Science Creation - 6

1. Food : Its Sources and Components

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

B. 1. Sugarcane and beet root.
2. omnivores 3. carnivores, lion, tiger
4. strong 5. carbohydrates

C. 1. ✗, 2. ✓, 3. ✗, 4. ✓, 5. ✗

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

E. 1. The most commonly eaten part of the plant is the taproot, although the stems and leaves are eaten as well. 2. Citrus fruits are rich in vitamin C eg. amla, orange etc. 3. Food mainly contains 5 major component- vitamins, minerals, carbohydrates, proteins and tats. 4. Disease that occur due to lack of nutrients over a long period are called deficiency diseases eg. night blindness etc. 5. Vitamin D and K are made by our body.

F. 1. We require food for four main reasons. ❖ It provides energy for various activities of the body. ❖ It helps the body to grow and replace worn out cells. ❖ It has chemicals that help to control various body functions. ❖ It protects the body from various disease and keep it fit and healthy. 2. A person may be getting .....sufficient iodine to prevent goitre. 3. Vegetables are a rich source of vitamins, minerals and roughage eg. turnip, carrot, potato etc.
4. Day lily is a plant that has more then one edible ..... can also be cooked.
5. Honey consists of water, ... and an easily digest able product. It is used in making medicines.

G. 1. A person may be getting ..... our body such diseases are called deficiency diseases. 2. Food items like milk, eggs, meat, ... us honey consists of water, sugar, minerals and enzymes.

2. Separation of Substances

A. 1. (b) 2. (c) 3. (c) 4. (d) 5. (c) 6. (d)

B. 1. Tiny sand particles, clay, air, humus.
2. Filteration 3. Magnetic
4. Evaporaluen 5. Sublimate

C. 1. ✗, 2. ✓, 3. ✗, 4. ✗, 5. ✓

D. 1. f, 2. d, 3. a, 4. b, 5. e, 6. c

E. 1. Pure substance - A pure substance is a sample of matter with both definite and constant composition and distinct chemical properties. For Example - Water, Diamond, Brass, Salt.
2. Evaporation - The process of turning the liquid into vapur is known as evaporation. For example : During summers the clothes dry aster as compared to winters as the water in them evaporates. 3. Sublimation - The process by which a solid changes directly into vapour without forming any liquid. 4. Two application where evaporation is used are: (a) To seprate salt from water-Take a glows of water and dissolve 4 spoons of salt in it. Put the mixture on heat and start boiling. After few minutes the water will evaporate and the residue left behind is salt. (b) Drying of clothes.

F. 1. A pure substance is ..... have two or more type of particles. 2. We can use the following method: (a) Pour the salt and sand mixture into a ..... how each component contributes to the properties. 3. **Mixture—**A substance made by mixing other substances together is refered as mixture. Example (a) sand and water (b) Water and oil.
4. First bring magnet near the mixture. ..... will be left behind with sand.

G. 1. (a) Wash your hands thoroughly before handeling the food. (b) Seprate the raw & cooked food. (c) Cook food throughly (d) Keep food at safe temperature. 2. The removal of certain components of a mixture is called separation of mixture. It is done for the following purposes :

1. Removing undesirable components: Sometimes small stones are present ..... be removed as they can be harmful. **2. Removing harmful components :** Salt is removed ..... harmful for health. **3. Obtaining useful components :** Crude petroleum, when mined from ..... for running heavy trucks and buses, etc. **4. Obtaining pure sample of substance:** Pure substances are ..... is needed for making electric wires.

3. Life Around Us

A. 1. d 2. b 3. c

B. 1. Green plants, animals 2. 100 3. Fish and turtle 4. Unicellular organism 5. Nonliving 6. 14 months.

C. 1. ✓ 2. ✓ 3. ✓ 4. ✗ 5. ✗ 6. ✓

D. 1. **Growth** - The growth of a person, animal or plant is its powers of increasing in size. 2. The process by which living things produce energy from food. Respiration usually needs oxygen to complete.

3. Geotropism - It is defined as the reciprocal attraction between carriers of the same on related latent recessive genes.4. Plants produce two gaseous waste products i.e. oxygen during photosynthesis and CO_2 during respiration. Excretion in gaseous water in plants take place through stomatal pores on leaves. Where as excess of water is also excreted from the plant body through the stomatal pores and from surface of fruits & stems. 5. Living organism need to take food because orgnisms need energy to perform any activity or function and they get that energy from food.

E. 1. All green plants are called autotroph because they can produce ..... food they are also called producers. 2. (i) Bacteria - 20 minutes (ii) Lion- 2025 years (iii) Mouse - 2-3 years (iv) Tortoise- 120-150 years

3. Non living things are ..... wind and soil erosion. 3. **Living things** (a) They are made up of cell that have the living matter ..... respire to take energy from food. **Non- Living things** (a) They are made of molecules hat has no living content. (b) They do not have any definite shape or structure. (c) They do not require any kind of food. (d) They do not breathe.

F. 1. A living thing is composed of one ..... of multicellular organism. 2. Response and Stimuli **Stimulus**- Something that can elicit ..... bacteria and chick it inhabitat viruses. 3. Light plays an important role in growth ..... as day light inigial.

4. Habitat and Adaptation

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

B. 1. Three 2. Autotrophs 3. Plants 4. Herbivores 5. Phytoplankton

C. 1. ✓ 2. ✗ 3. ✓ 4. ✓ 5. ✗

D. 1. c 2. d 3. e 4. a 5. b

E. 1. Habitat on earth is grouped under three main categories. (a) Terrestial habitat (b) Aquatic habitat (c) Aerial habitat 2. It consist of habitat of all orgnaisms which live on land. For example- man, lion, trees, etc. 3. Biotic components are all living components such as men, animals, plants, bacteria, fungi, etc. 4. The non-living components of our ecosystem are called abiotic components. For example- soil, water etc. 5. Cow, goat, deer 6. Lion, tiger, leopard 7. Human beings

F. 1. The habitats in oceans and seas that contain salty water are called marine

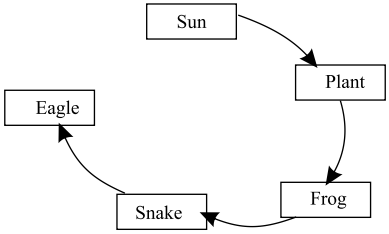
habitats. 2. Photosynthesis is refered as the process ..... and Sunlight Carbo hydrate food + O_2 3. Animals and human beings ..... are called heterotrophs or consumers. 4. The amount of light available ..... in the abiotic component also effect the living being. 5. Each living organisms can flourish over ..... in sleeping state called aestivation. 6. Soil is the uppermost layer of ..... of soil can be listed as- 1. Soil particles 2. Soil waters 3. Soil air 4. Organic matter/ humus 5. Soil organisms

G. 1. The habitat on the earth can be grouped under three main categories (1) Terrestial (2) Aquatic (3) Aerial **Terrestial**- It Consists of habitat ..... terrestrial organism. eg.-lion, tiger, man. **Aquatic**- It includes pond, river, sea, lake, ... whalses, sharks, etc. **Aerial**- It include air and trees. For example, tropical forests. The organisms which use tree for their activities are called aerial or arborial organisms. ex-bind such as eagles. 2. Plants prepare their food thumselves from the material available in nature. Therefore they are refered as autotophs.

Usefulness of plants

(a) They provide many type of medicinals compounds, spices and fibres. (b) They provide wood, gums, resin & rubber. (c) Humans are directly & indirectly dependent on plants for food. (d) Some animals get shade and protection from rain and heat. (e) Some animals make their shelter in plants.

3. Food chain is a series of organisms linked together by the process of eating and being eaten. Gueen plants and algae can produce food through photosyntesis.❖ Food chain starts from producers. Then other organism who are herbivores like deer, zebras depend on producers for nutrition. They are primary consumers. ❖ Next to primary consumers we have secondary consumers since they feed on primary consumers. They are carnivores like lion, tiger.



❖ Plant makes food using sun and water. ❖ Frog feed on plant. ❖ Snake feeds on frog. ❖ Eagle feeds on snake.

4. Any habitat is mainly composed of living beings and non living beings categorized as:

(a) Biotic component (b) Abiotic component All the non-living components are refered as abiotic component. The components like light, air, soil, water constitute abiotic environment this is known as physical environ-ment.

5. Plants Structure and Functions

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

B. 1. tap, fibrous 2. Stem, root
3. Chlorophyll 4. Support
5. Leaf blade 6. Plumule, radicle
7. Stomata

C. 1. ✗ 2. ✗ 3. ✘ 4. ✗

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

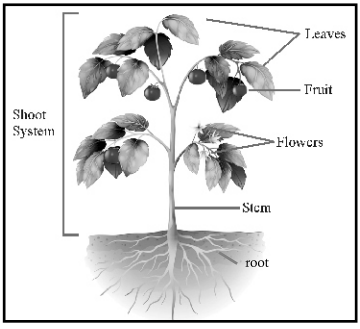
E. 1. Plants with tall, hard and woody stems are called trees. They have one main stem called trunk. 2. The two type of plants are flowering & non-flowering plants. 3. Rose, Tulsi, lemon, etc. 4. Wheat, paddy, mustard, tomato, etc. 5. These are the plants which complete their life-cycle in two years (Seasons). They produce their vegetative part i.e. leaf and stem during first season and flowers and fruits in second season. Example- carrot, radish,

potato, etc.

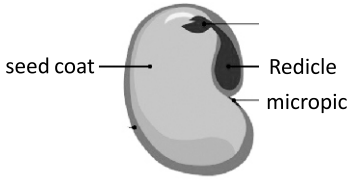
F. 1. The part of the plant which ..... spread out in soil. e.g.- wheat, sugarcane. 2. This system comprises of main stem, branches, leaves, flowers and fruits. ..... help the plant to increase the height of the plant. 3. In this system of root, ... are called fibourous roots. 4. Roots are also to perform some specialized ..... plant. They have swollen roots. 5. A seed contains a baby plant. ..... a membrane called seed coat.

G. 1. Function of leaf: (a) Leaves manufactures food for the plant body. Leaves in the presence of sunlight prepare food from carbondioxide, water and chlorophyll. This process in called photosynthesis. (b) There are small pores in the surface of leaves called stomata. Plants give out extra water in the form of vapour through stomata. (c) Stomata also helps in the exchange of gases in respiration and photos-ynthesis.

2.



3. Certain plants growing in saline and marshy places have ..... above the soil to respire. These are called breathing root. 4. Fruits ; A seed contains a baby plant and cotyledons. A baby plant consists of radicle and plumule. Radicle grows into roots and plumule forms the shoot system. All the parts of seeds are covered in a membrane called seed coat.



Seed Structure

5. A fruit is generally made ..... and beans are seeds. 6. This system comprises of ..... buds are called terminal buds. 1. The stem bears leaves, flowers and fruits the stem is a link between the roots, leaves and flowers. 2. It transport water and minerals from the roots to the leaves and flowers. 3. It transports food from leaves to the other part of the plant.

6. Animals-Forms and Functions

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

B. 1. Limbs, legs 2. head, thorax, abdomen 3. Pisces 4. Two 5. streamlined

C. 1. ✓ 2. ✓ 3. ✓ 4. ✗ 5. ✗

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

E. 1. A cell is the smallest functional unit of our body. 2. Skeleton system. 3. lower jaw. 4. The kind of skeleton is present in inverte bratty which do not possess a vertebral column or back bone are.

F. 1. **Vertebrates :** These are the animals which ..... e.g.-fish, frog, lizard.
Invertebrates : These are the animals which ..... e.g.-amoeba, hydra. 2. Features of birds which help them to fly are : (a) Body is streamlined, boat shaped, covered with feathers. (b) Forelimbs are modified into wings (c) Skeleton is strong, light & hollow (d) Fertilization internal, lays eggs, parental care is exhibited. 3. Animals are classified into two classes
(a) Invertebrates (b) Vertebrates
Invertebretes are animals which do not

possess a vertebral column or back-bone. example- amoeba, hydra, spides. Vertebrates are animals which possess a backbone or vertebral column. example - fish, frog, lizard. 4. There is an exoskeleton present ..... gives the insect an upward jerk which makes it fly. Distinct features are-

(a) They are noctural animals (b) They eat any kind of plant and animal matter.(c) Their body is divided in three parts namely head, thorax & abdomen.

G. 1. Birds have feathers which helps in flying and ..... 3 kinds of feathers: (a) Contour feathers -These are present on trunk and tail. These are large sized and beautifully coloured. (b) Down feathers - They are small in size. They are soft and keep body warm.

(c) Filoplumes - These are a bunch of delicate, hair -like eathers distributed over the body. 2. Human skeleton system consist of ..... in to 2 parts. (a) Axial skeleton system (b) Appendicular skeleton system. ..... girdles and the bones of arms and legs. 3. The place of joining two or more than two bones is called a joint. **Types of joints** (a) Ball and Socket joint - The ball of one bone is fitted in socket of another bone. The ball can move in the roacket. This joint is found in pelvic girdles. (b) Pivot joint - In this joint, the pointed part of bone fits into the cavity so that it can move around. (c) Hinge joint - It allows angular movement in one place only (d) Gliding joint - In this joint, one bone slips over the other at the place of joint.

