of human beings will be badly affected. Wastes from home and factories are dumped in water bodies such as rivers and lakes which pollute them. Fertilisers and pesticides get washed off by rain into water bodies .causes further pollution. Thus, pollution further reduces the clean water available to us. 5. Condensation is the process by which water vapour in the air is changed into liquid water. Condensation is crucial to the water cycle because it is responsible for the formation of clouds. These clouds may produce precipitation, which is the primary route for water to return to the Earth's surface within the water cycle. Condensation is the opposite of evaporation.

CHAPTER 16 : AIR AROUND US

A. 1. (a) 2. (c) 3. (b) 4. (a) 5. (b) **B.** 1. space 2. pollution 3. oxygen cycle 4. nitrogen 5. protein **C.** 1. T 2. F 3. F 4. T 5. F D. 1. 21% 2. respiration 3. oxygen 4. Earth 5. aquatic animals **E.** 1. Nitrogen and Oxygen 2. Aquatic animals like fish used dissolved air in water through their special organs called gills that can absorb oxygen dissolved in water. 3. In the simple example of the oxygen cycle shown above, you can see how oxygen is used and cycled by plants and animals. Plants are the main creators of oxygen in the atmosphere through the process of **photosynthesis**. Photosynthesis is a process by which light energy is converted into chemical energy. Here the tree uses sunlight and carbon dioxide to produce energy and releases oxygen. The giraffe breathes in the oxygen and then breathes

out carbon dioxide. The plant can then use this carbon dioxide and the cycle is complete. 4. Aquatic animals like fish used dissolved air in water through their special organs called gills that can absorb oxygen dissolved in water. 5. The amount of water vapour present in air is referred to as humidity. **F.** 1. **Atmosphere :** A layer of air called **atmosphere** surrounds the Earth. In atmosphere, about 95% of the total air is present up to a height of 20 km above the earth's surface. **Respiration :** The small organisms that live in the soil fulfil their requirement of oxygen needed for respiration through this trapped air. 2. In the simple example of the oxygen cycle shown above, you can see how oxygen is used and cycled by plants and animals. Plants are the main creators of oxygen in the atmosphere through the process of **photosynthesis**. Photosynthesis is a process by which light energy is converted into chemical energy. Here the tree uses sunlight and carbon dioxide to produce energy and releases oxygen. The giraffe breathes in the oxygen and then breathes out carbon dioxide. The plant can then use this carbon dioxide and the cycle is complete. 3. • Oxygen present in air is essential for the process of respiration. • Carbon dioxide present in the air is required for the process of photosynthesis. • Air helps in the movement of gliders, aeroplanes, balloons, parachutes etc. • Wind makes windmill rotate. Windmills are used to generate electricity, draw water from tube wells, and run flourmills. 4. A layer of air called **atmosphere** surrounds the Earth. In atmosphere, about 95% of the total air is present up to a height of 20 km above the earth's surface. The remaining 5% of air is present up to a height of about 280 km. The density of air in the atmosphere varies with altitude. 5. To show that an empty glass contains air.

Things required : An empty glass, plastic tub and water. **Method :** Fill the plastic tub with water. Take an empty glass and tilt it in the tub. **Observation :** You will see bubbles coming out of the mouth of the glass. The glass which looked empty was actually filled with air. Air being colourless was not visible. Air

being lighter than water is able to escape from the tilted glass. **Conclusion :** The empty glass contains air.

CHAPTER 17 : WASTE MANAGEMENT

A. 1. (a) 2. (c) 3. (b) 4. (a) 5. (a) **B.** 1. worms 2. organic waste 3. Land fill 4. organic 5. Recycling **C.** 1. T 2. F 3. F 4. F 5. T **D.** 1. No 2. Yes 3. Inorganic waste 4. Recycling is processing used materials (waste) into new, useful products. This is done to reduce the use of raw materials that would have been used. 5. Biodegradable waste include organic waste, e.g. kitchen waste, vegetables, fruits, flowers, leaves from the garden, and paper. Non-biodegradable waste can be further segregated into : **Recyclable waste :** plastics, paper, glass, metal, etc. **Toxic waste :** old medicines, paints, chemicals, bulbs, spray cans, fertilizer and pesticide containers, batteries, shoe polish. **Soiled :** hospital waste such as cloth soiled with blood and other body fluids. **E.** 1. Do it yourself 2. Plastic bags are used by everybody. You get them right from a vegetable vendor to a designer store. They are convenient and easy-to-use. But, most of us are blissfully of the repercussions that are occurring and will take place in the future. The following paragraphs will discuss the impact of plastic pollution on environment. 3. **Advantages of Recycling :** • Recycling preserves the environment. • Recycling saves energy. • Recycling reduces pollution. • Saves money.

Teacher's Help Book
Science (Class-7)

CHAPTER 1 : LIFE PROCESS : NUTRITION IN PLANTS

A. 1. (a) 2. (c) 3. (b) 4. (a) 5. (b) **B.** 1. autotrophs 2. photosynthesis 3. insectivorous plants 4. Insectivores 5. symbiosis **C.** 1. T 2. T 3. T 4. F 5. F **D.** 1. The process of synthesizing food by the leaves in the presence of sunlight is called photosynthesis". The process of photosynthesis can be represented by the equation given below :

$$\text{Carbon dioxide + water} \xrightarrow[\text{Chlorophyll}]{\text{Light energy}} \text{Carbohydrates + Oxygen}$$

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light energy}} C_6H_{12}O_6 + 6O_2$$

2. The mode of nutrition in which an organism derives its food from the body of another living organism is called parasitic nutrition. 3. The word 'auto' means 'self' and 'trophos' means 'nutrition'. Thus, the organisms that are capable to making their own food are called autotrophs. 4. The word 'heteros' means 'others' and 'trophos' means nutrition. Thus heterotrophic means nutrition from others. 5. The carbon dioxide which is absorbed by tiny pores of leaves (stomata) is reduced by the hydrogen to form glucose. The oxygen is released as a waste product from the body of plant. **E.** 1. Nutrition is a process by which an organism obtains food which helps in growing and utilization of their body. Continuous supply of food is required by all beings for gaining energy and performing work. 2. Symbiosis means, "Mutual beneficial relationship between two people or group". Thus, a mode of nutrition in which two organisms depend on each other for their nutrition and fulfillment of food is called symbiotic nutrition. **Lichens** are the most common example of symbiotic nutrition. They compose

of two distinct organisms namely **algae** and **fungi**, living and working together. 3. The process of synthesizing food by the leaves in the presence of sunlight is called photosynthesis. 4. Do it yourself

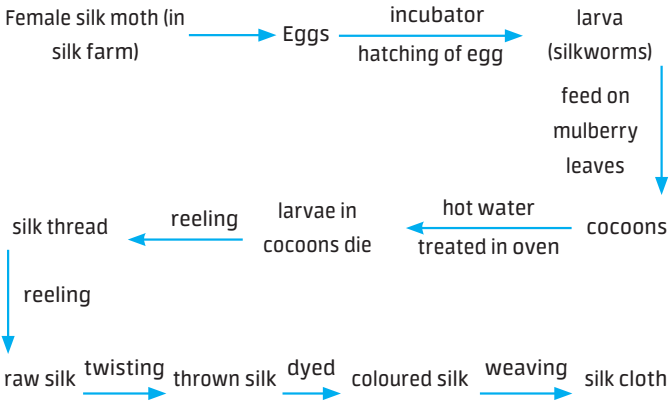
CHAPTER 2 : NUTRITION IN ANIMALS

A. 1. (b) 2. (b) 3. (d) 4. (a) 5. (c) 6. (c) **B.** 1. ingestion 2. gastric 3. food vacuole 4. villi 5. herbivores **C.** 1. F 2. F 3. T 4. T 5. T **D.** 1. There are four types of teeth which are different in shape and perform different functions. These are : **Incisors :** These are front teeth in each jaw which are very sharp and thus are used for cutting and biting **Canines :** Next to the incisors, are two long pointed teeth in each jaw called canines that are used for cutting and tearing the food. They are sharp and pointed. **Premolars and molars :** The two teeth next to the canines on each side of a jaw are premolars and the next three are molars. They are broad and flat and are used for chewing and grinding. 2. Many digestive processes are carried out in this organ.As the chyme (semi-solid paste) enters the small intestine, it mixed with the intestinal juice which is secreted by the wall of the small intestine. The small intestine receive secretions from two glands, the liver and the pancreas. Liver is the largest organ of our body weighing up to three kg in adult humans. It is reddish brown gland situated in the upper part of the abdomen on the right side of the stomach. 3. The inner wall of the small intestine has millions of finger like projections or folds called villi (singular: villus). Each villus has a network of them and small capillary closed to its surface. 4. Bile 5. The undigested and unabsorbed food is passed from the small intestine into the large intestine. Large intestine is about 1.5 meter in length. It absorbs water and some salts from the undigested food material. **E.** 1. Many digestive processes are carried out in this organ. As the chyme (semi-solid paste) enters the small intestine, it mixed with the intestinal juice which is secreted by the wall of the small intestine. The small intestine

receive secretions from two glands, the liver and the pancreas. 2. Tooth decay and cavity formation are most common dental problems. The food particles we eat sometimes get stuck in between teeth. If we don't brush teeth regularly then it leads to formation of yellow substance called **plaque**. It accumulates on the gums and teeth and hardens into a lime-like substance called tartar. This leads to a disease called **pyorrhea**. People suffering from pyrrhoea have shiny and bright red swollen gums which tend to bleed easily. 3. Whenever it senses any food around it, it pushes out one or more finger-like projections called **pseudopodia** around the food particles to trap it. Food vacuole encloses the food particle within itself with the help of pseudopodia which helps in surrounding the prey and capturing it. Within the food vacuole, an enzyme called **lysosome** who has hydrolic enzymes are secreted. The process of digestion is carried out in cytoplasm and under two phases i.e. acidic and alkaline phase. In this way, the food is digested and absorbed in cytoplasm and undigested food is removed from the body by vacuole.

CHAPTER 3 : FIBRE TO FABRIC

A. 1. (b) 2. (c) 3. (d) 4. (b) 5. (a) **B.** 1. cocoon 2. shearing 3. fun 4. natural 5. mulberry **C.** 1. F 2. T 3. T 4. F 5. F **D.** 1. Shearing a sheep's body to obtain fleece is called **shearing**. 2. Shearing, scouring, sorting, carding, dyeing, spinning. 3. The rearing of silk moth for obtaining silk is called **sericulture**. 4. Alpaca, cashmere goat. 5. Wool mark is a symbol of quality to assure that the woollen clothes are made from pure wool. This logo is assigned by International Wool Secretariat (IWS) established in North Yorkshire, United Kingdom. **E.** 1. Wool is obtained from the sheep by a long process which involves following steps : **Step 1 :** Shearing, **Step 2 :** Scouring, **Step 3 :** Sorting, **Step 4 :** Carding, **Step 5 :** Dyeing, **Step 6 :** Spinning 2. Summarizing the process into series of steps :



3. The life cycle of silk moth includes following steps : • The female silk moth lays pale yellow eggs (few hundreds) at a time on the leaves of mulberry. • After a few days, the fertile eggs turn grey. The eggs hatch to form worm-like larva which is called 'Caterpillar' or 'Silk worm'. • The silk worms feed on the leaves of mulberry tree and grow bigger in size. During the larva stage, the silk worm shed their skin four times while they grow. • The silk worm is ready to enter the next stage of its development called pupa. Pupa starts producing threads from its two salivary glands located in its head. • The fibre(made up of protein) hardens on exposure to air and forms around cover around pupa. This cover is called cocoon.

CHAPTER 4 : ACIDS, BASES AND SALTS

A. 1. (a) 2. (a) 3. (a) 4. (c) 5. (b) **B.** 1. Citric Acid 2. Chemical 3. Baking soda 4. Bases 5. Acetic acid **C.** 1. (iv) 2. (vi) 3. (v) 4. (ii) 5. (i) 6. (iii) **D.** 1. F 2. F 3. T 4. F 5. T **E.** 1. The presence of acids or a base can be confirmed with the help of a chemical called Indicator. 2. Characteristics of Base • They taste bitter. • They are slippery (soapy to touch). • Strong bases are corrosive in nature. • They react with acids to neutralize them and hence are called antacids. • They turn methyl orange yellow. • They

turn blue litmus solution red. • They have ph greater than 7. 3. Differences between Acids and Bases : **Acids :** 1. Acids are sour in taste. 2. Acid give corrsive touch. 3. Acids turn litmus to red. 4. Acids turns China rose indicator to magenta. 5. Acids have no effect on the colour of turmeric paper. 6. Acids turn methyl orange to red. 7. Acids turn purple colour of red cabbage to red. 8. Acids do not change the colour of phenolphthalein. **Bases :** 1. Bases are bitter in taste. 2. Bases give sopay touch. 3. Bases turn red litmus to blue. 4. Bases turn China rose indicator to green. 5. Bases turn turmeric paper red. 6. Bases turn methyl orange to yellow. 7. Bases turn purple colour of red cabbage to green. 8. Bases turn colourless phenolphthalein to pink. 4. The neutralization reaction between an acid and a base is an exothermic reaction. 5. The rain containing excess of acids is called an acid rain. Acidic gases like sulphur dioxide, nitrogen dioxide, carbon monoxide are released into the air as pollutants during the burning of various types of fuels used in factories, homes and automobiles. These acidic gases released in the atmosphere are fairly soluble in water. Sulphur dioxide gas dissolves in falling rain drops to form sulphuric acid, nitrogen dioxide gas form nitric acid, and carbon monoxide forms carbonic acid which dissolves in falling rain drops. **F.** 1. Do it yourself 2. Do it yourself 3. The harmful effects of acid rain are : 1. Acid rain makes water bodies like ponds, lakes and river acidic due to which fish and other aquatic animals get killed. 2. Acid rain makes the soil acidic and makes the soil unfit for cultivation. 3. Acid rain also damage crop plant in the field. 4. Acid rain corrodes (damages buildings, statues and historical monuments made of limestone, marble and plaster. Such materials are made of calcium carbonate ($CaCo_3$), a basic substance that is neutralized by acid rain. These structures decay and get coated with a black substance that contain gypsum salt ($CaSo_4$). It is formed when the sulphuric acid in acid rain reacts with the base calcium carbonate present in the building material.