7. Fibre to Fabric

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

B. 1. Cotton and silk 2. Weaving, knitting
3. Mulberry 4. Artificial silk
5. Leaves and skin of animals.

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

D. 1. ✗ 2. ✗ 3. ✗ 4. ✗ 5. ✓

E. 1. The major route between Europe and Asia due to its popularity for silk is known as silk route.
2. Cotton and silk.
3. The protective layer around a caterpillar is known as cocoon.
4. Removing the hair from sheep using special clippers is called shearing.
5. Clothes protect us from bad weather, insect bites, dust etc.

F. 1. The main source of wool is sheep cultivation and for silk is silk worm cultivation also known as sericulture.
2. Nature provide many different kind of fibre such as cotton, jute, silk and wool known as natural fibre. Cotton and silk are obtained from plants. Wool and silk from animals.
3. Knitting is one of the several ways to turn the yarn into cloth. It is done either by hand or by machines. There are two types of knitting weft and warp.
4. 1. It is a shimmery appearence.
2. highly costly 3. It is warm.
5.

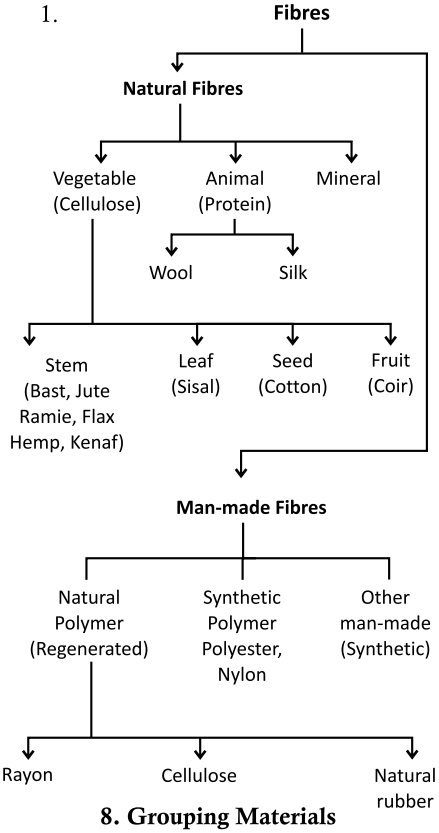
Natural	Artificial
Nature provides many different kind of fibre, known as natural fibre	The fibre derived from chemicals and prepared in industries are known as the artificial fibres
eg.-cotton, jute, silk	eg.-Nylon, rayon

G. 1. At the next page....
2. Advantages
(a) These have a property of retaining our body's heat.
(b) Cotton clothes allow air to pass through.
(c) They are comfortable to wear.
Disadvantages-
(a) They do not retain their crease
(b) They may shrink

(c) Natural silk is very expensive.

3. Jute is a rainy season crop grown best in warm, humid climates. ..... its fibres are converted into yarns to make fabric.

1.



8. Grouping Materials

A. 1. a 2. a 3. c 4. a

B. 1. Lusture 2. naturally, man-made
3. opaque, transparent
4. classification 5. Britle

C. 1. ✗ 2. ✓ 3. ✓ 4. ✗ 5. ✓

D. 1. c 2. d 3. a 4. e 5. b

E. 1. Three states of matter are - solid, liquid, gases. 2. Miscible –alchohol, vinegar Immissible - oils 3. Because wood and plastic are bad conductorn of heat. 4. Natural - cotton, silk
Man -made - nylon, rayon

F. 1. Put a coin in a water tub. Can ..... water in transparent. 2. The three states of matter are- (a) Solid - Dry wood and dry gases ..... each other in this state. (b) Liquid - The molecales ..... they are free to move. (c) Gas - They are extremely ..... difficult to compress are called hard material. 4. Advantage of grouping things- (a) easy to classify (b) easy to use in the similar state

G. 1. Physical properties can be listed as
❖ Appearence of material or Lusture
❖ Harndness. ❖ Floating and sinking
❖ Solubility in water ❖ Transparency
❖ Conduction of heat
❖ Combustibility. ❖ Attraction towards magnet. 2. The property by which certain substance catch fire when heated in presence of air is known as combustibility. The substance which can catch fire on heating are called combustible substances. For example paper, wood, LPG, CNG, alcohol etc.

9. Changes Around Us

A. 1. c 2. a 3. a 4. c 5. a

B. 1. Slow 2. Irreversible
3. Irreversible 4. Emitted
5. Physical 6. Chemical

C. 1. ✓ 2. ✗ 3. ✗ 4. ✗ 5. ✓

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

E. 1. The change which can be reversed after Cocurence is reversible change.
2. Some changes occurs very slowly. ..... changing of ice into water. 3. Undesirable change - Burning of petrol to run a vehicle is both desirable and undesirable. 4. A liquid which dissolves another substance is called solvent. Example : water, alcohol, acetone, etc.

F. 1. An exothermic reaction is a chemical reaction that releases heat. It gives heat energy to its surroundings.
❖ Combustion of fuels such as wood, coal and oil petroleum. ❖ Thermite reaction. 2. The characteristics of a chemical change are - (a) A chemical

change is permanent in nature. 2. Cooking of food is a chemical change because ❖ it is a permanent change ❖ it is an irreversible change ❖ during cooking of food, new substances are formed. ❖ the properties of new substances are different from the original. 3. Burning of fuels is a chemical change because: ❖ it is an permanent change. ❖ it is an irreversible change ❖ during burning of fuels, new products are formed.

4.

Physical
(a) It is reversible. (b) Temporary change (c) No new substance is formed (d) No change in properties of the substance. (e) Heat or light may not be given out.
Chemical
(a) It is irreversible. (b) permanent change (c) A new substance is formed. (d) Chang in composition of property of a substance (e) Energy in form of heat and light is generally given.

G. 1. Changing from the state to another is ..... changing of ice into water.

2. **Desirable changes-** There are some changes, ... are known as desirable change. **Undesirable change-** Rusting of iron, souring ..... summers the example of undesirable change.

10. Motion and Measurement of Distances

A. 1. c 2. b 3. a 4. a 5. b

B. 1. Kilogram per cubic metre

2. Translatory motion, rotatory motion and oscillatory motion.

3. Periodic oscillatory motion

4.Rectilinear motion 5. Small

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓ 5. ✗

D. 1. c 2. d 3. a 4. b 5. e

E. 1. a continuous change in position of a body is called motion. 2. Oscillatory motion is that in which a body moves to-and-fro about its mean position. 3. Rotatory motion is that in which a body moves about a fixed axis without changing its position. 4. Certain units of measure-ments have been accepted by people ..... in this system are called SI units. 5. 1m = 100 cm

F. 1. Translatory or Rectilinear : A falling stone Oscilatory motion : Swing. Pendulum Rotatory : A fan, spinning top 2. Sundials and obelisks, Sand glass, water clock, candle clock, pendulum and the quartz. 3. Measure-ments of things play an ..... with exactly the same specifications. ❖ We have instruments that measure things accurately. ❖ The entire world uses the same units to measure. 4. The size of something from end to the others. The SI unit for length it meters (m).

G. 1. **Oscillatory :** Oscillatory motion is that in which a body moves ..... of an oscillatory motion.

Rotatory motion : Rotatory motion is that in ..... fan start moving in circles along a fixed axis.

2. **Periodic motion :** A motion, if repeated at regular ..... speed are all examples of periodic motion.

Non-periodic motion : When an objects does ..... Swinging of our arms or legs.

11. Electric Current and Circuits

A. 1. b 2. b 3. c 4. c 5. a

B. 1. Two 2. 1.5 volts 3. Negative 4. Closed circuit 5. conductor 6. positive

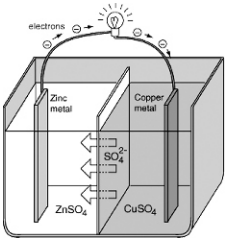
C. 1. ✓ 2. ✓ 3. ✗ 4. ✗ 5. ✗ 6. ✗ 7. ✓ 8. ✗ 9. ✓ 10. ✓

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

E. 1. Electric current is a form of electric energy which gets converted into heat and light when it flows through electric bulb. 2. Dry cell, solar cells, etc. 3. Dry cell was inverted by G-Leclanche. 4. A carbon rod having a brass cap is placed in centre of zinc container act as positive therminal. 5. The zinc container act as negative terminal.
6. It is a device used for opening and closing the electric circuit. 7. Substance which allow electric energy to pass through them are called conductors. 8. Substances which do not allow electric energy to pass through them are called insulators. 9. Wood, plastic, ebonite.

F. 1. He was an Italin scientist who invented Volta cell. 2. (a) They are light in weight & small in size. (b) They can be transported from one place to another. (c) Their is no fear of spoilage or leakage. 3. **Solar cell :** Solar cell is a device which ..... cells are used in wrist watches and calculators. 4. The complete path from ..... cell is called electric circuit. 5. Electricity flows in the form of current from the positive towards the negative term-inal of the battery. 6. The complete path of electric cell is called ..... or open electric circuit. 7. A circuit diagram is a diagram which shows the ..... the help of their symbols. 8. When two clouds with ..... spark is produced called lighting.

G. 1. An earliest cell known as simple Volta cells was ..... are connected to a battery bulb it starts glowing.



2. A dry cell is used in ..... then sealed from the top with pitch. 3. A dry cell gives 1.5 v, many ..... is called battery of cells. 4. Bulb is an electrical comp-onent which converts ..... as to prevent them from making contact. 5. The figure given in book shows ..... and the spring, and the bulb glows. 6. When clouds with unlike charges come ..... produced as sound and heard as thunder.

12. Magnets

A. 1. c 2. a 3. b 4. a

B. 1. natural magnet 2. magnetic compass 3. properties 4. iron 5. attract, attraction 6. north

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓ 5. ✓

D. 1. a 2. d 3. b 4. c 5. e

E. 1. A substance that attracts iron is called a magnet. 2. Chemical name - Iron oxide Chemical formula - Fe_3O_4
3. A simple device used by navigators and pilots to find the direction. 4. Earth is not a huge magnet but has a weak magnetic field. 5. Should not be hammered, dropped on hard surface.
Also a magnet should not be heated as it loses its magnetism.

F. 1. A bar magnet has two poles one is the south pole and another is the north pole. It works like a magnetic material.
2.

Natural Magnet	Artificial Magnet
Has a weak magnetic field.	Has a strong magnetic field.
Occurs naturally in the earth.	Is man-made
eg Iron oxide	eg Bar Magnet

3. Compass used to know the direction
❖ Toys, doorbells, head-phones, comeras etc. ❖ Objects are seperated using magnets. 4. (a) By heating a magnet it looses its magnetic strength.

(b) By placing two opposite poles of a magnet together for a long time. 5. (a) Magnets are used in compass to know the directions. (b) Used in large waste dumps to seperate magnetic and non-magnetic material.

G. 1. Greeks were the first people who discovered ..... shoe magnets, bar magnets etc. 2. Each magnet has two poles, north pole and ..... is maximum at poles.

13. Light

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

B. 1. Natural, artificial 2. Vertically 3. Full 4. reflection 5. virtual image

C. 1. ✓ 2. ✓ 3. ✗ 4. ✗ 5. ✓

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

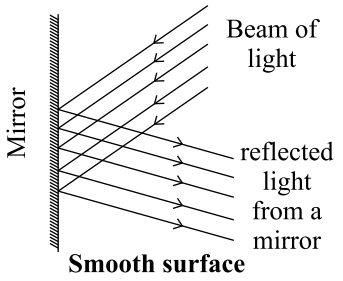
E. 1. Light is an invisible energy which causes the sensation of vision in us.

2. Speed of light in vaccum is 3×10^8 m/s. 3. Yes, light rays travel in straight line called as rectilinear propogation of light. 4. Pole star is the brightest star that appears nearest to either pole at any particular time.

F. 1. This is possible because of scattering of light in air which makes the light enter the place and make it glow. 2. Pinhole camera is used to capture the movement of the sun over a long period of time. ❖ It is used for experiments to study the working. 3. Because an opaque object does not allow the light to pass through it, hence light is blocked thus a shadow is formed. 4. Transparent objects : Which allow the light to pass through them freely. Translucent objects : which allows the light to pass through them partially

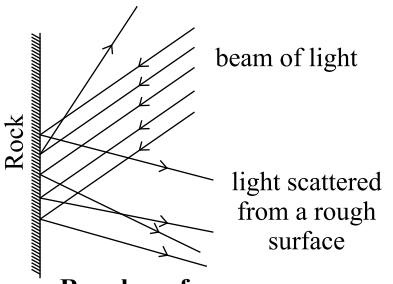
Opaque- objects : Which do not allow the light to pass through them.

G. 1. A mirror does not let light pass through it. It is an opaque object. A mirror has a smooth ..... continue to travel parallel to each other.



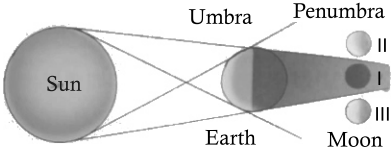
Smooth surface

If reflected light continues to travel as parallel rays, then a clear image is formed on the reflecting surface.



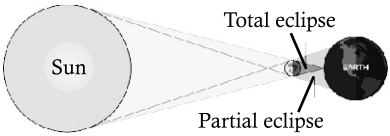
Rough surface

2. **Lunar eclipse :** When the earth comes in between the sun and ..... region of the shadow we see partial eclipse.



Solar Eclipse

3. **Solar eclipse :** When the moon comes in between ..... region see a partial solar ellipse.



Solar eclipse

14. Importance of Water

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

B. 1. Excess of mineral salts
2. Photosynthesis 3. Car engine
4. increases 5. Circulation

C. 1. ✗ 2. ✓ 3. ✓ 4. ✓ 5. ✗

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

E. 1. Water contains gases such as oxygen, hydrogen etc. 2. Water is called a universal solvent because it can dissolve many substances. 3. The main source of water are rains rivers, ponds, lakes etc. 4. By drought we means when there is scarcity of water in the nearby region.

F. 1. Water is used for bathing, cooking, drinking, making electricity etc. 2. The three states of water are- solid, liquid and gas. 3. Condensation refers to the turning of vapour into water. 4. Rainwater harvesting means collecting the rain water for presservation of water and to renew the water sources, so that they are not finished forever.

G. 1. Importance of water are as follow :
❖ All the chemical ..... during all such reactions. ❖ Nutrients travel from one ..... mainly consists of water. ❖ Water is used to ..... evaporation and sweating. ❖ Water dissolved in the soil contains ..... to different parts of the plants. 2. Uses of water are : ❖ For Agricultural uses ..... is needed for producing a crop. ❖ For industrial uses- Water is used ..... of waste etc. ❖ For household domestic uses - we need ..... bathing, cooking, washing etc. 3. To show that water is present ..... which condenses on the surface of apple. 4. Too much rain is also ..... and animals life. There is loss of life and property.

15. Air Around Us

A. 1. a 2. b 3. a 4. a 5. c

B. 1. air 2. 21 %, 78 % 3. water vapour
4. respiration, burning
5. burning

C. 1. ✓ 2. ✓ 3. ✗ 4. ✗ 5. ✓ 6. ✓

D. 1. b 2. d 3. c 4. a

E. 1. Gases present in air are Nitrogen gas, Oxygen gas, Carbon dioxide gas, water vapour. 2. Transpiration means water movement through a plant and its waporation from aerial parts, such as leaves stems etc. 3. When soil is added to water then air present in th soil is released due to this bubbles are released in water. 4. Air is composed of different gaseous matter and is invisible. Though it was invisible we can still feel its presence.

F. 1. Water vapour escapes from the plant mainly through the stomata present on the leaves. 2. Upon heating the ..... regulates the temperature on earth. 3. Earth is a unique planet as it ..... has the highest concentration of oxygen.

G. 1. Air is composed of different ..... can feel the presence of air as- ❖ When we switch on the fan, we feel the flow of air. ❖ When wind blows, we feel the pressure of air. ❖ When wind blows, we can see the papers ..... living organism can survive without air. 2. Carbondixoide helps plants in photosynthesis. Plants absorb ..... During this process oxygen is liberated.

16. Waste Management

A. 1. d, 2. a, 3. d, 4. c, 5. a

B. 1. Waste, 2. Non-biodegradable,
3. Plastic, 4. biodegredable
5. Cowdung

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓ 5. ✓

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

E. 1. Landfilling means placing west underground and covering it with soild. The waste is dumped and packed in with the use of bulldozers. 2. Incineration is the burning of waste. The heat released by burning waste can be used to generate electricity. 3.

Recycling of waste means to reuse the waste in some other form. It helps in reducing waste and use it in future. 4. Compost can also be prod-uced with the help of earthworms. This is known as vermiculture. Kitchen waste, like vegetable and fruit peel can be used to make vermicompost.

F. 1. Various sourcesof waste are Metal waste, Plastic waste, Waste Glass

2. Waste can be controlled by Minimize use, Reuse, Recycle 3. Organic waste converted into compost by using vermi-culture cheek it or by land filling. 4. Agricultural waste consists of many harmfull components such as nitrogen and phosphorous which is very harmfull for the atmosphere.

G. 1.

Biodegradable waste
1. Waste that can be broken down into simpler substance 2. They rot easily in short duration. 3. Easy to finish 4. eg- vegetables, fruits peels, domestic sewage etc.
Non-Biodegradable waste
1. Waste which cannot be broken down into simpler substance. 2. They do not rot easily. 3. Difficult to finish 4. Plastic bottles, glass, ceramics etc.

2. Metal waste consists of metal parts and to be ..... and given to metal scrap dealers.

Science Creation - 7

1. Nutrition in Plants

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

B. 4. Air, 3. Heterotrophs

2. Photosynthesis, 1. Saprotrophs, 5. Photosynthesis

C. 1. (✓) 2. (✗) 3. (✓) 4.(✗) 5.(✓)

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

E. 2. CO_2, Water & Sunlight

3. Carbohydrates, proteins, fats, vitamins.

1. The process of taking food by an organism and its utilization by the body is called nutrition.

F. 1. Organisms like green plants ..... They are called autotrophs.

2. Saprophytes like fungi secrete ..... obtains nutrition from it. 3. Lichens are the example of ..... provides food to fungus. 4. The fungi living in the soil feed on ..... to the soil, which are then absorbed by the plants.

G. 1. All kinds of animals consuments or other ..... living organisms are called heterotrophs. 2. Photosynthesis occurs in the cells of ..... solar energy falling on in and uses it to make food for the plant.

2. Nutrition in Animals

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

B. 1. Ingestion, Digestion, Absorption, Assimilation and Egestion.

2. gall bladder, 3. Mouth, 4. Vieli 5. Cud

C. 1. ✗ 2. ✓ 3. ✗ 4. ✓. 5. ✓

D. 1. c, 2. d, 3. e, 4. a, 5. b

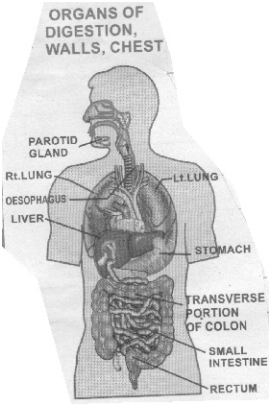
E. 1. Various use of nutrients by an organism for harvesting energy, building body. ..... diseases, is called nutrition. 2. Mouth, Stomach, and Small intestine. 3. Animals take food in the body through the mouth or some similar structure. Such a mode of nutrition is called holozoic nutrition.

4. The process in which the absorbed food is taken in by body cells and used for energy, growth & repair is called assimilation. 5. Goat, cow.

F. 1. Animals such as cows, deer, sheep,

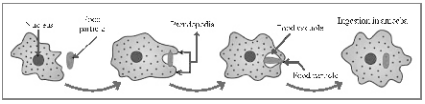
goats, buffaloes, cannels ..... through the digestive system of a ruminant.

2.



3. ORS-Oral Reyhdration Solution is given to the persons suffering from ..... cooled water with a pinch of salt and some sugar dissolved in it.

4. The ingestion of food takes place through ..... undigested remians are dischared at the surface of amoeba.



G. 1. Process of digestion in Man–Digestion of ..... and fats into fatty acids & glycerol. 2. (a) Amoeba–Amoeba proteus lives on ..... walls and assimilated in the cells. 3. The small intestine is made up of three parts ..... and fats in the fatty acids and glycerol. 4. We have four types of teeth. Such as- 1. Incisors (Cutting teeth)–The flat and sharp form front teeth of each jaw are called incisors. They used to bite or cut food are into small pieces. 2. Canines (Tearing teeth)–On both sides of the incisors on each jaw, is a sharp, pointed tooth called the canine. They are used to tear food. 3. Premolars (Grinding teeth)–These are broad and flat teeth. They grind food and convert it into fine pieces. These are two premoloars, next to each canine. 4. Molars : The remaining teeth in the jaw are also broad and flat. The last 2 or 3 teeth on both sides of each jaw are the molars. These teeth are also used to crush and grind food. 5. Differentiate between the digestive systems of human and ruminants.

Digestive System of humans	
1.	Stomach is divided into two Chambers.
2.	Rumen is not found in humans.
3.	Cellulose cannot be digested in humans.
4.	Methanogens (microorganisms are not found in stomach.)
5.	They can not store large amounts of food in stomach.
Digestive system of Ruminants	
1.	Stomach is divided into four Chambers.
2.	Rumen (a part of Stomach) is found.
3.	Cellulose can be digested in rumtinants.
4.	Microorganisms (methanogens) are found in stomach Ruminants.
5.	They can store large Amounts of food in rumen.

3. Weather, Climate and Adaptation in Animals

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

B. 1. Climate 2. Heat, Environment 3. Polar 4. Frog, bear 5. Camels

C. 1. ✓ 2. ✗ 3. ✓ 4. ✗ 5. ✗

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

E. 1. The day to day conditions of ..... the weather at that place. 2. Humidity is the amount of water vapours present in the air. 3. The climate of in our country varies from tropical climate in the ..... increases; altitude is the height of the place above sea level.

F. 1.

Weather	Climate
The day to day conditions of the atmosphere at a place in terms of temperature, humidity, rain-fall, wind speed, etc. is called the weather.	The average weather pattern taken over a long time say for 25 years is called the climate of the place.
The weather of the place changes day after day and week after week.	The climate remains same for longer .

2. Camels are marvellously adapted to live in desert. ..... This helps the camel to conserve water. 3. **Migration :** Periodic movement of animals ..... some example of migratory animals.

G. 1. The climate of a place affects the plants and animals and people ..... are a result of the process of evolution. 2. The temperature in a tropical rainforest rarely ..... leopards, lizards, snakes, birds and insects. 3. Polar bears are adapted to live ..... its surroundings without sweating. This helps the camel to conserve water.

4. Soil

A. 1.(c), 2. (d), 3. (b) 4. (d)

B. 1. Top Soil, 2. Loamy Soil, 3. Kerala and Tamil Nadu, 4. Clayey Soil, 5. Strong Winds

C. 1. ✓ 2. ✓ 3. ✗ 4. ✓ 5. ✓, 6. ✗

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

E. 1. The upper layer of land on the surface of the earth's crust is called soil. 2. Red Soil, Black Soil, Alluvial Soil, Desert Soil, Mountain Soil, Laterite Soil. 3. Top Soil (A- Horizon), Sub Soil (B-Horizon) and Parent rock (C-Horizon). 4. Soil is useful for us in many ways as ..... on the earth. Plants need soil to grow.

F. 1. Soil is a mixture of minerals, ... algae and protozoa, etc. 2. When rain falls water enter the crevices ..... an important role in the weathering of rocks. 3. Red colour of soil is due to presence of ..... Madhya Pradesh and Odisha. 4. A-Horizon (Top Soil) is the upper most layer of the ..... and has a large water holding capacity.

G. 1. The soil is found in layers, ... of the soil are topsoil, subsoil and the parent rock. 2. **Formation of Soil:** Soil has been formed from parent ..... Weathering is the very slow and gradual process. 3. Being a farmer, ... protect the soil :- ❖ To protect Soil Erosion : Growing trees and plants (Afforestation) : Step farming, soil cover ❖ Construction of River embankments and Dams : Preventing overgrazing. ❖ To increase soil fertility: Crop rotation often used by farmers

4. On the plains the erosion of soil in farmlands ..... way soil cover prevents soil erosion.

5. Respiration in Organisms

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

B. 1. Carbon dioxide 2. Chemical energy 3. Anaerobic 4. Cellular respiration 5. Body.

C. 1. ✗ 2. ✓ 3. ✗ 4. ✗ 5. ✗ 6. ✗

D. 1. c, 2. d, 3.e, 4.a, 5.b

E. 1. Taking in oxygen rich ..... called

breathing. 2. Cellular respiration, in presence of oxygen ..... water and carbon dioxide are produced. 3. Cellular respiration ..... as anaerobic respiration. 4. Stomata are tiny ..... takes place.

F. 1. Insects have branched respiratory ..... down movements of the insect body. 2. At the time of inhalation diaphragm contracts ..... so lung contract results the forcing out of air from lung. 3. Respiratory organs in different animals (i) Unicellular animals ..... the movement of oxygen and carbondixoide (ii) Skin-earth worm (iii) Gills - fish (iv) Lungs - Higher vertebrates

4.

Inhalation	Exhalation
1. Diaphram contracts and flatters.	1. Diaphragm relaxes and becomes dome shaped.
2. Volume of chest cavity increases.	2. Volume of chest cavity decreases.
3. Lungs expand	3. Lungs contract.
4. Air flowers into lungs.	4. Air is forced out of the lungs.