CHAPTER 5 : PHYSICAL AND CHEMICAL CHANGE

A. 1. (b) 2. (a) 3. (d) 4. (d) 5. (c) **B.** 1. physical 2. sodium hydrogen carbonate 3. irreversible 4. Galvanization **C.** 1. F 2. F 3. T 4. T 5. T **D.** 1. P 2. P 3. C 4. C 5. P 6. C 7. C 8. P 9. P 10. C 11. P 12. P **E.** 1. Burning of candle, formation of curd from milk form new substances after the process. These are chemical changes in which new substances are formed. Thus, a change in which chemical properties and composition of substances are changed is called a chemical change. **Two example of physical changes :** 1. Glowing of electric bulb. 2. Formation of clouds. 2. You must have seen that when an iron object is left in moist air for a long time, a red- brown coating develops around it. It is called rust which weakens the object. This process is called rusting of iron. Chemically speaking, when iron combines with oxygen and water, it forms a hydrated iron oxide ($Fe_2O_3.xH_2O$) which is rust. Rust is soft and porous. The layer of rust formed falls from the surface of the iron object (rusted) thus, exposing fresh iron metal. 3. **Physical Changes :** Shape, size, colour and state of a substance are its physical properties. A change in which only the physical properties of any substance are changed and no new substance is formed is called **physical change**. Burning of candle, formation of curd from milk form new substances after the process. These are chemical changes in which new substances are formed. Thus, a change in which chemical properties and composition of substances are changed is called a **chemical change**. 4. Crystallization is a process by which a pure form of substances in obtained. We know Sea water contains salts dissolved in it. Although the salt can be obtained from sea water through evaporation but the salt obtained would not be in pure form and the crystals will also be in distorted shape. **F.** 1. **Physical Changes :** Shape, size, colour and state of a substance are its physical properties. A change in which only the physical properties of

any substance are changed and no new substance is formed is called **physical change**. Some examples of physical changes. 1. Glowing of electric bulb. 2. Formation of clouds. Burning of candle, formation of curd from milk form new substances after the process. These are chemical changes in which new substances are formed. Thus, a change in which chemical properties and composition of substances are changed is called a **chemical change**. Some more example of chemical change : 1. Burning of candle. 2. Formation of curd form milk (or curding of milk). 2. Do it yourself 3. **Galvanization :** Galvanization of iron prevents its rusting. It is the coating of iron object with a thin layer of zinc .Galvanized iron sheets are used for roofing and for making gates, dams etc. **Crystallization :** is a process by which a pure form of substances in obtained. We know Sea water contains salts dissolved in it. Although the salt can be obtained from sea water through evaporation but the salt obtained would not be in pure form and the crystals will also be in distorted shape. **Rusting** : You must have seen that when an iron object is left in moist air for a long time, a red- brown coating develops around it. It is called rust which weakens the object. This process is called rusting of iron. Chemically speaking, when iron combines with oxygen and water, it forms a hydrated iron oxide ($Fe_2O_3.xH_2O$) which is rust. Rust is soft and porous. The layer of rust formed falls from the surface of the iron object (rusted) thus, exposing fresh iron metal. **Alloying :** Alloys are the substances formed as a result of mixing the metals through the process of alloying. Alloys are corrosion resistant. These substances can be formed by mixing metals lke chromium, manganese, etc. with iron. By alloying, we can prevent the rusting of iron.

CHAPTER 6 : WEATHER, CLIMATE AND ADAPTATIONS

A. 1. (b) 2. (d) 3. (c) **B.** 1. weather 2. water vapour 3. meteorologists 4. rain gauge 5. temporary adaptation C. 1. (v) 2. (iii) 3. (i) 4. (ii) 5. (iv) **D.** 1. Temperature, humidity, rainfall, wind speed etc. are

called the elements of weather. 2. Adaptations in polar bears are described below : **White Thick Fur** • White thick fur makes them not easily visible in the snowy background. As a result, white fur protects them from predators and helps them in catching their prey. • It also protects them from extreme cold. **Layer of fat under the skin** The layer of fat under the skin provides additional insulation and protects them from cold. **Wide and large paws having claws** Such paws help polar bear in : • Swimming • Walking on the snow • Digging the snow • Holding the prey • Self defence 3. The weather reports are prepared by the scientists (called meteorologists) of the Meteorology Department of the Government of India. This department uses different scientific instruments to collect data on temperature, pressure, wind speed, wind direction, humidity, cloud information and makes the weather forecast. 4. Weather describes the variations which occurs in the atmosphere on a day-to-day basis, whereas Climate of a particular place or region describes the long term pattern of weather at that place or region. 5. Tropical rainforests are located around the equator. The climate of the tropical rainforests is hot (15^0C-40^0C) and humid. This region gets plenty of rainfall. Due to warmth and humidity, the rainforests support a wide variety of plants and animals. **E.** 1. The following adaptations in penguins allow them to live in extreme cold regions. **White feathers on the belly** White feathers on the belly merge well with the snowy background. This protects penguins from their predators. Short but thick feathers make their body water-proof. **Thick layer of fat under-the-skin** The under-the-skin fat, thick skin and feathers on the body protect penguins from extreme cold conditions. **Streamlined body, webbed feet and flattened flipper-like wings** These features help penguins in swimming. **Penguins live in groups and remain huddled together** This feature helps them in keeping warm. 2. **Adaptation in Chameleon :** • Chameleon is an arboreal lizard • Its tail is long prehensile. • It has a great gripping power due to its fused

fingers in groups of three and two. • The eyes are very large, and they move in all directions, better adapted for binocular vision. The chameleon sees front with its right eye, and behind with its left eye. • Its tongue is large, sticky and rolled up as a tape inside the mouth. • It has the ability to change its colour it's skin similar to that of the background to hide itself. • On finding a suitable prey the chameleon at once shoots its tongue out to catch the prey. The tongue is then rolled up back into the mouth.

CHAPTER 7 : WIND, STORMS, AND CYCLONES

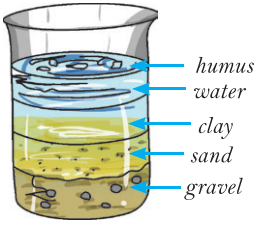
A. 1. (c) 2. (c) 3. (a) 4. (d) 5. (d) **B.** 1. expands, cooling 2. hot, cool 3. equator 4. anemometer **C.** 1. T 2. T 3. T 4. T 5. F **D.** 1. Thunderstorms mainly occur in tropical areas of India having humid and hot climate. 2. During the night, the land cools faster than the sea. The hot air above sea sises and creates a low pressure area. So the air from the land moves to the sea to take its place. This is called land breeze. 3. Wind blows due to difference in pressure between different regions. • Uneven heating of the earth surface between the equator and the poles. • Unequal heating of the land and water surfaces. 4. Keep good quality torch lights, a reliable battery power radio, and other necessities. • A first-aid box should be kept. • Store enough water for family members in air-tight containers. • Some essential commodities like food items should also be kept ready . • In case you need to leave your home, don't forget to turn off the gas/electricity/ water supply and unplug all electrical appliances. • When outdoors, look out for electricity cables that may have been brought down by the storm. Do not touch them. • Avoid pools of water with power cables lying in them. • Help your friends and neighbours. • Listen to radio, TV to get latest updates about cyclone. 5. **Cyclone :** We know the difference of temperature between two regions sets up convention currents in air. Warm air rises up creating a low pressure area and cool air from the surrounding area rushes towards this low pressure area.

Therefore the warm air cools down on rising up and the water vapour condenses to form clouds. The heat released due to condensation of water vapour warm the surrounding air. The warm air tends to rise up, leading to a drop in air pressure. More air rushes towards this low pressure area. This cycle is repetitive and results in a system of low pressure region with high speed winds revolving around it. This is called as a **cyclone**. **Tornadoes :** A tornado is a twisted funnel shaped rapidly rotating column of air which is very high. Tornadoes are formed in thunderstorm when unstable hot air on the ground rises and meets cooler air above. The wind speed in tornadoes in extreme cases can reach up to 400kmph. Tornadoes are quite destructive in nature and cause heavy loss to life and property. **Thunderstorm :** Thunderstorms mainly occur in tropical areas of India having humid and hot climate. They develops when the air has a lot of moisture that could result in the formation of clouds. They occur more when the air is warm as the warm air tends to rise up. As the rising up of air is rapid, it tends to be unstable and the probability of occurrence of thunderstorm increases. When accompanied by lighting, they can cause loss of life and material. **E.** 1. Air exerts pressure on us. We can feel the force exerted by air on our face when we sit on a fast riding bike. Thus, some phenomena gets much easier with air supporting the flow. The sailing of ships, flying kites, etc are much easier if air blows from behind them. 2. If velocity of wind increases, air pressure will decrease. The warm air is lighter, thus it rises resulting in reducing the air pressure and vice versa. If wind speed increases there is a drop in the air pressure. When high-speed wind blows over the roofs of buildings which are weakly attached to the building, the roofs can lifted and blown away.

CHAPTER 8 : SOIL

A. 1. (c) 2. (b) 3. (a) 4. (b) 5. (c) **B.** 1. Silt 2. Sand 3. Erosion 4. Upper most 5. Clay **C.** 1. T 2. F 3. F 4. T 5. T **D.** 1. (iv) 2. (iii) 3. (ii) 4. (v) 5.

(i) **E.** 1. Weathering is a process by which huge pieces of rocks break down into very small pieces by the action of forces like air, water, plants, etc. **Different types of soil are :** i. Sandy soil ii. Clayey soil iii. Loamy soil 2. Rocks contain many minerals. In the presence of moisture and oxygen, these minerals get oxidized. This makes the rocks brittle which then crumble to form the soil. 3. • This soil contains a large amount of sand particles and very small amounts of silt and clay particle. • Sandy soil is found in deserts. • Sandy soil cannot hold much water. • Sandy soil is not suited for agriculture. 4. **Clayey soil :** • This soil mostly contains clay particles and a small quantity of humus and silt. • Clay particles being very small get closely packed. So, clayey soil is compact and can hold water. • Clayey soil cannot trap air. So, there is very little air in the clayey soil. **Sandy soil :** • This soil contains a large amount of sand particles and very small amounts of silt and clay particle. • Sandy soil is found in deserts. • Sandy soil cannot hold much water. • Sandy soil is not suited for agriculture. 5. Soil is the uppermost layer of the earth's crust. It is composed of distinct layers. To know about the nature of these various layers of the soil, perform the following diagram.



F. 1. Top soil is soft and light. It can be carried away easily by wind or washed away by the flowing water. The process of carrying away the top soil by wind or by the flowing water is called **soil erosion**. **Prevention of Soil Erosion :** Soil erosion can be prevented by the following methods. **By planting more trees and grass :** Roots of trees bind the soil particles together and prevent soil erosion. Grass covers the bare soil and prevents soil erosion. Tall trees act as wind screens and prevent soil erosion by reducing the wind speed. **By step-farming :** In hilly areas, the step-farming method prevents soil erosion by reducing the speed of flowing water. **By constructing dams,**

check- dams and river embankments : The embankments of rocks and stones along the river banks and check-dams prevent soil erosion. **By preventing overgrazing :** Overgrazing by animals results in the removal of the green cover on the land. Bare soil suffers erosion severely. So by preventing overgrazing, the green cover on the land is protected. As a result, soil is not eroded. 2. **Percolation rate of Water in soil :** The term percolation describes the rate at which water (or any liquid) passes down through any material. Percolation property of any material is linked to its porosity. Different soils have different porosity. Therefore, water percolates differently through different soils.

CHAPTER 9 : LIGHT

A. 1. (c) 2. (c) 3. (a) 4. (a) 5. (b) **B.** 1. Virtual image 2. lens 3. concave 4. real 5. lens **C.** 1. (d) 2. (b) 3. (e) 4. (c) 5. (a) **D.** 1. T 2. T 3. F 4. F 5. T **E.** 1. We are able to see the candle flame through a straight tube but not through the bent tube. This is **because light travels in a straight line**. Generally, light does not bend on its own and therefore, it cannot reach our eyes through a bent tube. This property of light by which it travels in a straight lines is **called rectilinear propagation of light**. 2. 1. **Concave mirrors are used as shaving mirrors, 'make-up' mirrors** as they show enlarged image of face. 2. **Concave mirrors are used as reflectors** in torches, headlights of vehicles (such as cars, scooters, etc.) to get a strong straight beam of light. 3. Concave mirrors are used by dentists to see a magnified image of teeth. **Convex mirrors are used for many purposes :** 1. Convex mirrors are used as rear-view mirrors or side-view mirrors in automobiles such as cars, bikes, buses, etc. to see the traffic coming from behind. Since the convex mirror produces diminished image they are able to have a wide view of traffic behind the vehicle. 2. Convex mirrors are used as staircase-mirrors on the double-decker buses. 3. Big convex

mirrors are used as vigilance mirrors in shops and stores thus helping them to look for thieves. 3. **Image formed by a Plane Mirror**

When we see our self in a plane mirror, it appears as if a similar boy is present behind the mirror. The image formed by a plane mirror has some characteristics: 1. The images formed are of **same size and shape as the object**. 2. **The image formed in a plane mirror is erect**. 3. We place a vertical screen behind the plane mirror (where the image of an object appears to be present); we will find that the image of an object cannot be observed on the screen. So, we can say, the **image formed by the plane mirror is virtual (it cannot be obtained on a screen).** 4. **The image is at the same distance behind the mirror as the object is in front of it.** 5. The images in a plane mirror are laterally inverted with respect to the object. 4. Plane 5. **Differences between Concave lens and Convex lens**

S. No.	Concave lens	Convex lens
1.	Thicker at edges and thinner in middle.	Thicker in middle and thinner at edges.
2.	It has in virtual focus.	It has a real focus.

F. 1. The colour of sunlight is white. Have you wondered why then the rainbow shows seven different colours. When observed carefully, we can see seven colours in a rainbow. This is due to the dispersion of light. The phenomenon of splitting of white light into its component colours on passing through a transparent medium like a glass prism is called dispersion of light. The seven components of white light are— Violet, Indigo, Blue, Green, Yellow, Orange, Red They are often remembered as VIBGYOR (first letters of all colors). In the rainbow, the red color appears on the upper arc and the violet color on the lower arc. 2. The lens which is thicker in the middle and thinner at the

edges is called convex lens. It converges the light falling on it and hence are called converging lens.

CHAPTER 10 : LIFE PROCESS : RESPIRATION

A. 1. (b) 2. (d) 3. (c) 4. (c) 5. (d) **B.** 1. trachea 2. cuticle 3. adenosine, triphosphate 4. lungs 5. inhalation, exhalation **C.** 1. (e) 2. (a) 3. (e) 4. (b) 5. (c) **D.** 1. T 2. F 3. T 4. T 5. T **E.** 1. Breathing has two aspects : **1. Inhalation or inspiration :** Intake of air **2. Exhalation or expiration :** Giving out of carbon dioxide. Though this is an important part of respiration, it involves only the exchange of oxygen and carbon dioxide between the body and the atmosphere. Therefore, breathing is distinguished from true respiration by referring to it as external respiration. 2. Fish : gills, Insect : trachea, Earthworm : Skin, Frog : lungs 3. True respiration involves the breaking down (oxidation) of glucose molecules in the cells. This involves the reaction of glucose molecules with oxygen and results in the production of energy. It is also called **cellular respiration** or **internal respiration**. It is a very complex process and involves several steps. The overall reaction can be summarized as :

Glucose + Oxygen $\longrightarrow$ Carbon dioxide + Water + Energy 4. In plants, the process of photosynthesis as well as respiration takes place simultaneously. During photosynthesis, carbon dioxide is evolved. Thus both the processes are reverse of each other, but at the same time complementary to each other. F. 1. The process of taking in of oxygenated air and giving out of deoxygenated air is known as breathing. It is physical process. It involves the movement of diaphragm and ribs, etc. The diaphragm is a muscular sheet between the thoracic cavity and the abdominal cavity. **Inhalation :** When we breathe in, the diaphragm moves downward and the ribs move upward and outward. The volume of the chest cavity

increases and the pressure inside it decreases. As a result, air rushes into the lungs. **Exhalation :** When we breathe out, the diaphragm moves upward and the ribs move downward and backward. The volume of chest cavity decreases. This increases the pressure inside the chest cavity and the air is rushed out. 2. All animals take in oxygen and give out carbon dioxide. We refer to this process of taking in and giving out of air as breathing. Breathing has two aspects : **1. Inhalation or inspiration :** Intake of air **2. Exhalation or expiration :** Giving out of carbon dioxide. Though this is an important part of respiration, it involves only the exchange of oxygen and carbon dioxide between the body and the atmosphere. Therefore, breathing is distinguished from true respiration by referring to it as external respiration. 3. Water is taken in by the fish through the mouth, and allowed to flow over the gills. The oxygen dissolved in water diffuses directly into the blood capillaries in the gills. The carbon dioxide in the blood passes into the surrounding water. This deoxygenated water is then carried away and out of the body through the operculum. This process repeats itself continually and helps the process of respiration in fish.

CHAPTER 11 : TRANSPORTATION IN ANIMALS AND PLANTS

A. 1. (c) 2. (c) 3. (a) 4. (c) 5. (b) **B.** 1. blood vessels 2. red blood cells 3. blood vessels, 4. universal donors 5. kidneys 6. urine 7. heartbeat **C.** 1. (b) 2. (d) 3. (e) 4. (a) 5. (c) **D.** 1. T 2. T 3. F 4. F 5. T **E.** 1. One of the types of cell present is **red blood cells** (RBC) which contain a red pigment called **haemoglobin**. 2. Blood **is the fluid which flows in blood vessels**. It transports the digested food to the other parts of the body. It also carries oxygen from the lungs to each cells of the body and also helps in transporting waste for removal from the body. 3. One of the types of cell present is **red blood cells** (RBC) which contain a red pigment called

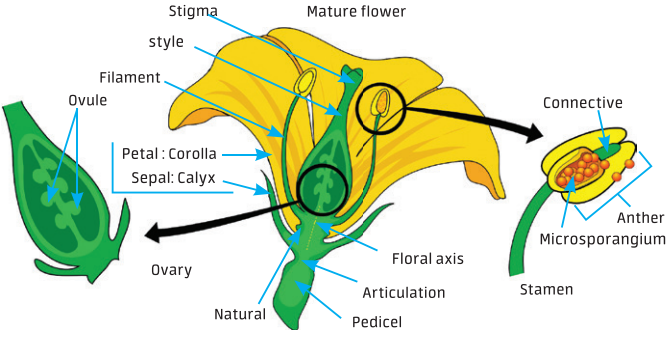
haemoglobin. Haemoglobin bind with oxygen and transports it to all other parts of the body and ultimately to all the cells. The presence of haemoglobin makes blood **appear red**. Another cells present are the **white blood cells** (WBC) which fight against germs that may enter our body. 4. Whenever we get a cut on our body, a clot is formed because of the presence of another type of cells in the blood, called **platelets**. 5. **Arteries** carry oxygen-rich blood from the heart to all parts of the body. The arteries have thick elastic walls. **Veins** are the vessels which carry carbon dioxide-rich blood from all parts of the body to the heart. All veins have thin walls. There are valves present in veins which allow blood to flow only towards the heart. **F.** 1. The heart has four chambers which prevents the blood rich in oxygen from mixing into the blood rich in carbon-dioxide. The two upper chambers are called the **atria** (singular : atrium) and the two lower chambers are called the **ventricles**. The partition between the chambers helps to avoid mixing up of blood rich in oxygen with the blood rich in carbon dioxide. The walls of the chambers of the heart are made up of muscles. These muscles contract and relax rhythmically. This rhythmic contraction is followed by its relaxation constitute a **heartbeat**. The doctor feels your heartbeats with the help of an instrument called a **stethoscope**. 2. Transfer of blood from a healthy person (called donor) to another person (called recipient) is called **blood transfusion**. Before transfusion, the blood of both, the donor and the recipients, are matched. If the blood of both, the donor and the recipient, is found matching, then it can be transfused into the body of the recipient. 3. The waste which is present in the blood has to be removed from the body. How can this be done? A mechanism to filter the blood is required. This is done by the blood capillaries in the **kidneys**. The pair of kidneys are situated in abdomen and about 10 cm long and weighs about 150 gm each.

.When the blood reaches the two kidneys, it contains both useful and harmful substances. Each kidney is made up of thousand small units called **nephrons**. These funnel like structures are the actual filters that separate waste product from the body. The useful substances are absorbed back into the blood. The waste substances get dissolved in water which is then removed as **urine**. From the kidneys the urine goes into the urinary **bladder** through tube-like **ureter**. It is stored in the bladder and is passed out through the urinary opening at the end of a muscular tube called **urethra**. The kidneys, ureters, bladder and urethra form the excretory system.

CHAPTER 12 : REPRODUCTION IN PLANTS

A. 1. (d) 2. (d) 3. (a) 4. (c) 5. (c) **B.** 1. animals 2. vegetative production 3. fertilization 4. unisexual 5. Asexual **C.** 1. (iv) 2. (v) 3. (vi) 4. (i) 5. (ii) 6. (iii) **D.** 1. It is a type of reproduction which is observed in yeast. In this reproduction, a small bulb like structure called **bud** develops. These outgrowths developed on the sides of organisms and after growing to certain size, it detaches itself from the parent organism and thus a new child is born. 2. **Self pollination :** In this, the pollen grains from the anther of a flower are transferred to the stigma of the same flower (or another flower on the same plant). **Cross pollination :** In this, the pollen grains from the anther of a flower of one plant are transferred to the stigma of a flower of another plant of the same kind. 3. (a) **Budding :** It is a type of reproduction which is observed in yeast. In this reproduction, a small bulb like structure called **bud** develops. These outgrowths developed on the sides of organisms and after growing to certain size, it detaches itself from the parent organism and thus a new child is born. (b) **Fragmentation :** We often see green patches floating on the surface of stagnant water bodies like ponds,

lakes, etc. They are due to the growth of green algae called **spirogyra**. Spirogyra reproduces by the asexual method of **fragmentation**. Difference between Asexual reproduction and Sexual reproduction : Asexual reproduction : 1. Only one parent is involved. 2. No gametes are involved 3. Plants are obtained without the production of seeds. 4. New born plants are exactly identical to the parent. 5. No reproductive organs are formed. (c) **Sexual reproduction :** 1. Both parents male and female are involved. 2. Gametes are involved. 3. Plants are obtained from exisiting parents through seeds. 4. New born plants are exactly not identical to the parents. 5. Reproductive organs are formed. **Asexual reproduction :** 1. Only one parent is involved. 2. No gamates are involved. 3. Plants are obtained without the production of seeds. 4. New born plants are exactly identical to the parent. 5. No reproductive organs are formed. 4. Reproduction which involves two individual sexes is called a sexual reproduction. In flowering plants, the flowers are the reproductive parts of the plant. The reproductive organs of a flower are : Stamen and Pistil. **E.** 1. Reproduction which involves two individual sexes is called a sexual reproduction. In flowering plants, the flowers are the reproductive parts of the plant. The reproductive organs of a flower are : Stamen and Pistil.



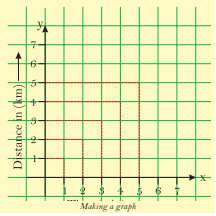
2. The scattering of seeds over a large area away from the mother plant by the agents of dispersal is called dispersal of seeds. If all the seeds produced by a plant fall directly underneath the plant, germinate and grow there, then a large number of new plants would grow up close together in a small area of soil. They will complete with one another for water and minerals (form the soil) and sunlight. Due to insufficient availability of water, minerals and sunlight, the new growing plants will not grow into healthy plants and some plants may also die. In order to prevent overcrowding at the same place, seeds and fruits need to be dispersed. 3. After fertilization, several changes occur in the flower, leading to the formation of seeds and fruits. These are : 1. The ovary of the flower swells and develops to form the fruit. Thus, fruit is a mature ovary of a flower. 2.
The ovule present in ovary grows to become a seed. The seed contains embryo (baby plant) and one or two cotyledons which store food. There is a tough protective coating around the seed which is called 'seed coat'. 3. The other parts of the flower like stamens, style and stigma, dry and fall off. So, at the place on the plant where we had a flower originally, we now have a fruit. A fruit protects the seeds. Some fruits are soft, fleshy, sweet and juicy like apples, mangoes and oranges. But some fruits are hard and woody such as almonds and walnuts.

CHAPTER 13 : TIME, MOTION AND SPEED

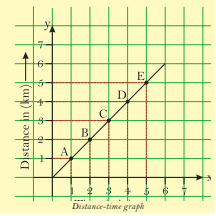
A. 1. (c) 2. (c) 3. (a) 4. (a) 5. (b) **B.** 1. clock or watch 2. average speed 3. straight 4. day 5. electronic **C.** 1. F 2. T 3. F 4. T 5. F **D**. 1. **Sundial :** A sundial is based on property that position and length of shadow casted by any object changes with time. Thus, a sundial measures time by the position of the shadow of an object casted by the sun at different times of a day. **2. Sand clock :** It consists of two identical glass bulbs connected with a small hole at the connection point. The sand is poured in one bulb and made to flow to another bulb. Sand flows through

it in a definite interval of time. 2. **Speed of a moving object is the distance travelled by it in unit time.** Mathematically, if we have a distance "d" to cover and we cover it in "t" time interval, then speed will be determined by :

$$\text{Speed} = \frac{\text{distance travelled}}{\text{time taken}} = \frac{d}{t}$$ Suppose, a bike travels a distance of 200 km in 10 hours, then its speed will be : Speed = 200km/10 h = 20km/h Thus, the speed of this bike is 20 kilometres per hour. **Units of Speed :** The standard unit (S.I.) of distance is metre (m) and that of time is the second (s) so, the standard unit of speed is metres per second or m/s. 3. If a body covers equal distances in equal intervals of time, it is said to be in **uniform motion** while if the body covers unequal distances in equal intervals of time, it is said to be in **non uniform motion**. 4. Do it yourself. 5. Do it yourself. **E.** 1. Do it yourself 2. • Fig shows the set of points on the graph corresponding to positions of the car at various times. • Join all the points on the graph as shown in fig. It is a straight line. This is the distance-time graph for the motion of the car. • If the distance-time graph is a straight line, it indicates that the object is moving with a constant speed. However, if the speed of the object keeps changing the graph can be of any shape. 3. The to and fro motion of a simple pendulum is an example of a periodic or an **oscillatory** motion. The pendulum is said to have completed one **oscillation** when its bob, staring from its mean position O, moves to A, to B and back to O. The pendulum also completes one oscillation when its bob moves from one extreme position A to the other extreme position B and comes back to O. The time taken by the pendulum to complete one oscillation is called its **time period**.



Making a graph



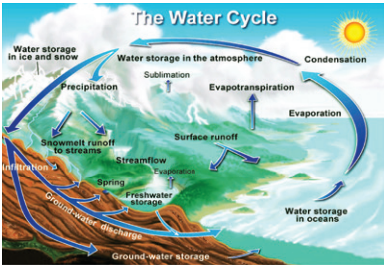
Distance-time graph

CHAPTER 14 : ELECTRIC CURRENT AND ITS EFFECT

A. 1. (b) 2. (c) 3. (c) 4. (d) **B.** 1. circuit 2. fuse 3. closed 4. current 5. electromagnet **C.** 1. F 2. F 3. T 4. T 5. T **D.** 1. The closed path through which the electric current flows is called electric circuit. 2. Whenever the electric current is passed through an equipment for a long time, it gets heated up. Thus, higher the magnitude of electric current, greater will be the heat produced in it. 3. Fuse is a safety device that is used in household circuits to protect the appliances from excessive flow of electric current. A fuse is a small piece of wire of an alloy of adequately low melting point (usually 63% tin and 37 % lead). 4. The magnetism disappears as soon as the current around coil is switched off. This temporary magent is called **Electromagnet**. **E.** 1. When current is passed through a wire, the magnetic compass needle kept close by it shows a deflection. Thus, when electric current is passed through a wire, the current carrying wire behaves like a magnet by producing a magnetic field around it. This is known as the magnetic effect of electric current. 2. When the button is pressed, the switch button gets to ON position thus making the circuit complete and current starts flowing . As a result, the soft iron rods, with the wire wrapped around them, start behaving as electromagnets. They attract the armature towards themselves. Thus, the armature moves towards the gong and strikes it producing the sound. When the push button is released, the connection between the armature and the contact screw breaks. As a result, there develops a gap in the circuit and current stops flowing. Due to this, the soft iron with the coil around it stops behaving like a magnet and the armature returns to its original position due to spring action. The process repeats when the switch is pressed again. 3. An electromagnet is a coil of insulated wire consisting of large no. of turns wound around a soft iron core. This setup is called **Solenoid**. Thus, when electric current is passed through a solenoid; the iron rod behaves as a magnet. 4. Do it yourself.

CHAPTER 15 : WATER : A PRECIOUS RESOURCE

A. 1. (a) 2. (b) 3. (b) 4. (b) 5. (a) **B.** 1. glacier 2. water cycle 3. rain harvesting 4. ice (soild), water (liquid), water vapour (gas) 5. ground water 6. water level **C.** 1. F 2. T 3. F 4. F 5. F **D.** 1. If you look at the picture of the earth taken from space, it appears blue. About 71% of the earth's surface is covered with water. Water is abundantly present on earth. Almost all the water on the earth is contained in the seas and oceans, rivers, lakes, ice caps, as groundwater and in the atmosphere. But most of this water is not fit for human consumption as it is salty. The water that is fit for human use is freshwater which less than 1% (about 0.8%). 2. Water is hugely available on the planet in all the three forms namely solids, liquids and vapours. The three states are interchangeable i.e. one state can be changed to other. • Ice(solid) changes to liquid water on heating. • Liquid Water on cooling changes to ice. • Water vapours on condensing changes to liquid. 3. Farming is the major occupation in India. Majority of farmers in India still depend upon rains for irrigating their crops. Irrigation systems such as canals are there only in a few places and they too may suffer from lack of water due to scanty rainfall. Therefore, farmers have to use groundwater for irrigation. This results in depletion of water table. **E.** 1. **Water cycle : You must have studied water cycle many times. Lets revise it one more time** : • Plants consume water to make food and retain some water in their roots and remaining water is released as vapour in the atmosphere. • Water vapour moves to places where temperature is low and condenses to form tiny water droplets. • These droplets form clouds. • The clouds



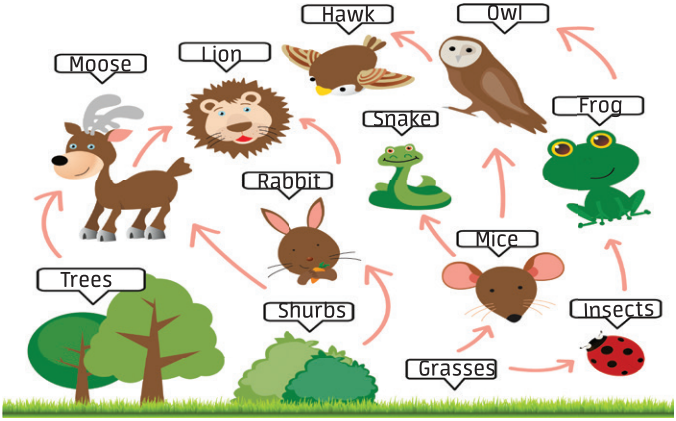
fall back on earth in the form of rain. • This water is collected in oceans, seas, rivers. • This water again forms vapours by the process of transpiration or evaporation.

2. We have learnt that there is a very low amount of usable water left on earth and we are wasting that too. The wastage of water is done at all levels from our personal use to commercial use. Thus, it is important to stop the wastage of water at all levels. All of us, knowingly or unknowingly, waste water while brushing teeth, washing and many other activities. Leaking taps is another source of huge water wastage.