G. 1. The air that we breathe in passes through the nostrils. ..... the windpipe at regular intervals. 2. Respiration is the chemical breakdown of food to ..... Oxygen, Water carbon dioxide

3. The plants normally do not have nay organ ..... below that in soil, so maintaining a diffusion gradient.

6. Transport of Substances in Plants and Animals

A. 1. (a), 2. (a), 3. (a), 4. (d), 5. (a) 6. (b) 7. (b)

B. 1. Red Blood Cells,
2. Simple Diffusion, 3. Arteries,
4. Oxygen 5. 70–72,

C. 1. ✓, 2. ✗, 3. ✓ 4. ✓ 5. ✓

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

E. 1. Blood looks red because of the pigment haemoglobin in red blood cells. 2. Blood is made up of Red blood cells (RBCs), white blood cells (WBCs) and blood platelets. The fluid portion of the blood is called plasma. 3. The flow of blood in an artery is called a pulse.

4. The process of evaporation of water from the pores called stomata present on the surface of leaves is called transpiration.

F. 1. Food synthesised in the leaves is transported to other parts of the plants through phloem tissue. Food is transported to all parts of the plant body by the process of translocation.

2. The kidneys filter and purify blood, throwing out the impurities through the urine. If the kidneys become diseased and decreased functioning, the blood gets poisoned and the patients dies. In such situation, it is by the process of dialysis that waste products and excess fluids are removed from the blood. 3. White blood cells defend the body against the disease-causing germs that harm the body. 4. Lymph contains cells (WBCs) called lymphocytes that protect the human body from disease causing organisms and substances.

G. 1. Minerals are present as dissolved salts in the soil. The amount of mineral salts is less outside the root hairs as compared to that inside the root hairs. So, the mineral molecules cannot enter into the root. They are absorbed from the soil by active transport. This process consumes some energy. The absorbed mineral molecules move upwards through xylem, the process is called accent of sap. 2. Haemoglobin combines with oxygen make oxy-haemoglobin and helps in the

transportation of oxygen. The cells will be deprived of oxygen if there is lack of haemoglobin. Its deficiency in blood may cause anaemia. 3. The carbon dioxide rich blood from all over the body except lungs is collected by two major veins Superior vena cava and inferior vena cava. Blood from these veins enters the right auricle. The right auricle contracts and passes the blood into the right ventricle then it is pumped into lungs by pulmonary artery. In the lungs, the blood gets oxygenated and enters the left auricle by pulmonary vein. From the left auricle, oxygenated blood passes to the left ventricle. This oxygenated blood is then pumped to all parts of the body.

7. Reproduction in Plants

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

B. 1. Vegetative Propagation,
2. Unisexual Flower, 3. Pollen Tube,
4. Ovary, 5. Colourful and scenty

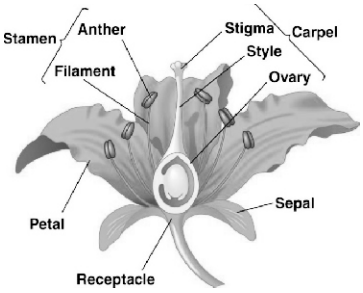
C. 1. ✗, 2. ✓, 3. ✗ 4. ✗, 5. ✗

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

E. 1. In a flower stamens and pistil are the reproductive parts in plants. 2. When both male and female gametes unite to form a new organism, it is called sexual reproduction. 3. If an organism is cut into pieces and each piece gives rise to a complete organism. Example : Planaria. 4. The fusion of male and female gametes is called fertilization.

F. 1. **Cross-pollination:** The transfer of pollen grains from the anther of one ..... winds and water. 2.Vegetative propagation is the ..... stem, root, leaves etc. 3. Dispersal of seed is necessary because if all the ..... the fruits and seeds are carried away to distant places.

G. 1. **Structure of a typical flower:** A flower is a reproductive part of a ..... The sepals protect the parts of the flower before it blooms.



Petals are either coloured or white and are only ..... more ovules. Ovules contain the egg cells, the female gametes. 2. The transfer of pollen grain to the stigma of a flower is called pollination. ..... conditions, they germ-inate into a new plant.

3. **Advantages of artificial vegetative propagation :** It's a cheap and rapid method of propagation of plants and these ..... raised with desired features by choosing features in parent plants. 4. **Various ways of dispersal of seeds :** By Wind : Seeds such as those of drumsticks and maple, ... dried fruit explodes, spreading the seeds away from the mother plant.

8. Fibre to Fabric

A. 1. d, 2. a, 3. b, 4. d, 5. c

B. 1. Incubation of, 2. Wool, 3. Coarse hair 4. Mulberry leaves

C. 1. ✗ 2. ✓ 3. ✗ 4. ✗ 5. ✓

D. 1.c, 2. d, 3. e, 4. b, 5.a

E. 1. Silk, wool, 2. The fibres which are from animal and plant origin are called natural fibres. 3. Lohi, Nali, Bakharwal and Marwari. 4. The fleece of the sheep along with a thin layer of skin is removed from its body, This process is called shearing.

F. 1. Breeding between two different breads of sheep by selecting parent sheep of good qualities for obtaining a desirable baby sheep is called cross selective breeding. 2. Cotton fibre is

from plant origin and ..... shiny black beads, which crumble on pressing. 3. Cocoons of silk worm are boiled or heated in ovens, ... used for weaving clothes. 4. About 5500 silkworms are required to produce one kilogram of raw silk.

G. 1. The fleece of the sheep along with a thin layer of skin so removed from ..... are spun and woven into wollen cloth. 2. Is the amount of usable silk from each cocoon ..... time that's why silk is so expensive. 3. Workers employed in the sericulture industry ..... water during the process of killing the insects.

9. Heat Flow and Temperature

A. 1.c, 2. a, 3.a, 4. b

B. 1. Temperature, 2. Fahrenheit f or celsius C, 3. expand, 4. 100° & 0°C, 5. Non SI unit - Colorie, SI unit-joule

C. 1. ✓ 2. ✓ 3. ✗ 4. ✗ 5. ✓ 6. ✗

D. 1. c, 2. d, 3. e, 4. a, 5. b

E. 1. Most metals like iron and copper are electrical conductors. Those metals are used to make wire to carry electric current. 2. (i) Electric bell (ii) The metal caps on glass bottles can be loosened by pouring hot water over ther metal cap. The metal cap expands on heating & looser. 3. Conductor– The substance that allows heat energy to transfer through it. 4. Joule 5. Thermometer – a device used for measuring temperature.

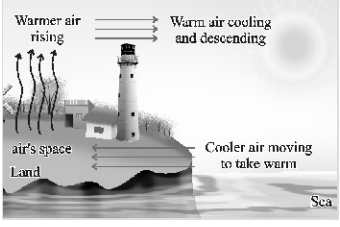
F. 1. Heat - Heat is a form of energy, Heat energy can neither be created or dest-oryed. it can only be conv-erted into other forms. 2.(i) Heat causes increase in temperature. (ii) heat causes expansion (iii) heat causes change of state. 3. The calorie is an older unit of heat. The quantity of heat required to raise the temper-ature of 1 gm of water by 1°C is called one calorie. 4. Mercury is used in thermameters because it has high coefficient of expansion. Hence the slightly change in temperature is notable, it also has a high boiling point which makes it suitable for measuring higher temper-atures. 5. The objects that allow heat energy to blow faster through them are good conductors. eg-metals. While the objects that do not allow fast flow of heat energy through them are bad conductor. eg-wood, glaas, plastic & air.

G. 1. Thermos Flask is also called ..... radiation and outer insulation of heat.

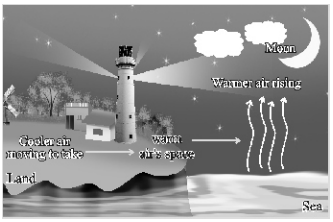
2.

Heat	Temperature
It is a form of energy.	It is the degree of hotness or cold-ness of a body.
Heat causes a change in the temperature of a body.	
It is measued in joules or calories.	It is measured in degree celsius or degree fahrenheit.

3. Land Breeze-It flowers during the night. The land is cool ..... sea by the rising warm air, over the sea causing land breeze to blow.



Sea Beeze- It flowers during the day. The land gets heated ..... sea flows to fill the empty. Space created over the land by the rising warm air, causing sea breeze to blow.



4. Fill a wide-mouthed bottle with tap water. Place a frying pan ..... to take its place. This gives rise to connection current through which energy flowes in a liquid or gas.

10. Acids, Bases and Salts

A. Tick (✓) the correct option:

1.b, 2. b, 3. c, 4. a 5. a

B. 1. Finding out acid or base,
2. Sodium hydroide 3. Sour in taste,
4. Sodium klydroxide 5. Weak,
6. Natural acids.

C. 1.✓, 2.✓, 3.✓, 4.✓, 5.✓

D. 1. Turmeric, bryophyllum leaf, china rose, red cabbage etc.

2. Tastaric acid.

3. Some acids are used in manufacture of fertilizers, petroleum products. HCL-Hydrochloric acid is made in stomach which helps us to digest food.

4. Calcium hydroxide $Ca(OH)_2$ Potasium hydrokxide KOH Sodium Hydroxide -NaOH

E. 1.

	Acid	Bases
1.	They are sour in taste	They are bitter
2.	They turn blue	They turn red litmus blue
3.	Acids have part less than 7	Bases have part more than 7
4.	Strong acids cause burn on skin	Bases have soapy feel, they don't burn skin

2. Properties of bases (i) Bases are hydroxide of metals. (ii) Bases have a bitter taste (iii) Bases turn red litmus bure (iv) Bases have a soapy feel.

3. A reaction between an acid and abase ..... by vinegar (a weak acid). 4. Repeated (question 1)

5. (i) No effect (ii) It turns red (iii) Becomes when lemon juice is added pall yellow (Lemon juice-citric acid) (iv) No colour with pehnolph-tolein

F. 1. Salt-A substance formed by the neutralization reaction of an acid with a base. properties. 1. Some salts are soluble in water while some are not. 2. Some salts are basic, they have the properties 3. Some salts are acidic, they have the properties of an acid. 4. Some salts are neutral, they are neither acidic nor basic. Table salt is a neutral salt.

2. Uses of bases 1. Sodium hydroxide-(Caustic Soda)–(i) Used to manufacture soap. (ii) Commonly used as laboratory reagent. (iii) Used in manufacture of synthetic fibre like & rayon. 2. Calcium oxide–(i) used in manufacture of glass and cement. (ii) Used to neutralized the acidity of soil.

(iii) Used a drying agent 3. Magnesium hydroxide and Calcium hydrovide- (i) Both these bases are used as antacids to neutralize acidity in stomach. 4. Calcium hydroxide–(i) The water solution ..... as a laboratory reagent. (ii) Used to manufacture of bleaching powers. (iii) The milk of lime is used in white washing. 3. Neutral Substances : Subst-ances ..... a natural solution is obtained. 4. Types of bases Strong bases : The oxide and hydroxides of sodium and potassium are strong bases eg., ... hydroxide ($Zn(OH)_2$). Water is also a weak base.

11. Physical and Chemical Changes

A. 1. d, 2. c, 3. d

B. 1. neither, destroyed, balanced 2. Sodium-bicarbonate 3. Physical 4. chemical 5. chemical

C. 1. ✗ 2. ✗ 3. ✓ 4. ✗ 5 .✓

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

E. 1. When iron is left exposed ..... which we call rust. 2. Physical change 3. (i) Combination reaction
(ii) Decomposition reaction
(iii) Oxidation reaction
(iv) Reduction reaction
4. A change in which one or ..... formed, is called chemical change.

F. 1. In a chemical reaction (i) There is a reaction between two or more substances. (ii) One are more new substances are formed. ..... the substances before the change. 2. Setting of curd is a chemical change because we ..... the milk in taste, smell and chemical properties. 3. Change in which a substance ..... of liquids into solids, glowing of bulb, boiling of milk etc.

G. 1. In a burning candle there are both physical and chemical ..... which are different than before, it is a chemical change. 2. In a chemical change ..... between two or more substances. (ii) One or more new substances are formed. (iii) Most chemical formed after ..... different in nature to the substances before the change.

Physical Change	Chemical Change
(i) A physical changes affects only the physical properties of a substance, such as shape, size and state.	A Chemical change is the result of a chemical.
(ii) No new substances are formed.	One or more new substances are formed.
(iii) The physical change can be either reversible or ireveresible, mostly reversible	Chemical change is mostly irreversible.
(iv) The substance after the change is identical in nature to the substance before the change.	Substances formed after the change are altogether different in nature to the substances before the change.

12. Motion and Time

A. 1.d, 2.a, 3.c, 4.c

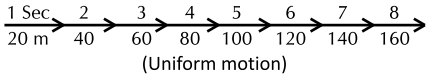
B. 1. Scaler 2. Distance 3. Jantar Mantar, 4. 24 5. 3×10^8

C. 1. ✗ 2. ✓ 3. ✓ 4. ✗

D. 1. Motion - The action or process of moving ..... is called motion. 2. Speed - The distance covered by a moving object in unit time in known as the speed. 3. S.I. unit of time is a second. 4. Solar day–It is the time that takes for the earth ..... 24 hours or 86400 seconds in a solar day.
5. Characteristics of Motion - To determine the motion of a moving body, the following ..... the moving body was and where it will be in future.

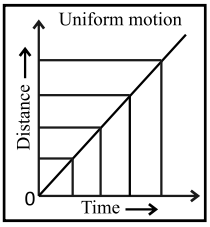
E. 1. Speed of a vehicle - Total distance/ Total time taken 2. Sundial–It is based on the fact that the position and the length of the .....of the shadow was utilized to mark the time of the day. 3. Speedometer is a device, used in a motor, vehicle etc to indicate the speed of the movement of vehicle. 4. Speed = Distance/Time distance - 4 km time = 3 seconds
Time in hours = 3/3600
Speed =Distance/Time = 4800 km/hr

F. 1. Sundial is based on the principle that the position and ..... after sunset or on a cloudy day. 2. Uniform motion
Eg - A motor car in running at a constant speed of 20 meters per second, since it is at a constant speed, it will cover 20 meters every second.



(Uniform motion)

This can be shown by above graph. The distance travelled is directly proportional to the time, so in the graph the distance time will be a straight line.



3. Motion - To determine the motion of a moving body. ..... states of a moving body are - 1. Uniform motion and 2. Non -uniform moation
Uniform moation - A body is said to have uniform motion, if it travels equal distances in equal intervals of time.
Non-Uniform motion - A body is said to have non-uiform motion, if it travels unequal distances in equal intervals of time.

13. Electric Current and Circuits

A. 1.d, 2.d, 3.a, 4.c 5. c

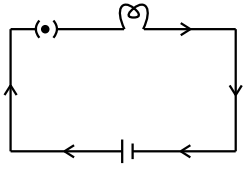
B. 1. increase, 2. nichrome wire 3. open 4. light, heat, 5. complete, ON

C. 1.✓, 2.✓, 3.✗ 4.✗ 5.✗ 6.✓ 7.✗

D. 1.e, 2.c, 3.a, 4.b, 5.d

E. 1. Electric current – Is the flow of electron in one direction in a circuit. 2. Electric circuit–The path along which an electric current flows. 3. Power source, load, wire and switch. 4. A circuit diagram is a simplified conventional graphical representation of an electrical circuit.
5. Oersted (1820) a scientist, performed an experiment which proved the magnetic effect of a current. 6. A region around a magnetic material or a moving electric charge within which the force of magnetism acts.
7. 1. ⏚ 8. Electric room heater, electric iron, electric kettle and electric toaster. 9. The fuse is a safety device that prevents excessive current from flowing in a circuit and prevent fire and damage due to short circuit.

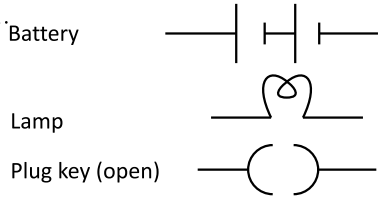
F. 1. Cell, battery, Lamp, wire, plug, switch. 2. Closed circuit is meant to be a circuit activated by a switch that "closes" a circuit loop and allows current to flow. open circuit is a condition when an electrical terminal is not connected to any impedance (facing infinite value for impedance).
3.



4. When a current flowes through a conductor ..... aster heat, eletric oven, electric heater etc. 5. The amount of heat produced by an electric ..... the greater is the heat produced. 6. When an electric current flows through a conductor, a part of the electric energy ..... music systems and computers have vents to allow air to cool them. 7. A soft metal core made into a magnet by the passage of electric current through a coil surrounding it. 8. Electromagnet is a coil with a core of iron nail/bar which act as a magnet only when electric current floues through it. 9. Earthing is done to protect the

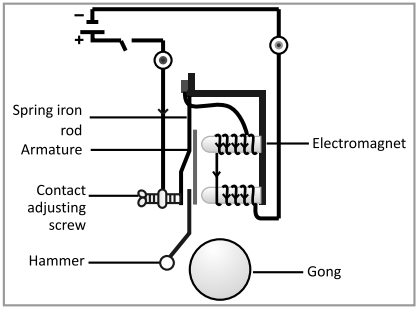
user from any accidental electric shock. One of the three wires coming from the main supply line is called earth wire. The other end of the earth wire is connected to a large metal plane burried deep about 5 meters inside the earth.

G. 1.



2. Advantage of heating effects of electric current : The common ..... is passed through the element, it produces heat energy. 2. Uses of electromagnet (i) We use electromagnets in cranes used to lift ..... of the current through the electromagnet (ii) Electromagnets are used in telephones, telegraphs, loudspeakers, electric bells etc. (iii) Electromagnets are also used in clinical apparatus to remove magnetic foreign bodies like iron fillings from a patient's body part.

4. Electric bell



Working of electric bell : When the switch is 'On', the ..... like a magnet thus, repeating the same process.

14. Light

A. 1. c, 2.b, 3.c

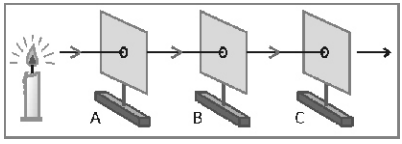
B. 1. Luminous, 2. Straight 3. luminous, 4. regular, diffused 5. lens

C. 1. ✗ 2. ✓, 3. ✓ 4. ✓ 5. ✗

D. 1. Light - It is a form of energy, which produces the sensation of light in our eyes. 2. A portion of a line which starts at a point and goes off in a particular direction to infinity.

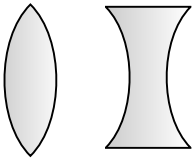
3. (i) The regular reflection caused by plane mirrors can be used to record picture for television showes. (ii) A dentist uses a plane mirror to look at the inaccessible teeth of a patient. 4. The lens which is bounded by two transparent spherical (concave) glasses is termed as concave lens. 5. A spectrum is a condition that is not limited to a specific set of values but can vary, without steps, across a continuous. 6. White light is actually made up of rays of seven colours known as spectrum.

E. 1. Take their square pieces of card board of the same size (each of about 10 cm × 10 cm) place them one upon another. On the uppermost cardboard draw diagonals as shown in figure. Make a hole with the help of a sharp nail at the point of the inters-ection of the diagonals through all the card boards. Fix the card board along small wooden blocks with the help of cellotape arrange the blockes with cardboard A, B and C is a straight line along the edge of a table as shown in figure (b), keep a lighted candle near the hole of the carboard, labelled as 'A', so that



the flame of the candle is at the same height as the hole in the cardboard. Look from the side of cardboard C. You will notice the candle flame is

visible. It is because light travels in a straight line. 2. Uses of spherical mirrors - concave ..... mirror makes things appear smaller. 3. For motion of rainbow- The rain drops act like tiny prism and the sunlight after passing through these prism splits into seven colours (A prims is a glass pyramid bounded by four triangular, trans-parent glass surfaces). 4. Lens–It in a transparent medium which is bounded by at ..... bounded by two transparent spherical concave glasses.



F. 1. Letters or Alphabet, in which the image formed in a plane mirror appears exactly like the letter itself are - A, H, I, M, O, T, U, V, W, X.

2.

Luminous Object	Non-Luminous Objects
Any objects that generate light are called luminous objects.	Objects that do not generate light are called non-luminous objects
Eg. the sun, a glowing bulb, a lighted candle	Eg-A book, a chair and human body.

3. Image - An image is an actual representation of an ..... image is always real but laterally inverted.

15. Winds, Storms and Cyclones

A. 1. d, 2. b, 3. a, 4.c, 5. d

B. 1. Eastern ghats

2. Odisha, Andra pradesh, Tamilnadu, West bengal 3. Breeze

4. 118-133 km/h 5. storm.

C. 1. ✗ 2. ✗ 3. ✓ 4. ✗ 5. ✗

D. 1.b, 2.d, 3.a, 4.e, 5.c

E. 1. Wind is a flowing of air. 2. Altitude is the height of a place above sea level. 3. Thunderstorms are formed in a humid region where large masses of cold air and warm air meet. 4. Two types of winds - Trade winds, polar winds. 5. Lightning and Thunder result from attraction bet-ween opposite charges. 6. A tornado is a rapidly rotating column ..... cases, the base of a cumulus cloud.

F. 1. The Indian meteorological department (IMD) provides advance warning to the people.

2. Hurricanes - These are tropical ..... cyclones that orginate in china sea.

3. A tornado is a rapidly rotating column ..... or in rare cases, the base of a cumulus cloud.

4. Rain clouds are formed when warm air moves ..... water droplets or ice crystal and forms clouds.

5. Safety measures in case of cyclone alert (i) Remain indoor when a cyclone warning has been issued. (ii) Store enough drinking water and food. (iii) Close and heavily tape all windows and lock doors. (iv) Turn off power, gas and water. (v) Stay inside and shelter (wall clear of window) in the strongest part of the house. (vi) Keep a fire aid kit ready. (vii) Check for gas leaks after a cyclone Don't' use electric appliances, if wet. (viii) Do not go outside or into a beach during the storm.

G. 1. As the warm air rises, it cools and some of the vapour ..... It causes sudden heavy rain along with lighting and strong winds.

2. Cyclones are large revolving tropical storms caused ..... cyclone

warning centres of different regions.

3. When the surface of land or water warms up, the air above it becomes warm. When air ..... the amount of air, the lesser is the pressure at ground level.

16. Water : A Precious Resource

A. 1.c, 2.c, 3.c, 4.a

B. 1. Summer, 2. ground water,
3. wells and handpumps
4. ice, water, water vapour
5. deserts

C. 1. c, 2. d, 3. e, 4. b, 5. a

D. 1. Natural resources like water and air, which are constantly renewed through rapid natural cycles are called renewable natural resources.

2. Uses of water - (1) For industries
(2) For agriculture (3) Domestic usage of water at homes.

3. Because ocean water is salty and also not safe for drinking and other activities.

4. Water is important for us to fulfil needs of increasing population in construction of houses, roads, for agriculture and industries.

E. 1. Ground water recharged can be defined as water added to the aquifer. The rain water has collected in the empty space below the parous layer of rock is known as aquifer the water remains there because below it is a hard layer of rock, which prevents water from moving further down wards. Groundwater rechare is done to restore water underground to increase watertable. it can be done by rainwater harvesting and construction of check dams. Rain water is collected (by rainwater harvesting) can be stored for direct use or can be allowed to reach the ground water. Once the water reaches the ground water, water tabl is raised.

Checkdams-Rian water percolates into the soil only if it does not flow away quickly. Water can be prevented from flowing away by constructing check dams in the path of its flow.

2. Water table may go down if the water is not sufficiently replenished. This may occur due to various reasions (i) Increasing population which increases the demand for construction of houses, roads etc. (ii) Increasing industries used a lot of ground water. (iii) Agricultural activities like irrigation of crops due to population demand.

3. Some ways to conserve water at home: (i) We should not waste water by not leaning the tap open while brushing our teeth, having bath, washing clothes. (ii) Reparing dripping taps immediately. (iii) Water plants early in the morning. (iv) Using bucket of water while washing vehicles. (v) Flushing the toilet uses a lot of water, by adjusting the ball cock to cut down the amount of water we use in flushing. (vi) Collect rain water in drums to use it for watering plants etc.

17. Waste Management

A. 1.c, 2.d

B. 1. waste 2. harmful 3. septic tank
4. sewage 5. polythene

C. 1. ✗ 2. ✗ 3. ✓ 4. ✗ 5. ✗

D. 1. Three good house keeping habits are
(a) day to day clean up
(b) waste disposed
(c) removal of unused materials

2. Municipal solid waste, industrial waste, agricultural waste and hazardus waste.

3. RCRA states that "solid waste" means any garbage or refuse, sludge

from a waste water treatment plant, water supply treat-ment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining and agricultural operations, and from community activities.

4. Sludge is a semi-solid slurry that can be produced from a range of industrial process, from water treatment, waste water treatment or on-site sanitation systems.

E. 1.Recycling is the process of converting waste materials into new materials and objects.

2. A bar screen is a mechanical filter used to remove large objects, such as rags and plastics, from waste water. It is part of the primary filtration flow and typically is the first, or preliminary, level of filtration, being installed at the influent to a waste water treatment plant.

3. Alternatively, leaking or flooding can cause completely untreated sewage to enter rivers and other water sources, causing them to become polluted. Contamination of water sources can cause diseases to spread, such as e-coli, diarrhea and hepatitis A. Even properly treated sewage can have its problems.

4. Most of the diseases resulting ..... inadequate sanitation is responsible for 4.0 percent of deaths and

5. 7 percent of disease burden worldwide.

F. 1. The basic function of waste water treatment is to speed up the natural processes by which water is purified. In the primary stage, solids are allowed to settle and removed from wastewater. The secondary stage uses biological processes to further purify wastewater. Sometimes, these stages are combined into one operation.