CHAPTER 16 : FOREST : THE GREEN GOLD

A. 1. (b) 2. (c) 3. (d) **B.** 1. Perennials 2. soil 3. plants 4. plants **C.** 1. F 2. T 3. T 4. T **D.** 1. Deforestation is clearing of land by destroying the forest. The forests are being destroyed to obtain land for agriculture, industries, housing, roads, etc. There are about 15-20 million hectares of tropical forests that are destroyed every year. Trees are also cut for timber and fuel. The destruction of trees affects the ecosystem on a large level. 2. Animals produce carbon dioxide during respiration which plants consume to produce food with the help of photosynthesis. Animals like butterfly, honeybee, etc., pollinate flowers in the forest. Decomposers convert the animal excreta and their dead bodies into humus. The humus acts as manure and provides minerals for growth of plants. 3. Food chain describes the relationship between producers and consumers. Producers are the green plants while the animals are the consumers. For example, grass is eaten by a grasshopper (insect), which in turn, is eaten by a frog (carnivore). The frog is eaten by snake (large carnivore). The snake is eaten by an eagle (top carnivore). This process is called food chain. 4. Chipko Movement was started in 1974 by Sunder Lal Bahuguna to reduce tree felling. This movement was initially started in Garhwal region. The villagers came forward and

hugged the trees to prevent the contractors from cutting them.
E. 1. In nature, we can see number of food chains. **Several food chains of a region interconnect to form a food web**.



2. A forest is a large land area densely covered with various types of trees, grasses, bushes, etc. Forest provide home for different plants, trees, animals, birds, reptiles, insects, etc. The trees grow on their own which is called natural vegetation. Some animals live on the floor, others on branches of trees. Some walk on the ground, some burrow and others fly. The factors that affect the type of forest growing in a region are temperature, rainfall, and soil.

CHAPTER 17 : WASTE WATER STORY

A. 1. (c) 2. (a) 3. (b) 4. (b) **B.** 1. domestic waste, garbage, 2. waste 3. Household wastewater 4. waste **C.** 1. (iii) 2. (iv) 3. (v) 4. (i) 5. (ii) **D.** 1. We know water is a basic necessity of life. It is not only essential for the existence of the human beings but also plants and animals. All life would perish without water. The usefulness of water for us can be determined by knowing that even our body is composed of about 75% water. Water allows blood to

flow through the blood vessels and also allows the elimination of waste water. All bio-chemical reactions in our body require water as a medium. 2. Household wastewater carried by body waste, dirt, soap and detergents from toilet, washing machines, and showers, food, and grease from sinks. 3. **Disinfection :** In this process, chemicals like chlorine and ozone are used to kill harmful microorganisms in the water. 4. Do it yourself 5. Do it yourself **E.** 1. Sewage is the accumulated wastewater which includes domestic or industrial liquid waste. It goes through a system of pipes, called sewers, which are linked to each other a form a network called **sewage system**. They help in collecting, treating, and disposing of sewage. Sewage from individual buildings flows into collecting sewers carrying the waste to a central plant for treatment and disposal. Stream of sewage called **influent** reaches the treatment plant. Sewers that only carry domestic sewage are called **sanitary sewers**. In many systems, both domestic sewage and runoff water are carried in combined sewers. 2. Constructing a sewage system is an expensive process as it involves the laying down of several sewers, aeration and sedimentation tanks, and their maintenance. There is another economical alternative for sewage disposal known **as onsite sewage disposal system**. In this, wastewater systems are designed to treat and dispose off effluents on the same property that produces the wastewater. It is a cost effective, practical, and sometimes beneficial way of dealing with sewage.

3. Water is an essential commodity which is needed in every walk of life. Whether accept it or reject, generation of wastewater is an inevitable part of human life. People need to realized their responsibility in the effective management of wastewater. How would you feel if you have to walk through the dirty drain water? Often people are seen fighting in such situation but aren't we ourselves responsible for this situation

? Had we been more careful while throwing garbage down the drain then our drains would not have got choked? So, if we want to stay healthy, it is our utmost responsibility to reduce the generation of sewage and make sure that the sewage does not make our surroundings dirty. Treatment of sewage depends a lot on the quantity and quality of the contaminants present in the sewage. With the rapidly increasing population, urbanization, and industrialization, the sewage is becoming more and more contaminated. The government should make sure that there are sewage facilities. These are the three ways in which the waste can be managed properly. Reduce, recycle, and reuse are known as the three Rs of the waste-reduction movement.

Teacher's Help Book
Science (Class-8)

CHAPTER 1 : CROP PRODUCTION AND MANGEMENT

A. 1. (c) 2. (b) 3. (d) 4. (b) **B.** 1. weeds 2. chemical 3. seed drill 4. irrigation 5. quality **C.** 1. animal husbandry 2. metachlor 3. Paddy 4. Silos 5. Wheat **D.** 1. Kharif crop and Rabi crop 2. The supply of water at regular intervals in the fields to maintain the level of water in the soil required for the proper growth of crops is called Irrigation. 3. Honey is source of sugars and minerals .Rearing of honey bees on a commercial level is called Apiculture. 4. When same plants are grown over a large area, it is called a crop. **E.** 1. The sequential steps followed are : 1. Preparation of soil 2. Sowing and selection of seeds. 3. Manuring. 4. Irrigation 5. Protection from weeds. 6. Harvesting, threshing and winnowing 7. Storage 2. After harvesting the grains are properly dried, proper storage arrangements are made. 1. On a smaller scale, the grains are stored in jute bags or metallic bins. 2. On a larger scale, grains are stored in granaries. Granaries store the food grains in gunny bags or in soil The gunny bags are stacked one on top of the other in a godown in such a way to protect them from absorbing moisture from the walls and the ground. 3. Various traditional and modern methods have been used for irrigation. Traditional Methods– These methods used by human labour or cattle's for lifting water to the fields. The water from the canals, wells or lakes is brought to the fields for the purpose of irrigation. Some of these methods are: 1. moat 2. dhekli 3. rahat 4. chain–pump. Modern methods– Modern methods of irrigation include sprinkler system or drip system. These methods are although expensive than the traditional ones but help in using water more efficiently and economically.

Sprinkler System : This type of system is very useful in sandy areas or uneven land. The water is sprinkled on the crops evenly as if it is raining. The main pipeline is attached to many

perpendicular pipes with rotating nozzles placed at regular intervals. These nozzles are called sprinklers. When pumps lift water under pressure and is sent to main pipe, it reaches the perpendicular pipes and escapes through sprinklers. This way the water is sprinkled in the field evenly. Drip System : The places where the availability of water is poor, drip system of irrigation is very effective. In this system, water is made to fall drop by drop at the position of the roots. In this way, the water is not wasted at all. This technique is used for watering fruit plants, garden and trees. 4. Differences between Manures and Fertilizers.

Manures	Fertilizers
1. These are organic substances which are obtained naturally.	1. These are chemical substances made in factories.
2. These are rich in humus.	2. These are not rich in humus.
3. These are not rich in inorganic contents.	3. These are rich in inorganic contents.
4. Manures have no side effects.	4. Fertilizers are non-biodegradable, hence cause water pollution.
5. Manures are cost-effective.	5. Fertilizers are costly.
6. These need a bigger area for preparation and storage.	6. Fertilizers are easily to store and handle.
7. Manures are insoluble in water so not are readily absorbed in the soil.	7. Fertilizers are soluble in water so are readily absorbed in the soil.

CHAPTER 2 : MICRO ORGANISMS

A. 1. (c) 2. (c) 3. (d) 4. (d) 5. (c) **B.** 1. organisms 2. pasturisation 3. purifying 4. microbiologists 5. lactobacillus **C.** 1. F 2. T 3. F 4. F 5. T **D.** 1. (c) 2. (d) 3. (a) 4. (e) 5. (b) **E.** 1. The living organisms which

cannot be seen with a naked eye but can only be observed under a microscope are called micro organisms. 2. Human body has the ability to fight against diseases by producing antibodies against it. When a foreign particle called the antigens invades our body, it starts working against them by producing antibodies. This tendency of the human body to produce antibodies to fight against disease causing micro organisms is called immunity. 3. If the methods of food preservation are not adapted, then lots of food would get spoilt and hence be wasted. It increases the shelf life of the food products so that they can be used for a longer time. Preservation also helps in retaining the nutritive quality of the food. **F.** 1. • You must have seen your mother making curd and cheese at home. The curd and cheese are made by the action of a bacteria called Lactobacillus in them. When this bacteria is added to milk, it starts multiplying and the milk is converted into acidic curd. The lactose of the milk is converted into lactic acid which gives the acidic flavour to the curd. This bacteria is also used during cheese and paneer making. The curdling of the milk during the cheese making is also due to the action of the Lactobacilli. • Yeast is used in making bhaturas, breads, cakes, pastries etc. The yeast acts upon the sugar present in the flour breaking it into alcohol and releasing carbon dioxide. The dough finally rises and becomes fluffy. • Other medicines like the vitamin capsules or the insulin doses which the diabetic patients are given are also extracted from micro organisms. • As we have read in the earlier chapter, some of the bacteria such as Rhizobium help in fixing the atmospheric nitrogen in the soil. These are found in the root nodules of some leguminous plants such as peas. In this way, they help in improving the soil quality. Some blue green algae also help in nitrogen fixation and are called natural biological fixers. • Have you ever thought what happens to the dead organic matter? It is decomposed by the micro organisms into simpler forms and restored to the soil. This means that the world would be covered with layers of dead organisms if no micro organisms existed. Thus, in this way the micro organisms

help in cleaning up the environment. 2. The germs present in the water may spread diseases like Cholera, Typhoid etc.. The food that we eat may promote growth of micro organisms if kept under unfavourable condition. Raw fruits and vegetables also may have many germs which may cause diseases like Dysentery, Hepatitis, Cholera etc. c. Through Insect and Animals : Some insects and animals like houseflies, cockroaches, and mosquitoes which act as carriers of micro organisms are called vectors. Houseflies carry micro organisms on its legs and its mouth parts. They collect these germs from the garbage they sit upon and contaminate our food which is left uncovered. If this food is consumed, we may fall ill. Similarly, the cockroaches breed in the gutters or dirty water. They carry disease causing germs which are left behind on the food when they sit on it. cholera, dysentery, thphoid are some of the diseases which are caused by micro organisms through contaminated food and water. 3. Nitrogen is an important gas which constitutes nearly 78% of our atmosphere. It is a basic constituent of all animal and plant proteins. Thus, it is required by all living organisms. The cycle in nature which maintains the level of nitrogen in atmosphere is called the nitrogen cycle. The Nitrogen present in the atmosphere cannot be used by living organisms as such. It has to be converted into nitrate compounds for absorption and assimilation. We have read in the earlier chapter how some bacteria live in the root nodules of leguminous plants and fix the atmospheric nitrogen. Many other bacteria also convert the atmospheric nitrogen into nitrate compounds. These compounds are absorbed by the roots of the plants from the soil and are used in the formation of plant proteins. These plants are eaten up by animals or used up by the humans as food, in this way, the nitrogen reaches animal and human bodies and used to synthesise animal proteins. 4. The various methods used for the preservation of food are discussed below :**1.By Heating :** High temperatures kill the micro organisms present in the food. The most common example of this method is the preservation of milk. The milk in our houses are boiled to kill

all microbes in them. On commercial basis, the milk is heated at high temperatures for about 30 seconds and then chilled immediately before packaging. This process of preservation was invented by Louis Pasteur and is so called Pasteurisation. A new method of preservation of milk is called the UHT or the ultra Heat treatment. The milk is sterilised at a temperature of 135 degrees, cooled and then packed in the tetra packs. **2. By Cooling :** Some foods are kept at very low temperatures to prevent them from spoiling. The low temperatures do not allow the microbes to grow. Thus, food kept in the refrigerator stays fresh longer than kept outside. Commercially also, most of the fruits, vegetables and meat products are kept at chilling temperatures. This increases their shelf life to several months. **3. By Drying :** Minimising the moisture level in the food products also prevents them from spoilage. As we have read in the earlier chapter, the grains are sun dried before storage. Dried fruits and spices are also examples of preservation by this method. **4. By use of Chemicals :** Many chemicals like sodium benzoate are added to the food to prevent them from spoilage. **5. By adding Sugar :** Sugar decreases the moisture content of the food product. Jams, jellies and squashes are products which are preserved by this method. **6. By adding Salt :** Salt is used as a preservative in many food products. Meat, fish, chips are coated with layer of salt which prevents them from spoilage. **7. By the use of oil and Vinegar :** Oil and vinegar both inhibit the growth of microbes. Therefore, no bacteria can survive if these are used in foods to preserve them. Many vegetables ,meat are stored in vinegar to increase their shelf life. **8. By Canning :** In this method, the food products are canned in air tight containers after sterilization. The food inside these containers remains fresh since it has no air and hence no micro organisms. However the food may get spoilt once the can is open.

CHAPTER 3 : SYNTHETIC FIBRES AND PLASTICS

A. 1. (b) 2. (c) 3. (b) 4. (d) **B.** 1. plants 2. plastics 3. artificial silk 4. nylon 5. plastic **C.** 1. T 2. T 3. F 4. F 5. T **D.** 1. cotton 2. rayon 3.

rayon 4. rayon 5. themo setting plastics **E.** 1. The fibres which are obtained from the natural sources are called the Natural Fibres. Natural fibres like cotton and linen are very comfortable to wear in summers while wool has the quality to retain the body heat and thus keeps us warm. 2. 1. Thermoplastics : Some plastics melt on heating and can be moulded into different shapes which they retain after cooling. The plastic substance which can be melted repeatedly by heating and can be moulded into different shapes is called a thermoplastic substance. The examples of such type of plastics are polythene and PVC (polyvinyl chloride). 2. Thermosetting plastics : These type of plastics do not melt on heating. These plastics thus cannot be remoulded into other things. Examples of such type of plastics are Bakelite and melamine. Both of these are poor conductor of electricity and are used in making electrical switches, kitchen ware, floor tiles and many other things. 3. • Clothes such as suits, sarees, ties, socks and other garments are made of nylon. • It is used in the sport industry for making racquets etc. • Because of its great tensile strength, it is used in making parachutes, climbing ropes, fishing nets and many other products. • It is used to make musical instruments as well. • Nylon is mixed with wool to make socks and carpets. • It is used to make many articles of daily use like toothbrushes, ropes, curtains, seat belts etc. 4. The natural wool from which warm clothes are made is quite expensive. A synthetic fibre which resembles the wool in its properties is called acrylic. It is warm and light like wool and can be woven to make warm clothes. The shawls, sweaters available in the market in a large variety are all made of acrylic. These are shrink resistant and are easily affordable. Since it is readily available, the acrylic fibre is more popular than the natural fibre.

E. 1.

S. No.	Synthetic fibres	Natural Fibres
1.	The synthetic fibres are very strong.	The natural fibres are not very strong.

2.	They do not absorb too much water and thus dry up quickly.	They absorb a lot of water and thus take a lot of time in drying.
3.	The synthetic fibres are wrinkle resistant.	These fibres are not wrinkle resistant.
4.	These fibres do not shrink.	These fibres shrink when dipped in water.
5.	Synthetic fibres are wear resistant and hence are more durable.	These are not too durable.

2. • **Lighter than metals :** Plastics are lighter than metals and hence more convenient. Thermocol is the most common example known for its lightness. It is used for making disposable crockery and as a packing material. • **Poor conductors of heat and electricity :** Plastics are poor conductors of heat and electricity. Hence they are used in making electrical switches, handles of utensils etc. • **Strong and durable :** The articles made of plastic have great strength and durability. • **They are non reactive :** Plastics unlike metals are non reactive and therefore corrosion resistant.