2. Bad impact on human health improper disposal of waste can greatly affect the health of the population living nearby the polluted area or landfills. Exposure to improperly handled wastes can cause skin irritations, blood infections, respiratory problems, growth problems, and even reproductive issues. 3. Treatment steps: 1. Screening and pumping. 2. Grit Removal 3. Primary settling 4. Aeration/ Activated sludge

5. Secondary settling 6. Filtration

7. Disinfection 8. Oxygen uptake.

Science Creations-8

1. Crop Production

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

B. 1. water, air and warmth

2. Autorops and heterotrophs

3. tilling 4. air and water

5. viral and bacterial

C. 1. (✗) 2. (✓) 3. (✗) 4. (✓)

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

E. 1. **Apiculture :** The rearing of honey been an large scale is called Apiculture.

2. **Weeding :** Weeding is the process ..... plants which from along with the useful crops. 3. **Bird flue :** It is a disease that is caused by a kind of virus that affects domestic poultry such as chickens and turkeys. 4. **Method of irrigation:** (i) Flood irrigation (ii) Brain irrigation (iii) Furrow irrigation (iv) Sprinkler irrigation (v) Drip irrigation (vi) Lift irrigation

5. **Animal husbandry :** Breeding of good quality animals feeding, weeding and earing of them.

F. 1. Sowing is the process of introducing seeds into the soil. Seeds have to be sown at a proper depth. they need water, air and warmth to germinate. Tilling circular air into the soil, which in done before sowing of seeds. 2. Drip irrigation : In this method small amounts of water are allowed to trickle slowly into the soil through mechanical devices. thus soil is welted without run off. 3. **Advantages of manure :** (i) It enhance the water holding capacity of the soil. (ii) It makes the soil porous due to which exchange of porous due to which exchanger of gases becomes easy. (iii) It increase the number of friendly microbes. (iv) It improves the texture of the soil. 4. Weeds are unwanted flowering plants. They complete with crops for water, soil nutrients, light and space thus, reduce the crop yield. We cab control weeds as: (i) By removal of weeds manually. (ii) By chemical methods : like 2, 4-D, isoproturon, sima zine and MCPA etc.

G. 1. Manure is an organic substance obtained from the decomposition of plants or animals wastes. Farmers dump plant and animal waste in pils at open places and allow it to decompose. The decomposed mater is used as organic manure. Fertilizers are chemical substances which are rich in a particular nutrient. Fertilizers are produced in factories. Some examples of fertilizers are : Urea, ammonium sulphate super phosphate, potash, NPK (Nitrogen, phosphorus, Potassium). Fertilizers make the soil less fertile and pollute the soil and water so in order to maintain the fertility of soil, we have to substitute fertilizers by organic manure. 2. Soil is prepared by following methods : (i) Ploughing : The process of losing and turning of soil is called ploughing or lotting. This is done using a plough (made of wood or iron). (ii) Levelling : After ploughing, the big chucks of soil are broken and the soil is pressed down lightly with a leveller. This process is called levelling. It helps preventing soil erosion and helps to distribute water evenly over the field. (iii) **Manuring :** The use of manures and fertilizers is called manuring. They supply the various requirements of nutrients to the plants. Tilling is very important as it allows the roots to penetrate freely and deeper. The loose soil allows the roots to breathe easily even when they are deep and they in turn secure the plant more firmly. The loose soil also aids the growth of worms and microbes present in the soil, who are friends of the farmer. 3. The supply of water to crops at different intervals is called irrigation. **Methods of irrigation :** These depends on the nature of soil, availability of water and type of crop. These are : (i) **Flood irrigation :** He used for flat and lavelled land, where plenty of water is available. Here water from an irrigation pump or canal is allowed in the field from a high level. (ii) **Basin irrigation :** For the crops requiring well irrigation conditions but water available for irrigation is loss, the field is made into basin like structure called basin irrigation. (iii) **Furrow irrigation :** It is used for row crops where crop is raised on the ridges and water is confined to the furrow. (iv) **Sprinkler irrigation :** When flood or furrow is not possible the water spread on the standing crops in the form of artificial rain and the method is called sprinkle irrigation. (v) **Drip irrigation :** In this, small amounts of water are allowed to trickle slowly into the soil through mechanical

devices. (vi) **Lift irrigation :** Water from underground well can be lifted by swinging basket method, by water wheel method, wind mills and mechanical power etc.

2. Micro-organisms

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

B. 1. microscope, 2. bacteria, 3. binary fission, 4. root and stem, 5. algae 6. plants animals

C. 1. (✗) 2. (✗) 3. (✓) 4. (✗) 5. (✗)

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

E. 1. Protozoa are unicellular organisms having animal like charameristics. 2. **Five methods of food preservation :** (i) Drying food items, (ii) Refrigerating. (iii) preserving in salt and sugar concentration. (iv) preserving in form of pickles. (v) Preparing jams. 3. A.V. Leeuwenhock discovered free cells in the form of bacteria, red blood cells etc. 4. Antibiotics produced by bacteria : (i) terramycin (ii) streptomycin 5. Autotrophic protozoan : Euglena 6. **Harmful effects of microorganisms are :** (i) Harmful bacteria spoil food and cause diseases in human beings, animals and plants. (ii) Some of the micro-organisms grow on our food and cause food poisoning.

F. 1. **Microorganisms :** These are micro-organisms are two small and are not visible to the unaided eye. Micro-organisms are classified in to five groups i.e bacteria, algal, protozoa, fungi and viruses. The branch of science in which we study micro-organisms is called microbiology. Anton Van Leeuwenhock, father of microbiology, first saw micro-organisms. 2. **Beneficial Bacteria :** (i) Bacteria help in production of vinegar, wines and alcohol by fermentation of fruit juice. (ii) Bacteria help in making curd from milk e.g- Lactobacillus. (iii) Many antibiotics like terramycin, streptomycin and aureomycin are prepared using bacteria. (iv) Symbiotic bacteria Rhizobium living in root nodules of the leguminers plant absorb atmospheric nitrogen and convert it into nitrogenous compound. (v) Anaerobic bacteria decompose animal waste to biogas which is used as domestic fuel. 3. Algal are the simple organisms that live in oceans, lakes, rivers, ponds and moist soil.

Uses : (i) Microscopic algae make and add huge amounts of oxygen into the atmosphere everyday. They contribute in sustaining life in earth. (ii) Some algae golden brown algae 'diatoms' contain silica- are used to make polishes, (iii) Algae are used as food and folder. Chlorella and spirulina are used for high protein value for us. Sea weeds ie, multicellular algae are used as folder animals. 4. **Pasteurization :** A french scientist named Louis Pasteur (1822-95), discovered that micro-organisms can be destroyed is a technique of preserving food especially mild. It involves heating milk to a temperature of between 72 c and 75 c for a period of 3o seconds before being cooled down immediately. This process kills approximately 99.5% of all micro-organisms in the milk. Pasteurised milk can be stored for five to six days in a refrigerator. Pasteurization is also used for preserving other food products such as fruits, juices, wine and dairy products. 5. Harmful effects of microorganisms : (i) Viruses cause many diseases in plants, animals and humans. (ii) Harmful bacteria spoil food and cause diseases in human beings, animals and plants. (iii) Some of the microorganisms grow on our food and cause food poisoning.

G. 1. Tiny organisms that cannot be seen

with the naked eyes, can be seen only through a microscope. These are as follows : ❖ Bacteria (singular : bacterium) ❖ Fungi (singular : fungus) ❖ Algae (singular : alga) ❖ Protozoa (singular : protozoa) ❖ viruses

Significance of micro-organisms on Earth-Micro organisms thrive in almost any kind of environment. They live in air, water, soil, hot springs, snow, saline water, decaying flesh and living bodies of other organisms. These extremely small organisms are the very foundation of marine and other aqatic food chains. A food chain is a community of organisms where each member is eaten in turn by another member. All marine food chains begin with micro-organisms floating on the surface of the oceans. The micro-organisms that live on the surface of water known as 'planktons'. Bacteria are used in the production of vinegar, wines alcohol, curd, antibiotics like Terramycin, streptomycin and auro-mycin etc. Algae are the source of oxygen, as food, agar gel and fodder for animals. Fungi such as mushrooms are eaten as food. Yeast has been used for making bread. Antibiotics such as penicillin is made from fungus penicillium. 2. **Bacterial diseases in human beings :** (i) E. Coli, clostridium botulinum Diarrhoea. (ii) Tuberculosis (TB) : Mycobacterium tuberculosis. (iii) Cholera : Vibrio (iv) Typhoid fever Salmonella typhae (v) Plague : Yersinia pestis (vi) Leprosy : Mycobacterium lepral. (vii) Pnemonia : Streptococcus pneumonae(viii) Meningitis : Neisseria meningitidis 3. Methods of Preservation of food at home : (i) By simply drying food items. (ii) By keeping them in refrigerator. (iii) By preserving in salt and sugar concentration. (iv) By preserving in the form of pickles. (v) By preparing jams and jellies.

4. **Viruses :** There are ultra microscopic organisms that live in a cell of another living thing. Viruses are found in other living things like plants, animals and human beings. They are also found in bacterial cell, where they are called bacteriophages. **Shape :** They have a variety of shapes. They may be rod shaped, polygonal, spherical and cuboidal. **Structure :** Their structure is very simple. There is just a core of nucleic acid RNA (ribonucleic acid) or DNA (deoxyribonucleic acid) surrounded by a sheath of protein. There is no cytoplasm, nucleus or cell membrane.

Size : Their size ranges from 0.015 to 0.2 m.

3. The Cell

A. 1. (b) 2. (b) 3. (a) 4. (b)

B. 1. unit 2. cell wall and chloroplast 3. Nervous tissue 4. eyepiece lens and objective lens 5. plant cell 6. muscles.

C. 1. ✓ 2. ✓ 3. ✗ 4. ✓ 5. ✗ 6. ✓ 7. ✓ 8. ✓

D. 1. Cytoplasm 2.Cell theory : (i) All lving things are made up of cells. (ii) All cells are similar in their basic structure and function but are not identical. (iii) New cells are formed due to division in old cells. (iv) The organization of cells in the body of a living organisms determines its structure. (v) The way an organism functions depends on the way the cells work. 3. **Animal tissues :** (i) Epithelial Tissue (ii) Connective tissue (iii) Muscular Tissue (iv) Nervous tissue. 4. Largest cell in our body : Nerve cell 5. Plastids are the sac-like organelles in plants cells that contain pigments like chlorophyll. 6. Vacuoles : In the centre of the plant cell, is a large cavity called the central vacuole. It is filled with cell sap, a watery fluid.

F. 1. Cell Theory : In 1838, Mathias Schleiden and theodor Schwann put forwar cell theory. The main points are : (i) All living things are made up of cells. (ii) All cells are similar in their basic structure and function but are not identical. (iii) New cells are formed due to division in old cells. (iv) The organisation of cells in the body of a living organisms determines its structure. (v) The way an organism functions depends on the way the cells work. 2. Division of labour is a term that describes the specialised functions of cell organelles which come together to ensure the cell is capable of surviving as well as performing its role in the body. For e.g., Ribosomes synthesize proteins depends on the type of cell. Endoplasmic reticulum transport these proteins. 3. **Plant Cell :** 1. There is cell wall around plasma membrane. 2. Chloro-plasts are present. 3. One or two big vacuoles are found in cytoplasm. 4. Centrosomes are absent. 5. Plant cell has dictyosomes.

Animal Cell: 1. There is no cell wall around plasma membrane. 2. No chloroplast is there in animal cell. 3. No or very small vacuoles are found. 4. Centrosomes are present near nucleus.

5. Animal cell has Golgi bodies.

4. (i) **Nucleus :** The nucleus is a spherical body present in the cytoplasm. Almost every cell has a nucleus. Red blood cels are among the exceptions. The nucleus is the largest and the most important organelle of the cell. Its has nuclear membrane are around it, nucleolus and nucleoplasm.

(ii) **Cytoplasm :** The cell contains a fluid material called cytoplasm. Dissolved in the cytoplasm are many enzymes, amino acids, sugars and other molecules. The cell uses these molecules to maintain life. Hundreds of chemical reactions take places in the cytoplasm. Several extremely small structure called cell organelle present in the cytoplasm. (iii) **Chloroplast :** Most plant cells possess sac-like organelles called chloroplast. We know that plants make their own food through the process of photosynthesis chloroplast contain green pigment, chlorophyll which is required for photosynthesis.

(iv) **Cell organelles :** The cell is like a tiny factory that manufactures or synthesis whatever it requires from smaller molecules. Inside the cell, there are several small structures called organelles that perform specific tasks. Plant and animal cells have many cell organelles in common. These cell organelles have been discussed below.

5. **Golgibodies :** The cell organelle which transports molecules in and outside the cells. These are named after its discoverer, camilo golgi.