Uses of Plastics : Plastics are used almost everywhere around us. They are used in making things of our daily use like mugs, buckets, kitchenware, polythene bags etc. They are also used in the manufacture of pipes, flooring tiles, electrical wires, switches. They are used in all the industries such as for making the parts of mobile phones, television, refrigerator or computer. Plastics are used in the packing of surgical goods like injections, bandages and other items. A type of plastic called the Teflon is used for making non- stick cookware. So, we see that there are countless materials that are made of plastic. We cannot imagine our world without these plastic products. Therefore, the present times have been rightly called the Plastic Age. Disadvantages of Using Plastics : • Plastics are highly inflammable. They catch fire very easily as compared to the natural fibres. Plastics also

melt on heating and stick to the body thus causing serious burns. • Since plastics do not absorb water easily, they are quite uncomfortable to wear is summers. • Plastics do not allow air to pass through them. As a result, it can cause many types of skin problems like rashes etc. • Plastics are non-biodegradable. The substances which are not decomposed by the micro organisms are called the non-biodegradable material. The plastics pile up in the soil and cause soil pollution. If these plastic bags are consumed by the cattle, it may be hazardous to them. This garbage also blocks the drains and the sewage and chokes the drainage system. The poisonous dyes used in the polythene bags may contaminate our food as well. The plastics on burning give out poisonous fumes which cause air pollution. Thus, plastics have now become a matter of serious concern to the environmentalists.

CHAPTER 4 : METALS AND NON-METALS

A. 1. (d) 2. (c) 3. (c) 4. (d) **B.** 1. elements 2. combined 3. non-metal 4. oxides 5. Hydrogen **C.** 1. F 2. T 3. T 4. F 5. T **D.** 1. **Physical state :** Metals and non-metals differ in their physical state. Most metals are solids at room temperature. The examples of metals which are liquid at room temperature are mercury and gallium. **Hardness :** Most of the metals are hard and strong. For example iron, aluminium, gold all are hard metals **Lustre :** All metals have a shiny surface. This is called their metallic lustre. Due to this quality, the metals like gold and silver are used in making jewellery and copper is used in making various pieces of art. **Malleability :** You must have seen the Aluminium foil which your mother uses to pack your lunch at school. Thin sheets of silver are also used widely in the decoration of sweets at the sweet shop. **Ductility :** The metals can be drawn into wires as well. The property of the metals to be drawn into thin wires is called ductility and the metals are called ductile. **Conductivity :** Metals are good conductors of heat and electricity. Non-metals on the other hand are poor conductors of heat and electricity. 2. The

non-metals are available in the nature in the free state or in combined forms. Hydrogen, nitrogen, sulphur, carbon, oxygen are a few examples of non-metals. 3. we see that metals can be hammered and thin sheets can be made out of them. This property of metals to be hammered into thin sheets is called malleability and the metals are said to be malleable. **Ductility :** The metals can be drawn into wires as well. The property of the metals to be drawn into thin wires is called ductility and the metals are called ductile. The wires made of different metals are used for different purposes. 4. Because sodium is highly reactive metal and react vigorously with water. That is why it is stored in the kerosene oil. 5. All the metals except sodium and potassium have high melting and boiling points. Non-metals on the other hand have low melting and boiling points. However, graphite is an exception with very high melting and boiling points. **E.** 1. To show that metals react with oxygen to form basic oxides.

Things needed : A piece of magnesium ribbon, burner, tongs, water, test tube and a red litmus paper. **Method :** Hold the magnesium ribbon over the flame of a burner with the help of tongs. The magnesium burns with the bright flame. Collect the white ash of the magnesium oxide in a test tube and dissolve it in little water. Test this solution with a red litmus paper.

2. Differences between metals and non-metals :

S. No.	Synthetic fibres	Natural Fibres
1.	Metals exist in solid and liquid state.	Non-metals exist in solid, liquid or gaseous state.
2.	Metals are mostly hard and strong.	Non-metals mostly are not hard and strong.
3.	All metals have a shiny surface.	Non-metals do not have a shiny appearance.
4.	Metals are malleable.	Non-metals are not malleable.
5.	Metals are ductile.	Non-metals are not ductile.

6.	Metals are good conductors of heat and electricity.	Non-metals are poor conductors of heat and electricity.

3. Do it yourself. 4. To show that a more reactive metal displaces a less reactive metal. **Things needed :** A test tube with some copper sulphate solution marked A, another test tube marked B with some iron sulphate solution, an iron nail, a piece of copper wire. **Method :** Take a test tube A filled with some copper sulphate solution in it. Now place an iron nail in this solution. Now, to the test tube marked B which is filled with some iron sulphate solution, add a piece of copper wire. What do you see? **Observation :** We see a thin layer of copper on the iron nail in the test tube A. There is no reaction in the test tube B. **Result :** Since the iron is more reactive than copper, it displaces copper and forms iron sulphate. The layer formed on the iron nail is that of copper. Now in test tube B, since copper is placed below iron in the reactivity series, no reaction takes place.

$$Fe + CuSO4 \longrightarrow FeSO4 + Cu$$

Result : This shows that the more reactive metals displace the less reactive ones.

CHAPTER 5 : COMBUSTION AND FLAME

A. 1. (c) 2. (a) 3. (a) 4. (a) 5. (a) **B.** 1. combustion 2. CO_2 3. carbon-dioxide 4. ignition, temperature 5. partial **C.** 1. F 2. F 3. T 4. F 5. T **D.** 1. combustion can be defined as a process in which a substance burns in the presence of oxygen to give out heat and light. 2. The lowest temperature at which a substance catches fire and starts burning is called its ignition temperature 3. 1. presence of combustible sustance 2. oxygan is necessary for combustion. 4. The efficiency of the fuel depends on the amount of the heat produced. The amount of heat energy produced by the complete combustion of one kilogram of fuel is called its calorific value. The unit for the calorific value is kilo joule/kg.

E. 1. To show that oxygen is necessary for combustion. **Things needed :** A candle, matchstick and a glass jar. **Method :** Light a candle with the help of a matchstick. Place this candle on the table. Now, cover the lighted candle with a inverted glass jar. What do you see? **Observation :** We find that when the glass jar is inverted over the lighted candle, the candle goes off after some time. **Result :** This shows that the burning of candle takes place in the presence of oxygen but when the inverted glass jar is placed on top of the lighted candle, the candle goes off finally after a short while because all the oxygen needed for combustion is present in the glass jar is used up by the burning candle.This shows that oxygen is needed for combustion. 2. The combustion may be of three types : **1. Slow combustion :** The reaction in which burning takes place at a very slow rate is called the slow combustion. Take a piece of coal and ignite it. What do you see? The coal burns at a very slow rate and gives out very little heat and light. Similarly, the process of respiration is an example of slow combustion. In this process also, the food we eat burns in the presence of oxygen to release energy. In this case also the energy is released at a slow rate giving out no light.

2. Rapid combustion : Take a match stick or some kerosene oil. Ignite it with a flame. What do you observe? We see that all these substances burn quickly and produce heat and light. Thus, we can say that when a combustible substance burns quickly, producing a large amount of heat and light is called a rapid combustion. Other examples of rapid combustion are burning of the cooking gas, candle or fire crackers. **3. Spontaneous combustion :** In some cases as that of forest fires, the atmospheric temperature reaches to the extent that it exceeds the ignition temperature of the dry forest grass. In such cases, the grass catches the fire and this fire spreads to cause forest fires. Similarly, white phosphorous catches fire

by itself when the temperature outside exceeds its ignition temperature i.e. 35 degrees. 3. All the fire extinguishers used for domestic or industrial purpose are filled with liquid carbon dioxide compressed at high pressure. When this CO_2 is released, it changes into its gaseous state and forms a covers the substance as a blanket. It also lowers down the temperature and thus helps in extinguishing fire. 4. The efficiency of the fuel depends on the amount of the heat produced. The amount of heat energy produced by the complete combustion of one kilogram of fuel is called its calorific value. The unit for the calorific value is kilo joule/kg. **F.** 1. Do it yourself. 2. **Types of Combustion :** The combustion may be of three types : **1. Slow combustion** The reaction in which burning takes place at a very slow rate is called the slow combustion. Take a piece of coal and ignite it. What do you see? The coal burns at a very slow rate and gives out very little heat and light. Similarly, the process of respiration is an example of slow combustion. In this process also, the food we eat burns in the presence of oxygen to release energy. In this case also the energy is released at a slow rate giving out no light. **2. Rapid Combustion :** Take a match stick or some kerosene oil. Ignite it with a flame. What do you observe? We see that all these substances burn quickly and produce heat and light. **3. Spontaneous combustion :** In some cases as that of forest fires, the atmospheric temperature reaches to the extent that it exceeds the ignition temperature of the dry forest grass. In such cases, the grass catches the fire and this fire spreads to cause forest fires. 3. All the fire extinguishers used for domestic or industrial purpose are filled with liquid carbon dioxide compressed at high pressure. When this CO_2 is released, it changes into its gaseous state and forms a covers the substance as a blanket. It also lowers down the temperature and thus helps in extinguishing fire. 4. **The Candle Flame :** You must have seen a candle flame. Have you ever

observed its parts closely? When you see it, you will notice that it can be differentiated into various zones. The outermost part of the candle flame is the area of complete combustion. That's why this part of the flame is the hottest. The middle part of the candle flame is the area of partial combustion. Thus, this part of the candle is moderately hot. A flame can be thus divided into three parts. **1. The innermost part. :** This is the area of no combustion. Since no air reaches this area, no combustion takes place and hence this part appears black due to the presence of unburnt wax vapours. **2. The middle non- luminous part.** It is the area in the middle where partial combustion takes place. 3. **The Outermost Luminous Part** 5. • The unburnt carbon particles which are residue left after the combustion of fuels like wood, coal and petroleum are the main pollutants which pollute the air and cause various diseases like asthma etc. • The global warming is also a result of excessive combustion of fuel since it has raised the atmospheric level of carbon dioxide. Due to this, the temperature of the earth's atmosphere has increased. This may result in melting of the polar glaciers and thus be the main reason of devastation by floods. • The incomplete combustion of the fuels results in the formation of carbon monoxide which is a very poisonous gas. • Many poisonous gases like sulphur dioxide released during the combustion of diesel and coal are highly corrosive and suffocating. Similarly gases released after the combustion of petrol are the main cause of acid rain. These acid rains are not only harmful to the crops but also corrode the buildings, bridges etc.

CHAPTER 6 : CONSERVATION OF PLANTS AND ANIMALS

A. 1. (d) 2. (c) 3. (a) 4. (d) **B.** 1. Bharatpur bird sanctuary 2. reforestation 3. ecosystem 4. recycling 5. hunting **C.** 1. (d) 2. (a) 3. (e) 4. (b) 5. (c) **D.** 1. T 2. F 3.T 4. T 5.F **E.** 1. The wide range of living organisms which are found in a particular area and their inter relationship with themselves and the environment

is called the biodiversity of that area. 2. The endemic species are those species of plants and animals which are found exclusively in that particular area or region and are not found naturally in any other area. 3. Project Tiger was launched by the government to ensure the survival and maintenance of tiger in our country. 4. All these living organisms, plants or animals which are called flora and fauna respectively live and grow in the environment around them. **F.** 1. The cutting down of forests for many different purposes is known as deforestation. The main reasons for the deforestation are : • Using the land for agriculture to produce more and more food for the growing population. • Using the land for construction of buildings and factories. • To get wood which is further used as a fuel or making furniture. • Overgrazing by the animals like cattle, sheep etc. • Due to some natural causes like drought, floods, tsunamis or attack of insects and pests. 2. Some of the areas are restricted for the conservation of wildlife. These areas provide a natural habitat to the flora and fauna of that area. It also preserves the landscapes and the historic objects of the particular area. The names of some national parks in India are : • Jim Corbett National Park (Uttarakhand) for Tigers. • Kaziranga National Park (Assam) for one-horned Rhinoceros. • Gir National Park (Gujarat) for Asiatic Lions. • Kanha National Park (Madhya Pradesh) for Tigers. 3. The Red Data Book is a book which maintains the records of the endangered species of plants and animals. This helps to bring into notice the species which are on the verge of becoming extinct and the need to conserve them. This book is maintained by the IUCN (International Union for Conservation of Nature and Natural Resources). 4. Reforestation means planting of new trees to restore the loss done through deforestation. New plants and trees, generally of the same species common to that particular area are planted. The number of planted trees should be same or more than the number of trees cut. Reforestation can also be done if the deforested land is left undisturbed for some time. The trees and plants may grow naturally there by

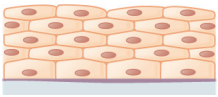
the process called natural reforestation. Our government has started various programmes which aim at the awareness of the people to grow more trees and conserve our heritage. 5. • Forests are the home to many animals. All these animals live in the natural environment of the forest. If all these forests are cut, many of the species of these animals would become extinct. • We also depend on the forests for many things. There would be a shortage of many such products if the trees are cut at such a rate. • Deforestation also results in the increase in temperature of our planet earth. Since, the content of carbon dioxide would increase due to deforestation, the temperature on the earth would rise. This would result in global warming. • Carbon dioxide is a major pollutant. The increase in its level in the atmosphere would cause various respiratory diseases like asthma. etc. • The level of ground water decreases since the water absorption capacity of the soil is lowered. • The amount of rainfall and soil fertility would also decrease as a result of deforestation. • Deforestation would result in the increased possibility of floods and droughts. • The reduction in the number of trees would lead to desertification. As we all know, the roots of the trees hold the soil firmly. If there would be no trees, the fertile topmost layer of the soil would get eroded and would expose the hard, rocky layer beneath it. Over a period of time, the fertile lands would be converted into infertile deserts. • Since the water holding capacity of the soil is decreased, the soil does not absorb the water and thus results in floods. Deforestation also decreases the quality of soil and the nutrient content in it.

CHAPTER 7 : CELL STRUCTURE AND FUNCTIONS

A. 1. (d) 2. (d) 3. (a) 4. (c) **B.** 1. cell 2. carried 3. elongated 4. strength and support 5. The neucleus. **C.** 1. T 2.F 3.F 4. F 5. T **D.** 1. Robert hooke 2. Amoeba 3. Mitochondria 4. Plastia 5. Centrosomes **E.** 1. cells 2. The main purpose of the cell wall is to

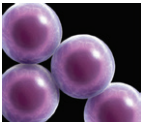
provide strength and support to the plant cells. 3. The cells of the bacteria and the blue-green algae do not have a well organised nucleus. They do not have a separate nuclear membrane which distinguishes it from the cytoplasm. Such cells are called the Prokaryotic Cells. The cells which have a well organised nucleus with the definite nuclear membrane are called the Eukaryotic Cells. All cells except the bacteria and the blue-green algae are Eukaryotes 4. Although the cells show a diversity in size, most of them are microscopic and cannot be seen by the naked eyes. The cells of bacteria are however smallest and measures only 0.0001 * 0.0005 mm. The largest cell is that of the ostrich's egg. Our human body also shows variation in size of the cell. The smallest cell in our body is that of red blood cell and the largest is the nerve cell. Fibre cells in plants like jute are also a few centimetres. The size of the cells does not vary with the size of an organism. Bigger animals like giraffe or smaller animals like frogs may have the cells of the same sizes performing similar functions. **F.** 1.

2.