F. 1. Robert Hooke in 1665 discovered the cell. Cell Theory : given in answer E-3.

2. Cell is the smallest structural and functional unit of life. The functional unit of a living organism is a cell. This means a living organism carries out most of its functions in its cell. For example, digestion of food takes place in the various organs of the digestive system but the enzyme that digest food are produced by the cells of the digestive glands. Blood transports oxygen and carbondioxide. The structural unit means all the living beings are mde up of cells. 3. Function of endoplasmic reticulum: The endoplasmic reticulum is responsible for the production of proteins and lipid components in the cells. Protein syntehsis and transport is carried out by

RER (rough endoplasmic reticulum) and synthesis and transport of lipids is carried out by SER (Smooth endoplasmic reticulum). Endoplasmic reticulum also helps in production of other cell components including lysosomes, secretory vesicles, golgi apparatus, the cell membrane and plant cell vacuoles. 4. Mitochondira are called powerhouse of the cell. These are the second largest sized cell organelles. These are spherical or rod-shaped and bounded by two membranes. Inner membrane makes fold inside called cristal. The innerside of mitochondria matrix is present that contain ribosomes, enzymes and its own DNA. Mitochondria are the centres of oxidation where the chemical energy stored in the food is changed into usable biological energy i.e., ATP (adenosine triphosphate). Mitochondria are like a power house where one form of energy is transformed into the another readily usable form of ATP energy. Glucose is oxidized in mitochondria to form ATPs required for various biological activities.

4. The Reproduction

A. 1. (a) 2. (b) 3. (a) 4. (b)

B. 1. amoeba and hydra
2. unicellular, binary tission
3. zygote 4. ovaries
5. incubation

C. 1. ✓ 2. ✓ 3. ✓ 4. ✗ 5. ✓

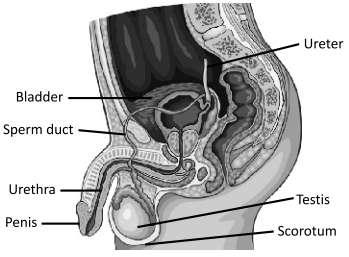
D. 1. Living organism : grow, breathe, reproduce, snow movement, respond to stimulus and metabolise. 2. Pituitary gland 3. Sex chromosomes : Being a male or a female is dependent on a particular pair of chromosomes. This pair is known as sex chromosomes. There are two types of sex chromosomes X and Y. Every cell of a male has X and Y chromosome whereas the pair of sex chromosomes in a female is made up of two X chromosome. 4. Reproduction : The production of new individuals from the parents of the scame is called reproduction. 5. Testes are male reproductive organs. These are present in scrotal sacs. These are oval in shape, two in number and produce large number of sperms.

E. 1. The penis enters the vagina during intercourse (copulation) and empties the sperms there the sperms spend about 7 hours in the female genital tracs. Ultimately the sperm reachdes the secondary oocyte. Here sperm unites with the egg. The union of sperm with the nucleus of egg forms a zygote. This process is called the fertilization. The sperm and egg are haploid (half chromosomes) in nature and after union form a diploid (full chromosomes) zygote. The zygote passes down the oviduct and reaches the uterus. Here the zygote starts developing into an embryo. In due course of time, the embryo develops into baby before it comes out from the female body. 2. **Internal fertilization :** In this kind of fertilization, the union of gametes (egg and sperm takes place insidew the womb of the female. The mebryo gets developed over a specific period and birth is given to new one, on completion of the reproductive period. This kind of fertilization is seen in mammals. 3. **Asexual reproduction :** The method of reproduction in which a single organism is able to reproduce on eor more of its own kind by itself is called asexual reproduction. Asexual reproduction does not require both male and female. This type of reproduction occurs in lower organisms. It takes place when there is plenty

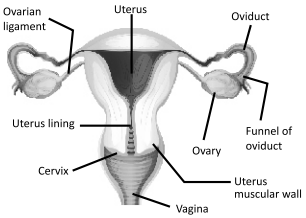
of food available and conditions are good. The amoeba, hydra, yeast etc. reproduce by asexual reproduction.

4. **Exocrine glands :** The glands that release their secretions with the help of ducts at specific areas are called exocrine glands. For example, the salivary glands secrete saliva in the mouth while the digestive glands secrete their secretions in the digestive tract with the help of ducts.

F. 1. **Gamete Formation :** Testes : produce large number of sperms (male gametes) which are haploid in nature from the diploid cells. Teh process is called spermatogenesis. **Ovaries :** produce usually one or two haploid egg cells (female gametes), through the process of Oogenesis. 2. Male reproduc -tive system include testes a pair in scrotal sacs, Epididymis (collects sperms), vas deferens (tube connects epididymis with urethra), urethra (common passage for urine and semen) seminal vesicles (glands that secrete fluid) this fluid mixes with sperms to produce seman) and Penis : used to pass sperms into vagina of female.



Female reproductive organs include a pair of ovaries, to which fallopian tubes (oviduct) and uterus are attached. Development of embryo takes place in uterus and after development baby comes out of the body from 'vagina' through 'cervix'.



3. **Testes :** These produce sperms (male gametes) **Ovaries :** Ovaries produce egg cells (female gametes) The male gamete (sperm) and female gamete (ovum) unite to form zygote which gives rise to embryo and embryo develops into baby in female body (uterus). Testes and ovaries also act as endodrine glands i.e., these secrete male and female sex hormones teste sterone by testes and progesterone and oestrogen by ovaries. These hormones are responsible for sex characters and development of gametes. 4. **Fertilization :** The sperms are discharged by male into the female genital tract, her sperm reaches the secondary oocyte and fuses with egg. The union not sperm with the nucleus of egg forms a zygote. This process is called as 'fertilization'. Pregnancy : Zygote passes down the oviduct and reaches the uterus. Here the zygote starts developing into embryo. Embryo is attached to the wall of uterus through the placenta and umbillical cord. Here embryo starts developing into 'foetus'. Foetus gets nourishment (food supply) and oxygen from the circulatory system of mother, by this attachment (umbillical cord) carbondioxide and other wastes are taken away frm foetus. During pregnancy, the mother must take adequate nourishment to meet the needs of the developing baby. Child birth : In about nine months, the development of the foetus is complete and baby comes out of the female's body through vagina. This is called

child birth or 'parturition'.

5. Fibre to Fabric

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

B. 1. Polymers, Man-made,
2. monomers, 3. Polymer,
4. New, London, 5. electrical wire/cable

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓ 5. ✗

D. 1. (d) 2. (c) 3. (a) 4. (b)

E. 1. Fibres are the raw materials for all fabrics. Fibres are twisted into yarns and then by knitting or weaving, yarns are made into fabric.2. How is polyester useful? Use of folyester. (i) It is lasts longer (ii) It is strong, durable and elartic (iii) It is need no ironing 3. Themosetting are plastics which is hard and do not melt on heating. They can be shaped onluy okke. 4. 1. It is used for making fishing nets, tyre cords, climbing ropes, parachute fabrics, bristles for toothbrushes and paint brushes. 2. It is used in the production of textiles like sarees, shirts, neck-ties, socks and other garments.

F. 1. Synthetic fibres with a range of properties have been engineered with its use in mind. Most synthetic materials are light yet strong, absorb specific dyes, dry easily and require no or light ironing. 2. (i) Melamine is a versatile material. It resists fire and can tolerate heat better than other plastics.
(ii) They are non biodegra-dable
3. What are the uses of poly-thene? Uses of polythene (i) It is earsly monldable (ii) It is recycled. (iii) It is strong drroble and elertic. (iv) It is commonly used for making polyshene bags. 4. **Thermosets** 1. Hard
2. Do not melt on heating 3. Can be shaped only once
Thermoplastics 1. Soft 2. Melt on heating 3. Can be moulded into any shape, a number of times

G. 1. We use a number of materials in our daily life. Some of these such as wood, cotton, stones and clay are natural materials. However most of the materials do not occur as such in nature. They have been changed from their natural state by chemical processes. Plastics, paints, medicines, cement, fertilizers, synthetic fibres are some such man-made materials. Most of these materials are made from raw materials such as coal, crude oil, natural gas, air, water, salt and limestone. Chemical processes are used to change these raw materials into materials with special properties that we can use. Man-made materials are made in factories called industrial plants. Raw materials are converted into useful materials by chemical reactions. Man-made materials industry is one of the largest industries in the world today. 2. Natural polymers like cotton, silk or wool are biodegradable. They decay fairly quickly as micro-organisms break them down and use them as food. But micro-organisms cannot break down synthetic polymers like nylon and polythene. They are non-biodegrada-ble. Since synthetic polymers have a wide use, they also result in creating a huge amount of waste and their disposal is a challenge. Plastic bags thrown in the open is a common sight.
Presently, most of the plastic is dumped around or burned, but burning gives off pollutants that are dangerous to health and, hence, is not a good alternative.
All kinds of plastics cannot be recycled because it is difficult to sort them out. Presently, all kinds of thermoplastics are melted together to produce recycled plastic. The black plastic bags are made from thermoplastics are melted together to produce recycled plastic. The black plastic bags are made from

recycled plastic. 3. since synthetic polymers have a wide use, they also result in creating a huge amount of waste and their disposal is a challenge. Plastic bags thrown in the open is a common sight. Presently, most of the plastic is dumped around or burned, but burning gives off pollutants that are dangerous to health and, hence, is not a good alternative. All kinds of plastics cannot be recycled because it is difficult to sort them out. Presently, all kinds of thermoplastics are melted together to produce recycled plastic. The black plastic bags are made from recycled plastic.

6. Metals and Non-metals

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

B. 1. Poisonous 2. good, electricity
3. Hydrogen 4. carbon 5. carbon

C. 1. ✓ 2. ✗ 3. ✓ 4. ✓ 5. ✗

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

E. 1. Rust : Formation of iron oxide (brownish substance) on the surface of iron is 'rust'. 2. Alloys : An alloy is obtained by mixing two or more metals or a metal and a non-metal. For e.g., brass is an alloy (having 80% copper and 20% zinc). 3. 'Sodium' is the most reactive metal. 4. Two characteristics of non-metals : (i) Britteness : They are solid and cannot be hammered or beaten into thin sheets. (ii) Reaction with air : They react with oxygen to form oxides. as $C + O_2 \rightarrow CO_2$
(carbondioxide)
5. $Si + 4HCl \rightarrow SiCl_4 + Cl_2$
Silicon tetrachloride
6. Galvanising is used to remove rust of iron.

F. 1. **Characteristics of non-metals : Physical :** (i) Brittleness (ii) non-ductility (iii) Non-lusturous (except carbon) (iv) Low melting and boiling point (except diamond and graphite). (v) Low density
Chemical Properties : (i) Reaction with oxygen non-metals give covalent oxides. (ii) **Reaction with acids :** Unlike metals, non-metals as a rule do not replace hydrogen in acids. However silicon reacts with hydro-chloric acid forming hydrogen Si (silicon) + 2HCl (Hydrochloric acid) $SiCl_4$ (Silicon tetrachloride) + H_2 (Hydrogen) Sulphur reacts with hot concentrated nitric acid to form sulphurdioxide and water $S + 4HNO_3 \rightarrow SO_2 + 4NO_2 + H_2O$ Sulphur Nitric acid (Sulphur dioxide) (Nitrogen dioxide) 2. Uses of metals : (i) Copper (Cu) is used formaking electric wires, pipes, industrial boilers, utensils etc. (ii) Aluminium is used in ship building, aeroplanes, automobiles, utensils and foils etc. (iii) Alloyes mixture of metals and non-metals are used to makes various things. like brass (copper and zinc) for pots stainless steel is made by iron, chromium and nickel.
3. **Prevention of rusting of iron :** (i) Cover the surface with paint or a thin layer of oil/grease. (ii) Electroplating iron with a non corrosive metal like nickel or chromium. 4. Metal oxides are basic in nature because they react with dilute acids to form salt and water. They also dissolve in water to form metal hydroxides which are alkaline in nature. These metal hydroxides release OH^- ions, so they are basic oxides. Metals are strongly basic. All non-metals form covalent oxides with oxygen, which reacts with water to form acids or with bases to form salts. Most non-metal oxides are acidic. Which in turn yield hydronium ions (H_3O^+) in aquous solution.

G. 1. In nature, most metals occur in the combined state minerals. Nearly, all rocks contain some mtallic minerals. However, often the amount of metal

present in the rock is so little that it in two expensive to mine there rocks and extract the metal from them. If the amount of metal is more, it is profitable to mine the rocks and extract the metal. Such rocks are called ores. In ores, the useful metallic mineral is mixed with other minerals which are not of much use. These minerals, present as impurities, are called gangue. Some metals, like silver , platinum and gold are not very reactive. They occur in free state in nature. Their ores contain partides of metals mixed with large amount of impurities, they are known as noble metals. The ores of very reactive metals, such as sodium or calcium, contain chlorides or carbonates of the metals for e.g., rock salt (NaCl), dolomite ($CaCO_3$, $MgCO_3$).

The ores of other metals, such as aluminium, iron, copper or zinc, contain mostly oxides or sulphides for e.g., baukite (Al_2O_3), iron pyrites (FeS_2), haematite (Fe_2O_3), copper glance (CuS) and zinc (blende (ZnS). 2. Reactivity series of metals : Metals react differently with different substances. The series of metals in order of reactivity from highest to lowest i.e., the most reactive metal is presented at the top and the least reactive metal at the bottom as :

Element	**Symbol**	**Reactivity**
Potassium	K	Most reactive
Sodium	Na	
Barium	Ba	
Calcium	Ca	
Magnisium	Mg	
Zinc	Zn	
Iron	Fe	
Nickel	Ni	
Tin	Sn	
Lead	Pb	
Hydrogen	H	
Copper	Cu	
Mercury	Hg	
Silver	Ag	
Gold	Au	Least reactive

3. **Chemical Properties of Non-metals :** 1. **Reaction with air :** Non-metals react with oxygen to give covalent oxides. Such oxides are either neutral or acidic in nature. Carbon, sulphur etc. react with oxygen to form acidic oxides, which dissolve in water to form acids.