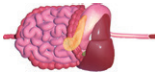


(b) Epithelial tissue (many cells join together to form a tissue)

(c) Stomach (many tissues join together to form an organ

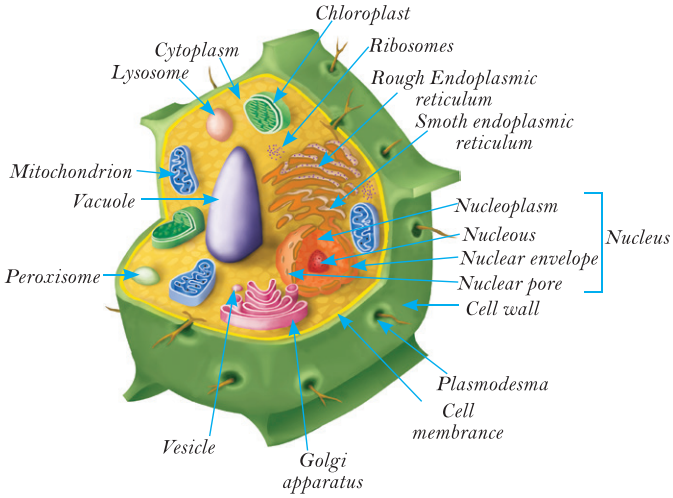


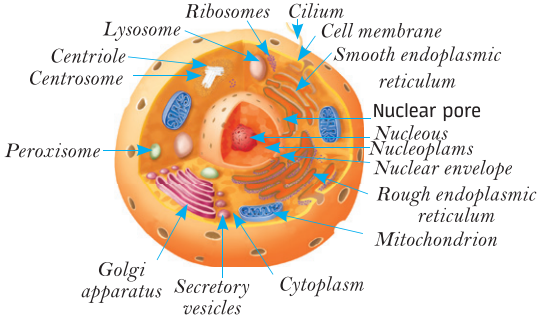
(a) Cell (the fundamental unit of life)



(d) Digestive system (many organs that work together to perform a specific life-function form an organ system)

(e) Organism (the various organ systems make up a living organism)





3. To observe the basic components of the cell.

Things needed : An onion, methylene blue solution, cover slip and a microscope.

Method : Peel an onion and remove one of the layer from inside it. Take this layer and cut it with the help of the blade into yet another very thin slice. This layer is kept in a drop of water on a glass slide. Now, add a drop of methylene blue solution on it and cover it with a coverslip. The coverslip should be so

placed that no air bubbles are present under it. Observe the slide under a microscope.

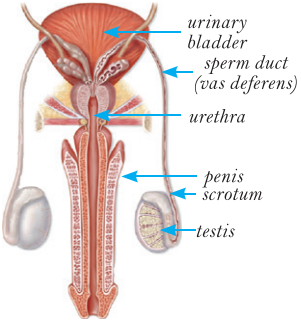
Observation : We see a cell membrane which is further surrounded by a thick cell wall. The jelly like fluid inside the cell membrane is the cytoplasm. We also see a rounded structure in the centre of the cell which is called the nucleus.

Result : All the cells have some common components. They are the cell membrane, cytoplasm, nucleus which are present in all living cells.

CHAPTER 8 : REPRODUCTION IN ANIMALS

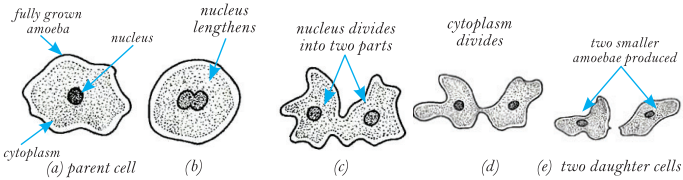
A. 1. (d) 2. (d) 3. (a) 4. (b) **B.** 1 (c) 2. (d) 3. (e) 4. (a) 5. (b) **C.** 1. Reproduction 2. male 3. metamorphosis 4. oviparous animals 5. The ovary **D.** 1. amoeba 2. estrogens and progeserone 3. zygote 4. foetus **E.** 1. Reproduction therefore means production of the new individuals of the same kind from their parents. If the process of reproduction was not there, all species would become extinct from the earth since parents would die of old age and no new offsprings would be produced.

The testes : The testes are oval in shape. They lie outside the abdomen in the muscular sac called the scrotal sacs. The function of the testes are to produce the male gametes called the sperms. It also produces the male hormone called the testosterone. In humans, the sperms are produced from the age of 14-15 till death. The testes produce millions of sperms every time out of which only one of the sperm participates in the process of fertilisation. Each sperm is a single cell with a head, a middle piece and a tail. The tail helps in the movement of the sperm from the male to the female body.

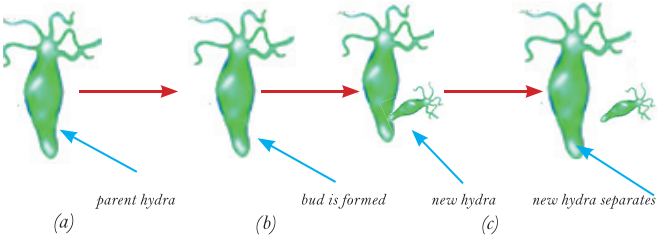


Male reproductive organs in humans

3. In those cases where the birth is given to young ones, the development of embryo takes place inside the body of the female. Such animals are called viviparous animals. In the animals which lay eggs, the embryo develops outside the female body. Such animals are called the oviparous animals. 4. The process of fusion of the ovum with the sperm to form a zygote is called the fertilisation. **F.** 1. This is one of the easiest method of asexual reproduction. The word bi- means two and fission means division. So we can say that binary fission means division of the organism into two parts. This type of reproduction is common in unicellular organisms like amoeba. In binary fission in amoeba, the nucleus elongates and divides into two daughter nuclei. After this, the cytoplasm also divides into two parts and each part surrounds the daughter nucleus. This results in the formation of two amoebae from the parent cell. This process is called binary fission.



Budding : This is yet another way of reproducing asexually. The most common example of budding is *hydra*. You can see outgrowths coming out from various points in the hydra called the buds. These buds get separated from the parent and start



Budding in hydra

growing individually. Since the new individual here grows out of a bud, hence this process is called budding.

2. In most of the animals, the young ones which are born or hatch out of the eggs grow into adults of the same appearance as that of the young one. For example, in case of human beings, the infant grows into an adult of the same physical appearance as himself.

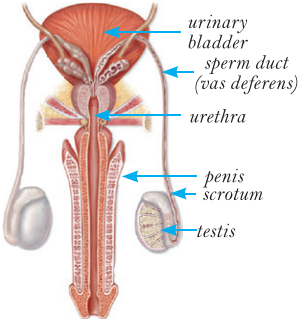
But in case of some animals such as frog or a butterfly, the young one which hatches from the egg is completely different from the adult frog. Do you remember the life cycle of a butterfly which you studied in the previous class?

In case of a butterfly, the life cycle can be divided into three different stages i.e. egg → larva or caterpillar → pupa → adult

Similarly, the life cycle of the frog can be divided into three different stages i.e. egg → tadpole → adult frog

In this case also, the tadpole is completely different from the adult frog.

This phenomenon of the transformation of the larva into the adult through drastic changes is called **metamorphosis**.



Male reproductive organs in humans

3.The male reproductive organs include a pair of testes, two sperm ducts, urethra and a penis.

The testes : The testes are oval in shape. They lie outside the abdomen in the muscular sac called the scrotal sacs. The function of the testes are to produce the male gametes called the sperms. It also produces the male hormone called the testosterone. In humans, the sperms are produced from the age of 14-15 till death. The testes produce millions of sperms every time out of which only one of the sperm participates in the process of fertilisation. Each sperm is a single cell with a

head, a middle piece and a tail. The tail helps in the movement of the sperm from the male to the female body.

The sperm ducts : The sperm ducts are also called the vas deferens. It is a narrow tube which acts as a passage for the sperms to move out of the testes and reach the urethra. The seminal vesicles mix some fluid with the sperms in the vas deferens which help in their smooth movement and also provide nourishment to the sperms.

Human sperm

The urethra : The urethra is a long tube which starts from the urinary bladder. The function of the urethra is to carry semen and urine through the penis to the main genital pore. 4. As we have already read, the human beings also reproduce through sexual reproduction. The male and the female both have different reproductive organs for the production of the sperms and the ovum. The zygote in the human beings forms once the egg is fertilised internally. Then, this zygote develops into a **foetus** or a fully formed small individual inside the mother's body. To understand the sexual reproduction in humans and how the fertilisation takes place, it is necessary to first understand the male and the female reproductive organs. 5. sexual reproduction is a process in which the fusion of male and the female gametes takes place to form a zygote. This zygote is the first cell of the new organism. In this type of reproduction, we need two types of gametes i.e. the male gamete called the sperm and the female gamete called the egg or the ovum. These gametes may be produced in the same organism or two different individuals. The animals like earthworms, leeches, tapeworms etc. possess both male as well as female reproductive organs in their body. Such animals which have both male and female reproductive organs in their body are called hermaphrodites or bisexual animals.

The process in which the organisms are produced by a single parent is called asexual reproduction. Many organisms reproduce asexually. The different methods of asexual reproduction are **binary fission**, **budding**, **fragmentation** and regeneration.

CHAPTER 9 : FORCE AND PRESSURE

A. 1. (c) 2. (d) 3. (c) 4. (d) **B.** 1 pull 2. pull 3. area 4. magnetic force 5. mascular **C.** 1. T 2. F 3. T 4. T 5. T **D.** 1. The effort which is required to push or pull an object is called the force. This force causes the motion of the objects. 2. This is because we too oppose the atmospheric pressure with the same force as the atmospheric pressure. 3. Because the area of the pointed end is much smaller therefore produces sufficient pressure with the same amount of force. Hence it is easier to cut an apple with a sharp knife. 4. Take a very heavy object and try to move it all alone in the opposite direction. Does it move? No, it doesn't. Now ask another person to help you to move it. When both of you apply the force in the same direction, the object starts moving. Now, if both of you apply the force in the opposite direction, the object again stops moving or moves in the direction in which greater force is applied.

5. The force acting on a unit area of the surface is called the pressure.

Pressure = force/area on which it acts

So from the above expression, we can say that with the same amount of force, the pressure is less if the area on which it acts is more and the pressure is more if the area on which it acts is less. Now, we can explain why the nail with the pointed tip goes inside the wood or the sharp knife cuts the apple easily or the pointed side of the pencil is more painful than the broader end. The area of the pointed end is much smaller therefore produces sufficient pressure with the same amount of force. That's why all the tools meant for cutting have sharp edges. **E.** 1. The forces which act when the objects are in physical contact with each other are called the contact forces. For example, the

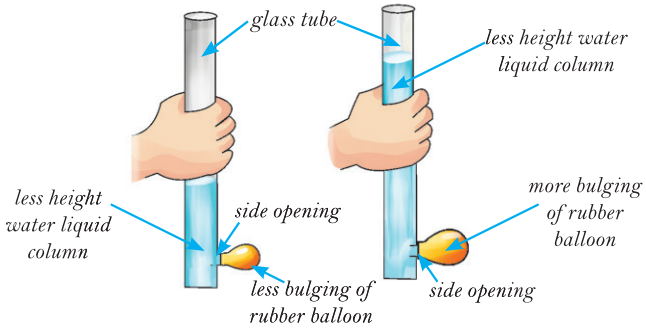
vendor moves the fruit cart by pushing it by hand. The children lift their school bags by pulling its string.

The contact forces may further be divided under the following heads:

1. Muscular force 2. Mechanical force 3. Frictional force

2. To show that liquid exert pressure on the walls of the container.

Things needed : A plastic bottle with an opening at the side, a glass tube, a rubber balloon.

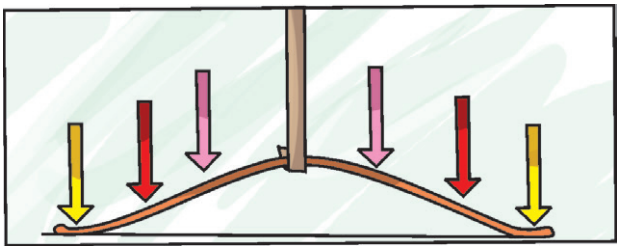


Method : Take a plastic bottle and fix the glass tube on its side as shown in the picture below. Apply some molten wax to avoid any kind of leakage. Now tie a rubber balloon at the free end of the glass tube. Pour some water in the plastic bottle. What do you observe? Now increase the water level by pouring more water into it. What change do you observe now?

Observation : When we pour water into the plastic bottle, the water passes into the glass tube at the side and through it into the balloon which starts bulging initially. When we pour more water into the bottle, the size of the balloon also increases.

Result : From the above activity, we can say that the water exerts pressure on the side walls also. This pressure is increased if the height of the water in the container is increased.

3. The envelope of air that surrounds our earth is called the atmosphere. This envelope as we all know extends to kilometres above the ground level. Thus, pressure which this layer of air exerts on the earth is called the atmospheric pressure. This pressure is exerted on each one of us. Then, why don't we get suppressed under this atmospheric pressure? This is because we too oppose the atmospheric pressure with the same force as the atmospheric pressure. This cancels the atmospheric pressure outside. The effect of the atmospheric pressure can be explained by the following activity :



A rubber sucker pressed on a smooth surface

Take a rubber sucker and press it hard so that it sticks against the plane surface. When this rubber sucker is pressed against the wall, most of the air present between the cup and the wall escapes so much so that the pressure exerted by it is almost negligible as compared to the atmospheric pressure exerted on the rubber sucker. That is the reason why it sticks firmly to the wall. If there was no air at all inside the rubber sucker, it would become impossible to pull it away from the wall. From this, we can say that the atmospheric pressure asked on the rubber sucker makes it cling to the wall tightly. 4. Have you ever seen a magnet? What do you observe when you bring some iron nails close to the magnet? The iron nails get attracted toward the magnet and get stick to it. This method is often used in the iron mining to separate iron from the other impurities. This invisible force by which a magnet attracts the iron towards itself is called the magnetic force. The magnet develops a magnetic

field around itself which attracts the iron even when they are not in physical contact with each other.

CHAPTER 10 : SOUND

A. 1. (b) 2. (a) 3. (c) 4. (a) **B.** 1 Frequency 2. sound of aeroplane 3. vacuum 4. 20 Hz 5. noise **C.** 1. F 2. T 3. T 4. T 5. F **D.** 1. cochea 2. 20 Hz 3. guitar 4. Pinna 5. Solids **E.** 1 (a) A vibration is a back and forth movement of a body about its mean position. The sound is produced by these vibrations. (b) Frequency is the number of oscillations completed in one second. (c) The characteristic of sound which helps us to differentiate between a loud and a low sound is called loudness. 2. How can we distinguish a shrill sound from a hoarse one? Even if the sound is of the same loudness, there can be difference in the shrillness of the sound. This characteristic of the sound is called the pitch of the sound. 3. The pollution of the environment with the undesirable sounds all around us is called the noise pollution. 4. Do it yourself.

F. 1. Things needed : A frying pan, a string and a spoon.

Method : Hang the frying pan from its handle with the help of the string in such a way that it does not touch the wall. Now strike the pan with a spoon so that sound is produced. Gently touch the pan now and note the observations.

Observations : When we touch the pan, we can feel it vibrating and the sound is produced but as soon as the sound stops, we see that the vibrations also stop. **Result :** This shows that the sound produced is a result of a vibrating body. 2. One of the most important sense organ in the human body is the ear. We can hear sounds from the surroundings through this sensory organ. Sound waves travel through the air and reach our ear. To understand the process of hearing, we first need to understand the structure of the ear. Our ear is divided into three parts :

1. The external ear 2. Middle ear 3. Inner ear

• The outer ear is a flap like structure called the **pinna**. This pinna leads the sound waves through the ear canal to the ear

drum. The ear drum is a stretched membrane which vibrates on receiving the sound waves. These vibrations are further transferred to the middle and the inner ear. •The middle ear consists of three bones which are connected to the ear drum on one side and to the inner ear on the other. When the ear drum vibrates, the middle ear also starts vibrating. • The inner ear consists of the cochlear which is filled with a fluid. The vibrations are received by the cochlea and are sent to the brain in the form of nerve impulses. The brain then interprets the sound on receiving these nerve impulses. 3. • Noise pollution may lead to various health problems. It causes headache, high blood pressure, ear ache and may lead to deafness. • It may also lead to loss of sleep or insomnia. • It may also result in lack of concentration. • Continuous exposure to noise may result in temporary or permanent loss of hearing.

Measures to Control the Noise Pollution

To minimise the noise pollution in our environment, we must try to control the use of sources that produce sounds. • Proper use of silencers in the automobiles, industrial machines and air crafts should be encouraged. • We should discourage the use of blowing of horns unnecessarily. • The television, radios, music systems should not be played at high volumes. • People working in areas of greater noise should be encouraged to use ear plugs. • The use of fire crackers should be discouraged as they cause lot of noise as well as air pollution. • The area of residence should be away from such places where the noise pollution is more. 4. Do it yourself. 5. Now, it must be clear that sound is produced only when a body vibrates. These vibrations are passed from the body to any medium in which the object is kept. For the vibrations to pass through, it is therefore necessary that there must be molecules which receive the vibrations and then transfer them. Therefore, we can say that the sound needs a material medium to pass through.

CHAPTER 11 : CHEMICAL EFFECTS OF ELECTRIC CURRENT

A. 1. (c) 2. (b) 3. (d) 4. (c) **B.** 1. conductor 2. chemical 3. light emitting diode 4. Hydrogen, Oxygen 5. electroplating **C.** 1. F 2. T 3. T 4. T 5. F **D.** 1. graphite 2. insulator 3. light emitting diode 4. iron 5. electrolysis **E.** 1. The materials that allow the electricity to flow through them are called conductors. The materials that do not allow the electricity to flow through them are called insulators. 2. The method of coating the metal's surface of an article with some other metal with the help of electrolysis is called electroplating. 3. Distilled water as we all know is a poor conductor of electricity. But the water we get from the water sources such as taps, hand pumps or submersible pumps is not pure. Some salts are naturally present in it. This water thus becomes a good conductor of electricity. So we can say that the addition of salts to the distilled water makes it a good conductor of electricity. 4. In some of the cases, the bulb does not light up because the current that flows through the circuit is weak. It is not sufficient to produce the heating effect that is required to light the filament of the bulb. So in such cases, the bulb is substituted by a LED (light emitting diode) which glows even if a weak electric current flows through it. 5. The electric current also produces chemical effects when it flows through the conducting solutions.

When an electric current is passed through a conducting solution called the electrolyte, chemical reactions take place. **F.** 1. Place a compass needle inside the tray of a match box and wrap it with a copper wire. Connect the free end of the wire to one of the terminal of the battery leaving the other end free. Connect yet another copper wire to the second terminal of the battery. To confirm the proper working of the tester, join both the free ends of the wire. The deflection in the compass needle shows that the tester is working properly. 2. • Since chromium is corrosion resistant and has a good lustre, its coating is widely used in car parts, sanitary items, gas burners, rims of the wheels etc. Being an expensive metal, the whole of the

object cannot be made out of it so a thin layer is coated on the object. • Artificial jewellery is made to look real by electroplating silver and gold on less expensive metals. It not only gives it a real appearance but is quite inexpensive and affordable. • Tin is electroplated on iron in the manufacture of tin cans. Since the tin is less reactive, it does not corrode easily and does not react with the food stored in it. • The iron used in automobile industry is coated with a layer of zinc to protect it from rusting. Similarly, many less reactive metals like nickel are also electroplated on iron. 3. **Things needed :** two carbon rods, copper wires, battery, beaker, few drops of lime juice, tap water.

Method : Take out two carbon rods from the discarded cells and clean their metal caps with the sand paper. Wrap the copper wires around the metal caps and join them to the battery. These would act as electrodes. Now take some water in the beaker and a few drops of lime juice to it to improve its conductivity. Immerse the electrodes in the beaker. (Be careful that the metal caps are above the water solution) .

Observation : After 3-4 minutes, we see bubbles at both the electrodes.

Result : In the above activity, we see that a chemical reaction takes place and the electrolyte (water) is decomposed into hydrogen and oxygen.4. In our daily life, we see many articles that have a great shine and lustre. With regular wear and tear and continuous usage, the non- lustrous part inside is revealed. The method of coating the metal's surface of an article with some other metal with the help of electrolysis is called electroplating. The purpose of electroplating is to give shiny appearance to the article and to provide protection against corrosion. 5. Do it yourself.

CHAPTER 12 : FRICTION

A. 1. (a) 2. (b) 3. (a) 4. (c) **B.** 1. lift 2.opposes 3. lubricants 4. shape 5. sliding friction **C.** 1. F 2. T 3. T 4. T 5. F **D.** 1. friction 2. lubricants

3. static friction 4. ball- bearing 5. fluid friction **E.** 1. The friction depends on the nature of the surfaces in contact with one another. The smoothness and the roughness of the surface decreases and increases the magnitude of the frictional force respectively. 2. This magnitude of force at which the object is at position of rest just starts moving is called the static friction. 3. The ball bearings are extensively used in most of the machineries to reduce the friction and hence increase the efficiency. 4.The soles of the shoes and the tyres are grooved to avoid slipping. 5. You must have experienced that we rub our palms together in winters when we feel cold. Similarly, when the machines are run, their parts rub against each other and produce heat. This heat gradually damages the machine parts. Friction causes wear and tear of the machines. If there would have been no friction, the machines would not wear out with time. Similarly, the soles of the shoes or the tyres of the vehicles also wear out with constant use. **F.** 1. The frictional force is very important in our daily lives. Our day to day activities would not have been possible if there was no frictional force among the objects. We would not be able to hold anything if there was no friction. The friction between our feet and the ground helps us to walk. Can you tell why it is difficult to move on a slippery ground or why the sole of the shoes are made rough and grooved? The friction between the tyres of the vehicles and the roads help them to move on the roads easily without slipping. To increase the friction between them, the tyres are also grooved to prevent skidding. Can you imagine that no writing would have been possible if there was no friction? The friction between the paper and the pencil causes some lead particles to rub off against the paper and stick to it. This is how the written work becomes visible.

If there was no friction, we would not be able to fix a nail or apply the brakes. Thus, we see that friction is important in our daily life. 2. We have seen that friction is used in various fields in our daily life. On the other hand, it has various drawbacks

as well. Thus, friction can be rightly called a necessary evil. 3. • Some substances called the **lubricants** are used in the machines to reduce the friction. These are applied on the moving parts of the machine so that a thin layer is formed between them and they do not directly rub against each other. An air cushion can also be incorporated between the parts of the machine to reduce the friction. • We can also reduce friction by polishing the objects. Since the irregularities of the surface are covered by the polish, it becomes smoother and the friction is reduced. • In most of the machines, the ball bearings are used which also reduce the friction of the moving parts. Similarly, the wheels and rollers are used in heavy objects like suitcases to reduce friction. 4. **Things needed :** Four cylindrical pencils and a book.

Method : Place all the pencils so that they lie parallel to each other. Now place a book on these pencils and push it forward.

Observation : We observe that the book moves more smoothly when rolled on the pencils than when it is slided on the table.

Result : The rolling of any object reduces the friction and hence the movement becomes smoother.

From all the above examples, we see that when a body is rolled over another body, it reduces the friction and thus, the motion becomes smoother. This kind of friction is called the **rolling friction**. It is therefore, easier to roll an object than to slide it.

Now, you must have understood why heavy machineries and objects are shifted from one place to another by keeping them on round logs of wood.

The ball bearings are extensively used in most of the machineries to reduce the friction and hence increase the efficiency.

CHAPTER 13 : SOME NATURAL PHENOMENON

A. 1. (a) 2. (c) 3. (b) 4. (a) **B.** 1. Negative 2. Opposite 3. Tremores 4. Earthquake 5. mud or timber **C.** 1. F 2. F 3. T 4. T 5. F **D.** 1. Rubbing can produce an electric charge in the object. In this

process, the hair and the cloth also acquire an electric charge. The bodies that carry an electric charge on them are called the charged bodies. The charges do not move by themselves and are limited to the surface of the object. Thus, they are called the static charges. 2. The plastic scale gets electrically charged on rubbing. Therefore, it attracts the bits of paper towards itself. 3. The intensity of an earthquake is measured on a scale which is called the Richter scale 4. The devices which are used to protect the buildings from the effects of lightening are called the lightening conductors. 5. In India, the earthquake prone regions are Kashmir, the western and the central part of the Himalayas and the Indo-Gangetic plains. **E.** 1. **Things needed :** two glass rods, a silk cloth, two ebonite rods, some wool, two strings and two wooden stands.

Method : This activity should be performed in three parts.

Part A : Rub a glass rod with a silk cloth and hang it on the wooden stand with the help of a string. Now, rub another glass rod similarly and bring it close to the rod suspended from the wooden stand. Note your observations.

Part B : Rub an ebonite rod with the wool and suspend it on another stand with the help of the string. Now, rub another ebonite rod and bring it close to the rod which is already suspended. Note your observations.

Part C : Bring the charged ebonite rod close to the charged glass rod. What do you observe?

Observation : In Part A, we observe that when we bring the charged glass rod closer to the other glass rod, they tend to repel each other.

In Part B, in this case also when the two charged ebonite rods are brought closer, they repel themselves in the same way as the glass rods.

In Part C, when a charged ebonite rod is brought closer to the charged glass rod, we see that they attract each other.

Result : This activity shows that the charges on the glass rod

and the ebonite rod are not of the same type. They must be different from each other.

So we can conclude that :

Two negatively charged objects (the ebonite rods) repel each other.

Two positively charged objects (the glass rods) repel each other.

Two opposite charged objects (a glass rod and an ebonite rod) attract each other.

Thus, we can say that the like charges repel and unlike charges attract each other. 2. One must find a safer place on hearing a thunder. • Do not come out soon after the last thunder storm. • One can take shelter in a car with all doors and windows closed. • If outside in open fields, do not stand near any metal poles or trees.

• Do not lie flat on the ground. • Do not take shelter near the water bodies.

One should squat on the ground with hands on the knees since the position makes you the smallest target to be struck.

Inside the House : • Do not use any of the electrical appliances during a thunderstorm. Infact, the electrical appliances should be unplugged. • One should not take a bath in the thunderstorm with running water. • Cordless phones or mobile phones can be used but the use of any kind of wired phones is not advised.

• No metal pipes should be touched. Most of the pipes used in the sanitary products are made of metal. 3. The uppermost part of the earth is not in the form of single piece. It is in the form of many pieces called the **tectonic plates**. These plates are in constant motion with one another. Sometimes these tectonic plates brush against one another and in the process get deformed or displaced. This sends tremors deep below the earth surface that causes earthquakes.

The whole world is divided into seven large tectonic plates. Since the earthquakes are caused due to the movement of

plates one over another, the place at which the two plates join are the weak points and are more prone to the earthquakes. These earthquake prone zones are called the **seismic** or the **fault zones**.

In India, the earthquake prone regions are Kashmir, the western and the central part of the Himalayas and the Indo-Gangetic plains.

Since the earthquakes cannot be predicted, they can be highly destructive and cause a great loss to the life and property. The only way to protect yourself from the destructive nature of the earthquake is to keep in mind some preventive measures that can minimise the destruction. The people living in the earthquake prone regions should keep in mind the following points:

• The buildings should be designed in such a way that it can withstand the tremors.

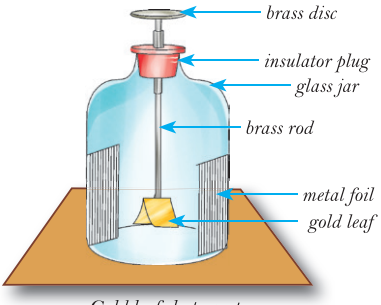
• The houses in these areas should be made of light materials like mud or timber.

• The roof of the house should be made as light as possible. • The almirahs and the wardrobes should be fixed in the walls so that they do not fall off easily. • The building should be equipped with proper fire extinguishing equipment so that in case of fire due to an earthquake, it can be handled quickly. • The doors of the house should be easy to open and should open outwards.

4. **Things needed :** A wide mouthed bottle, a piece of cardboard, a metal wire, two rectangular pieces of aluminium foil of about 2cm* 3cm each and an ebonite rod.

Method : Take a wide mouthed bottle and place a cardboard on top of it. Make a hole in the cardboard so that a metal wire can pass through it. Turn both ends of the wire as shown in the figure below. Now, take two pieces of aluminium foil and hang them to the lower end of the metal wire. Touch a charged ebonite rod with the upper end of the metal wire and observe. Now, touch the metal wire and observe the change.

Observation : The two aluminium strips at the end of the metal wire repel each other and widen out. But when the metal wire is touched, the strips come back to their original position.



Gold leaf electroscope

Result : This happens because the negative charge is transferred from the ebonite rod to the metal wire and the aluminium strips through conduction. Since like charges repel each other, the strips become wide open. Thus, we see that the electric charge is transferred from a charged object to another through conduction. But when the metal wire is touched, the aluminium strips come back to their original position because the charge is lost to the earth through our body. The object is now said to be discharged. The process in which the charge of the charged body is transferred to the earth is called earthing.

This device is known as an electroscope and can be used to check whether an object is charged or not. 5. Lightening is a common natural phenomenon. All of us have seen it quite often in the rainy season. You must have seen similar sparks like those that come out of a lighter when we light the LPG in the kitchen or the spark that comes out of the electric socket when the switch is loose. All these are similar sparks and can be explained on the basis of the same phenomenon. These sparks arise because of the flow of electric current through air. But how does this current pass when air as we have read earlier is a poor conductor of electricity? For this, we need to understand the reason of these sparks and the nature of the electric charges.

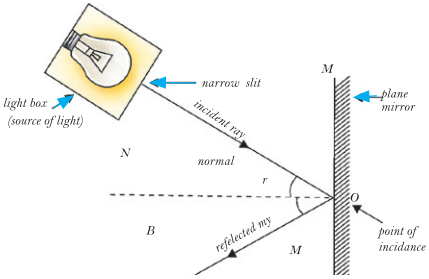
CHAPTER 14 : LIGHT

A. 1. (b) 2. (a) 3. (b) 4. (a) **B.** 1. keleidoscope 2. closer 3. incident 4.

regular 5. two **C.** 1. T 2. F 3. T 4. T 5. F **D.** 1. Those objects that emit light of their own are called the luminous objects while those who do not emit the light of their own are called non-luminous objects. The examples of luminous objects are the sun, candle, bulb etc. while the examples of non-luminous objects are table, chair, fan, blackboard etc. 2. (a) The angle which the incident ray makes with the normal is called the angle of incidence. It is denoted by <i. The angle which the reflected ray makes with the normal is called the angle of reflection. It is denoted by <r. (b) The angle which the incident ray makes with the normal is called the angle of incidence. It is denoted by <i. The angle which the reflected ray makes with the normal is called the angle of reflection. It is denoted by <r. (c) While, some people can clearly see the objects that are closer but find difficulty in seeing the distant objects. This defect is called myopia. (d) Some people can see the distant objects clearly but find difficulty in seeing the objects close by. This defect is called hypermetropia. (e) Do it yourself. (f) In case of a smooth surface like a mirror, all the rays are reflected in the same direction. This helps in forming proper images. This type of reflection is called the regular reflection. 3. Do it yourself 4. There is a place where the optic nerve and retina meet. At this point, the sensory cells are absent so any image formed at this spot. Therefore, this point is called the blind spot. 5. You must have seen, the sunlight coming into your room through the window. What is its colour? Your answer will be that sunlight if of the white colour. But do you know that sunlight actually consists of seven colours. **E.** 1. **Things needed :** A sheet of white paper, a piece of cardboard, a torch, a small strip of plane mirror.

Method : Fix a sheet of white paper on the table. Cut a thin slit in a cardboard and fix it vertically on the white sheet as shown in the picture below. Switch off all the lights in the room so that the room is completely dark. Bring a lighted torch behind the slit. Now, keep a plane mirror vertically in the path of the light and write your observations.

Observations : When we keep a lighted torch behind the cardboard, we see a ray of light on the sheet of paper on the other side of the torch. But when the plane mirror is placed vertically in the path of the light, we can clearly see another ray which is reflected by the mirror in the other direction. If we move the mirror, the reflected ray also moves accordingly.



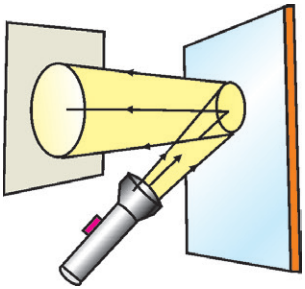
Result : We see that the light is reflected if a plane mirror is kept in the path of the light. The light ray which strikes the surface of any object is called the incident ray while the ray which comes back after reflection from a surface is called the reflected ray.

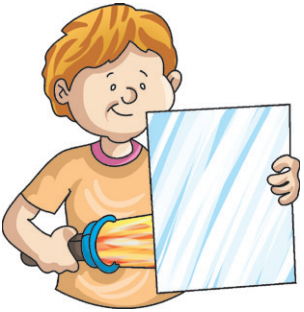
Things needed : A plane mirror, a stiff sheet of paper, a cardboard and a torch.

Method : We cut a thin slit in the cardboard as in the above activity. Now, we place a stiff sheet of paper on the table so that a portion of the sheet is extended outside the table. Firstly, we carry out the same activity as before. Place a plane mirror just beyond the edge of the table. Put this cardboard in the vertical position on the sheet and light a torch behind it in a dark room. We see that the ray of light strikes the mirror and is reflected back in other direction.

Now, cut the extended sheet from the middle with a pair of scissors and bend it on the opposite side on which the reflected ray falls.

Observation : As soon as we bend the piece of the extended part of the sheet on which the reflected ray was falling, the reflected ray disappears. We can only see the reflected ray if the folded paper is brought back to its original position.



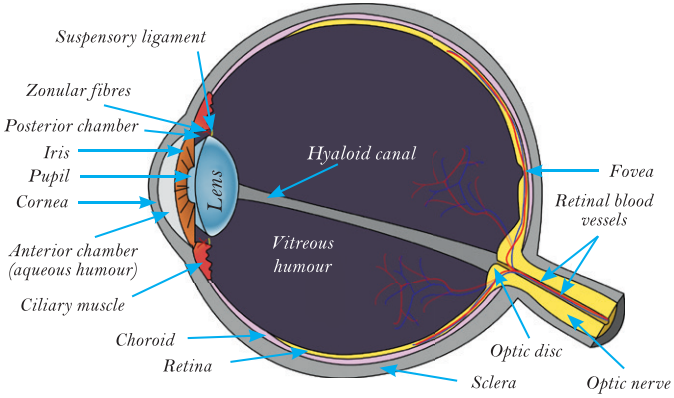


Result : When the whole sheet of paper is spread on the table, it forms a single plane. The incident ray, the normal and the reflected ray all lie in the same plane. But when the paper is folded, it makes another plane for the incident ray and the normal. Hence the reflected ray is not seen. 2. A kaleidoscope is a device which uses the process of multiple reflections to produce a variety of patterns.

To make a kaleidoscope, we need three rectangular mirror strips about 15 cm long and 4 cm wide. Join them to from a prism. Fix them in a circular tube made by using a thick sheet of paper or a piece of cardboard. Take care that the tube is slightly longer than the mirrors. On one end of the circular tube, fix a piece of circular cardboard with a hole in the centre. On the other end touching the end of the mirrors, fix a plane glass plate with some multicoloured pieces of broken bangles on top of it. Now, close the end of the tube by another glass plate so that there is enough space for the movement of the bangle pieces.

When we peep through the hole of the cardboard, we are able to see many different types of patterns in the tube. These patterns are used by the designers to design fabrics, wallpapers etc.

3. Here is a list of some of the ways by which we can keep our eyes healthy : • One should go for a regular eye check up to a doctor after regular interval. • One should use appropriate spectacles, if advised by the doctor. • One should avoid reading from too far or at a distance which is too close from the eyes.



One should also not read while lying down on the bed. • One should not rub the eyes. In case of irritation, one should wash the eyes with water. If there is no relief, visit the doctor. • One should wash his/ her eyes frequently with cold water. • One should not read during travelling. • Watching too much television or computer continuously for long hours is also harmful for eyes. • We should also eat a balanced diet to keep our eyes healthy. We should include a diet which is rich in vitamin A. The deficiency of this vitamin may lead to various eye problems such as night blindness. Carrots, spinach, broccoli, mango, papaya, milk and milk products are rich in vitamin A. 4. Louis Braille published a system called the Braille for the visually impaired people. He was himself a visually impaired person who developed it so that all such people can be benefitted by it. A Braille code has been set up for most of the common languages, mathematics and science. In this system, the patterns are embossed on the Braille sheets. They are raised patterns which can be identified easily by touching. The patterns of dots which are used for different letters or grammatical signs are different from one another. Thus, they can be distinguished from each other. The learning starts with the recognition of letters and special characters. After this, they learn the words by combining letters. For the proper formation of words, it is very important that all the characters are properly memorised.

CHAPTER 15 : STARS AND THE SOLAR SYSTEM

A. 1. (b) 2. (c) 3. (d) 4. (a) 5. (d) **B.** 1. Neil Armstrong 2. Phases of moon 3. Great Beer or the Saptarishi 4. ice, dust 5. hydrogen, helium. **C.** 1. F 2. T 3. T 4. F 5. T **D.** 1. new moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, last quarter, Waxing crescent 2. Observe this constellation, three to four times at an interval of two to three hours. You will find that the constellations moves around the pole star thus we can say that all the stars appear to revolve around the pole star 3. **Meteors :** These are other heavenly bodies that revolve around the sun. When they enter the earth's atmosphere, they get heated up due to the friction and a bright streak light of light is visible in the sky. This streak of bright light is visible for a few seconds as all the material of the meteors burns up and evaporates before it reaches the earth's surface. The meteors are also called the shooting stars. **Meteorites :** Some of the meteors do not completely burn in the atmosphere. They reach the earth surface and can create large craters on it. These are called the meteorites. The meteorites help the scientist to gather information about the matter of which these celestial objects are made up of. 4. The purpose of these artificial satellites are : • To forecast the weather. • To transmit the television and radio signals. • For telecommunication such as services like cellular phones, fax etc. • For remote sensing and land mapping. • To know more about space and the other planets. 5. The environmental conditions of the earth are such that they favour the existence and promotion of life. The conditions which favour the existence of life are appropriate temperature, presence of air and water and the blanket of the ozone. **E.** 1. • It is also called the Great Bear or the Saptarishi. • It is seen in the month of April in the northern part of the sky. • The shape of this constellation is like that of a dipper which was earlier used to draw out water from the pots. It looks like a big bowl attached to a long handle. • There are seven stars in

the constellation- three on the handle and four on the corners of its bowl.

This constellation is used to locate the position of the pole star. On a summer night, locate the Ursa Major and notice the two stars at the end of the constellation. Imagine a straight line passing through these stars and extend it further ahead to such a point that it joins a not so bright star in the north. This is the pole star. Observe it continuously and you will notice that while all the other stars move from east to west, this star remains stationary.

Now, observe this constellation, three to four times at an interval of two to three hours. You will find that the constellations moves around the pole star thus we can say that all the stars appear to revolve around the pole star

Orion : • It is also called the hunter. • It is another constellation which can be seen the winter season. • It is the brightest constellation that is found in the sky. • It has seven to eight bright stars which are arranged in the shape of the hunter along with many faint stars. • The three middle stars represent the belt of the hunter and the other four represent a quadrilateral. • The biggest star in the sky called the Sirius is located close to this constellation. It can be located by passing a straight line through the three middle stars of the Orion and extending towards the east. The point of this imaginary line which leads to the brightest star is the Sirius. 2. Their names according to the distance from the sun are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. These planets revolve around the sun in a fixed path. This elliptical path in which the planet revolves around the sun is called its orbit. They can be seen in the sky as the objects which do not emit any kind of light. They only reflect the small amount of sunlight that falls on them. In this way, they can be easily distinguished from the planets.

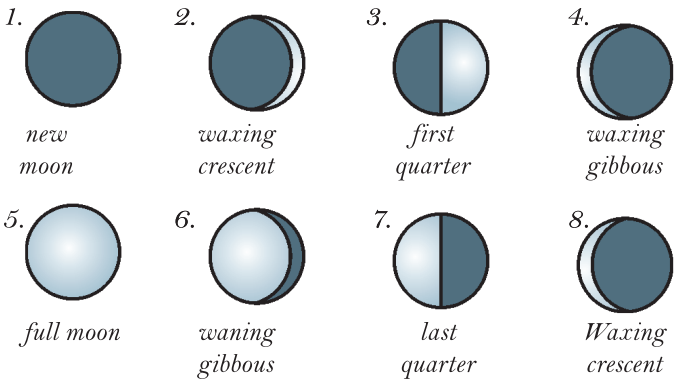
3. **Asteroids :** The gap between the orbits of the planets such as Mars and Jupiter are occupied with many other celestial bodies

called the asteroids. The asteroids are made up of irregular masses of rocks and metals. They are so large in number that it appears as a belt in this region. These can be seen through large telescopes.

Comets : Comets are made up of ice and dust that are found in our solar system. They also revolve around the sun in their very elliptical orbit. The comet appears as a elongated body with a bright broad head ending in a long tail which grows in size as it approaches the sun. This tail of the comet is positioned in such a way that it always points away from the sun.

Some of the comets can be seen after a fixed period of time. For example; the Halley's comet can be seen after every 76 years. Since it was seen last in 1986, it would now be seen in 2061-2062.

Meteors : These are other heavenly bodies that revolve around the sun. When they enter the earth's atmosphere, they get heated up due to the friction and a bright streak light of light is visible in the sky. This streak of bright light is visible for a few seconds as all the material of the meteors burns up and evaporates before it reaches the earth's surface. The meteors are also called the shooting stars. 4.



CHAPTER 16 : POLLUTION OF AIR AND WATER

A. 1. (b) 2. (a) 3. (c) 4. (d) **B.** 1. impurities 2. Pollution 3. smoke, carbon monoxide 4. Boiling 5. CNG **C.** 1. F 2. T 3. T 4. F 5. T **D.** 1. pollution 2. asthama 3. corbon dioxide 4. detergents 5. Ganga **E.** 1. The quantity of pollutants vary at different places in the air. These pollutants adversely affect the living and the non-living. The presence of the harmful substances in the air which have harmful effect on both the living and non-living is called the air pollution.

Water pollution means the contamination of water with the toxic substances like chemicals that come out of the industries, the insecticides and the pesticides or the domestic sewage which may have harmful effects on both the living and the non-living things. 2. The harmful or the toxic substances which pollute the air are called the air pollutants. These pollutants may be natural or a result of urbanisation of the human beings. The natural sources which contaminate the air are the smoke and dust that arise from the forest fires and the volcanic eruptions. Most of the other pollutants that contaminate the air arise from the industries, the power plants and the automobiles. 3. A large quantity of the domestic and industrial sewage is discharged in this river. 4. There are many ways that are adopted to clean the water and make it safe for drinking. Some of the ways are :

By Simple Filteration Method : For domestic purposes, the most common way to clean the water is to remove its suspended impurities by filtering it through a fine muslin cloth.

A traditional type of the candle filters can also be used for the same purpose.

By Boiling : Since we know that micro organisms are killed at higher temperatures, boiling of water is another method to make it germ-free. The water is boiled for about 10-15 minutes and then cooled before drinking.

By the use of Certain Chemicals : This process is also called chlorination. A specific amount of chlorine in the form of

chlorine tablets or bleaching powder is added to the water to purify it.

By the use of Ultra Violet Radiations : Nowadays, the water is purified by the use of ultra-violet rays. The modern water purifiers are mostly based on this technique. 5. (a) headache and lung diseases (b) dysentry and cholera **F.** 1. The quantity of pollutants vary at different places in the air. These pollutants adversely affect the living and the non-living. The presence of the harmful substances in the air which have harmful effect on both the living and non-living is called the air pollution.

Causes of Air pollution : The harmful or the toxic substances which pollute the air are called the air pollutants. These pollutants may be natural or a result of urbanisation of the human beings. The natural sources which contaminate the air are the smoke and dust that arise from the forest fires and the volcanic eruptions. Most of the other pollutants that contaminate the air arise from the industries, the power plants and the automobiles. 2. A well known historic monument in the city of Agra is one of the seven wonders of the world. But it has now become a matter of great concern since the marble used in it is being damaged by the pollutants present in the air.

2. The main cause of the corrosion of the marble is the industrial fumes that are released in the air in the city of Agra. The fumes coming out of the rubber industries, the chemical industries and mainly the Mathura refinery have caused a great damage to this monument. The oxides of nitrogen and sulphur which are released from the Mathura oil refinery react with the atmospheric water vapour to form their respective acids. These acids result in the corrosion of the marble. This is called "marble cancer". Also, the soot that is released in the air settles down on the monument thus resulting in the yellowing of the white marble. 3. The main reasons that cause water pollution are : One of the most important reasons for water pollution is the industrial sewage that is directly discharged in the water bodies without being treated. The wastes from the oil refineries, the

paper industries or the textile industry cause the chemical contamination of water. • The water is also polluted when the wastes from our kitchen and toilets are discharged into the rivers through the sewage system. The presence of bacteria present in the faeces of human and other mammals in the water indicate that the water is contaminated. • The human activities like bathing, washing or throwing of wastes in the water bodies also pollute the water. The animals are also left to bathe in the small water bodies which contaminate the water by passing urine or faeces in the water. • The use of pesticides, we decides and the fertilisers are encouraged in the modern techniques of agriculture. These if used in excessive amounts find their way through the soil into the water sources. This results in water pollution. • The huge tankers carry the oil to different countries through the seas. This oil spills in the water due to the leakage of the oil tankers. This results in the pollution of sea water which adversely affects the life of aquatic plants and animals.

The prevention and control of water pollution :

The water pollution is a serious problem. We should take the following measures to prevent and control it :

The human activities like washing clothes, bathing etc. near the banks of the water bodies should be discouraged. • The animals should not be allowed to bathe in the water bodies. • The industrial wastes should be treated properly and all the toxic substances should be removed from them. • The excessive use of fertilisers and pesticides should be discouraged. • The sewage should be properly treated in the sewage tanks so that it does not contaminate the water bodies. • We should all try to dispose the garbage in a proper manner. No garbage should be thrown in the water. • The dead bodies should be properly cremated. They should not be put in the flowing water. • We should all follow the rules to keep the water free from pollution. 4. There are various reasons that attribute to the pollution of this river :

• A large quantity of the domestic and industrial sewage is discharged in this river. • The fertilisers, detergents, leather and paints industries discharge their residues directly into the river water. • The dead bodies of human beings and the animals are thrown in the waters. • Since this river is the holy river for the hindus, much pollution is caused due to the flowers, or the diyas or the idols of gods which are used as offerings to the holy river.

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