C (Carbon) + O_2 (Oxygen) Δ CO_2 (Carbondioxide)

CO_2 (Carbondioxide) + H_2O (water) Δ H_2CO_3 (carbonic acid)

S (Sulphur) + O_2 (Oxygen) Δ SO_3 (Sulphur dioxide)

Reaction with Water : Unlike metals, non-metals as a rule do not react with water. **Reaction with acids :** Unlike metals, non-metals as a rule do not replace hydrogen in acids. However silicon reacts with hydrochloric acid forming hydrogen.

Si + 4HCl Δ
Silicon + hydrochloric acid
$SiCl_4$ + H_2
(silicon tetra chloride) + Hydrogen

Sulphur reacts with not concentrated nitric acid to form sulphur dioxide and water.

S (Sulphur) + $4HNO_3$ Δ Nitric acid
SO_2 (Sulphur oxide) + $4NO_2$ (Nitrogen oxide) + H_2O (Water)

4. Corrosion is the process by which metals are washed away. When acidic substances or water come in contact with metals such as iron or steel, rust begin to form. Rust in the result of corroding steel or iron after the iron

particles have been exposed to oxygen and moisture (humidity, vapour etc.).

Methods to prevent corrosion :

1. One way to ..... contact with iron. 2. Alloying the metal ..... iron to corrode. 3. Electroplating : In this process, ... electroplating of iron.

7. Force and Pressure

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

B. 1. contact 2. iron 3. pascal 4. attracts 5. pressure

C. 1. ✓ 2. ✗ 3. ✓ 4. ✓ 5. ✓

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

E. 1. Force : Push or a pull acting on an object is called force. 2. Types of force : (i) Gravitational force (ii) Frictional force 3. Issac Newton 4. Newton 5. Pascal

F. 1. **Frictional force :** Frictional force refers to the ..... surface of the ball and the ground. 2. **Spring balance :** It consists of a spring enclosed ..... weight is to be measured is attached to the hook.

3. **Uses of pressure in daily life:** (i) The railway tracks are laid on large size sleepers to that the thrust due to weight of train is spread over large area to reduce the pressure on the railway line.

(ii) It iscomfortable to carry a load on shoulders because the shoulders provide large area thus reducing the pressure on the body. 4. Atmospheric pressure : The pressure exerted by the atmospheric air at any point on the earth. We live at the bottom of this layer. The air above presses down on us with a force equal to that exerted by a mass of 1 kg on every square centimeter. The area of our palm is about 100 square centimeters. Thus, a force equal to that exerted by a mass of about 100 kg acts on our palm. 5. The pressure exerted by a liquid increases with increasing depth inside the liquid. But as we go deeper in a liquid the pressure of liquid increases. As the depth of liquid increases the weight of liquid column pushing down from above increases and hence the pressure also increases.

G. 1. A force can change the shape and the size of the object, this is the principle applied when a blacksmith hammers a hot piece of iron while making a tool. The piece of the iron gets flattened due to hammering. 2. Two forces acting on the rocket : (i) **Gravitational force :** With which the earth pulls it towards itself. (ii) **Trictional force :** Air exert trictional force on the satellite when it moves upwards. 3. **Contact forces :** These forces are involved only when two objects physically interact or touch each other. (i) **Muscular force :** This force is exerted by the muscles of our body. e.g., kicking a football. (ii) **Trictional force :** The force responsible for changing the state of motion of objects for e.g., a ball rolling along the ground gradually slows down and finally comes to rest.

8. Sound

A. 1. (c) 2. (d) 3. (b) 4. (c) 5. (d) 6. (b)

B. 1. medium 2. pitch 3. time-period 4. noise 5. pitch

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓ 5. ✗ 6. ✓

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

E. 1. Echo is the sound heard after reflection from a high wall or/obstacle. 2. Sound is produced by vibrating objects 3. The range of frequencies between 20 Hz to 20,000 Hz is called audible range. 4. No, sound can not travel in a vacuum. 5. Sound waves : a

wave of compression and refaction, by which sound is propagated in an elastic medium such as air. 6. String instruments : Violin, guitar, veena, sitar.

F. 1. **Audible Sound :** The range of frequencies between 20 Hz to 20,000 Hz ..... 20 KHz (20,000) Hz (called ultrasonic).

2. **Frequency :** Number of oscillations made by a partide per second is called frequency. ..... Frequency is measured in Hertz (Hz). 3. Sound needs a medium to travel. The medium can be air, water or a solid such as a metal wire. Sound can not travel through vacuum. Vacuum has no air in it. If an electric bell is placed on a sound proof material in a glass jar with vacuum, the bell will not be heard. This proves that sound needs a medium to propagate. 4. Noise is unpleasant or unwanted sound produced by irregular vibrations. Noise from motor vehicles, aeroplanes, machines and sometimes, loud sound from radios and televisions can annoy us and is reffered to as noise or sound pollution. 5. A metal plate falling on the ground produces noise because metals are sonorous and produces sound.

G. 1. **Various types of sources of sound :** Sources of sound can be divided into two types : natural and man-made. Examples of natural sources are : animals, wind, flowing streams, avalanches and volcanoes. Examples of man-made sources are : airplanes helicopters, road vehides, trains, explosions, factories and home appliances such as washing machines, vacuum clears, fan etc. In addition, to above, there are several types of musical instruments that are used to produce sound of varying quality like wind instruments, string instruments and membrane instruments. Examples of wind struments are flute, shehnai and harmonium, examples of string instruments are violin, guitar, veena etc. and examples of membrane instruments are tabla, mridangam, drum and dholak etc. 2. Characteristics of Vibration : There are two main characteristics of vibration that are : (i) **Frequency :** The frequency of an oscillating particle is the total number of oscillations made by the particle in one second. (ii) **Amplitude :** It is the maximum distance travelled by a pendulum towards any one side from its initial position. 3. Distance of sound reflecting surface = 200 metres

Speed of sound = 340 m/s

Time period T = ?

$$d = \frac{V \times t}{2}$$

$$t = \frac{2 \times d}{V}$$

$$= \frac{200 \times 2}{340} = 1.17 \text{ second}$$

4. Applications of Ultrasonics : Ultrasonic vibrations reflected by different parts of an organ help to create an image of an organ. This technique is called echo cardiography in case of the heart. The term ultrasonography is generally used in the case of other organs. Bats use echoes to locate their prey.

Sonar system : It is used to map the sea floor or locate sunken vessels on active sonar system on fixing on a ship.

Sonography : It is a technique by which sound waves are bounced back from the human body and their reflections (echoes) are captued by a machine which transforms them into an image that can be seen on the screen.

9. Friction

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

B. 1. surface 2. magnitude 3. surface to surface 4. friction, gases 5. rolling.

C. 1. ✓ 2. ✓ 3. ✗ 4. ✓ 5. ✗ 6. ✗

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

E. 1. Rolling ball stops after moving a certain distance because of rolling friction between the rolling body and the surface on which it is moving. 2. Friction is an opposing force that comes into play when one body actually moves or even tries to move over another body. 3. Three types of friction : (i) Sliding or kinetic friction (ii) Rolling friction (iii) Staticfriction.

4. **Static friction :** It is the opposing force that comes into play when one body tends to move over the surface of the other body but actual motion is yet to start. 5. Friction is a contact force.

F. 1. When a body rolls over a level track, ... the forces of adhesion between the surfaces in contact. 2. Causes of friction between two surfaces in contact : (i) Due to inter locking of surfaces.

(ii) Due to force of adhesion between the two surfaces. 3. It's difficult to walk on ice because ..... friction and make of easier to walk on ice.

4. To increase friction : (i) On a rainy day and on ..... to increase friction.

(ii) In the manufacture of tyres, ... friction with the road in larger. (iii) Tyres of automobiles are made corrugated and rough the increase to friction.

G. 1. **Laves of limiting friction :**

1. **First law :** The magnitude of the force of limiting friction between ..... reaction between than i.e., Far. 2. **Second law :** This law states that the direction of the ..... verge of moving over the other. 3. **Third law :** This law states that the force of ..... reaction between the two bodies in contact remains the same. 2. **Advantages of friction :** (i) Walking will not be possible without friction. (ii) No two bodies will stick to each other if there is no friction. (iii) Brakes of the vehicles will not work there is no friction. (iv) Writing on balckboard or on paper will also not be possible without friction.

(v) Adhesives will not work in absence of friction.

Disadvantage of friction

(i) Friction is an evil because it involves unnecessary waste of energy. (ii) Friction causes wear and tear of the parts of machinery in contact. (iii) Frictional force result in the production of heat, which causes damage to the bodies in contact i.e., machinery etc. (iv) Friction always opposes the relative motion between any two bodies in contact. 3. Machine oil is poured on the moving parts of a machine to fill up the irregularities of the surface in contact making them smoother. Hence friction decreases. 4. Friction can be reduced by : (i) By polishing the surfaces of contact. (ii) By lubrication by oil, grease etc. to fill up the irregularities of the surfaces. (iii) By streamlining the shape of the body for e.g., aeroplanes, boats, ships. (iv) By using ball bearings friction can be redued in a rolling body.

5. Friction due to air and water is considerably reduced by streamlining the shape of the body, for e.g., jets, aeroplanes, fast moving cars, fishes etc. have streamlined shape. 6. We sprinkle a little talcum powder on the surface of carrom board, to reduce the friction between the surface of the carrom board, the striker and the coins. As a result, the coins and the striker can move easily on the carrom board.

10. Electricity

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

B. 1. conduct, 2. cation, 3. positive 4. negative 5. repel

C. 1. ✗ 2. ✗ 3. ✘ 4. ✗ 5. ✗

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

E. 1. The Sl unit of electric current is Ampers (A). 2. Sources of electric current batteries, thermocouples, solar

cells etc. 3. Yes, solar cell is the source of electric current. 4. **Electric conductors :** Copper, aluminium, iorn, gold & silver. 5. **Voltmeter :** It is an instrument which is used for measuring the voltage aross the two electrodes is called voltmeter. Voltage is measured in volts. 6. **Ammetr:** An ammeter is an instrument which is used fopr measuring the current flowing through the circuit. Current is measured in amperes (A). 7. When electric currnt is passed through certain liquids or solutikons that conduct electricity chemical change occur. This is called chemical effect of electric current.

F. 1. Materials that allow electricity to flow through them easily are called conductor, such as, copper, aluminium etc. and the ability of a substance to carry electric current is called electrical conductivity. 2. Uses of chemical effect : 1. To purify metals such as copper tin, silver and gold. 2. To extract metals from the ores e.g., aluminium or sodium. 3. For electroplating, process of coating a thin layer of metal over another by the procss of electrolysis.

3. (a) **Cation & anion :** An electrolyte when dissolved in water, produces ions positively charged ions are called cations and negatively charged ions are called anions.(b) **Electrode :** A metallic wire or rod, through which electric current either enters or leaves an electrolytic solution is called electrode.

(c) **Cathode and anode :** In an electrolytic cell the electrode at which electricity enters. The solution is called anode and the electrode at which current leaves the solution is called cathode. (d) **Voltmeter :** An instrument which is used for measuring voltage across two electrodes. **Ammeter :** It is used for measuring current flowing through the circuit.

4. **Uses of Electrolysis :** 1. Electrolysis is sued in the extraction of metals from their ores. 2. It is used for refining metals e.g., copper & zinc. 3. It is used for electroplating. 4. It is used for the manufacture of chorine.

5. **Describe :** (a) **The Voltaic cell :** The simple voltaic cell is made by taking a glass container with dilute sulphuric acid and two metal rods i.e., one of copper and other of zinc are dipped in it. When the rods are joined with a wire, an electric current starts flowing.

(b) **The Dry cell :** In adry cell we use a zinc container, having a zinc anode, a carbon (graphite) cathode surrounded by manganese dioxide and a paste containing ammonium chloride as electrolyte. The emf produced by a dry cell is 1.5 V. Dry cell is not reversible therefore have alimited life. (c) **Solar cells** are made up of semiconductors. A simple solar cell is made from thin wafer of silicon. Some arsenic atoms are ambedded in this silicon wafer and the 'treated wafer' is then coated with a thin layer of silicon and boron. This treatment results in the formation of what is known as a p-n junction. Under the action of sunlight this specially designed p-n junction provides us with an electric current. Solar cell are now finding increasing practical use because they are a unconventional source of energy. The current provided by a solar cell, when sunlight falls on it, may be used to charge a storage battery which may then be used during night time.

G. 1. Pure water is a poor conductor of electricity. But the water we are using in our homes is not pure water. generally well water, pond water, underground water and tap water contain a lot of impurities, most of which are usually dissolved salts. The presence of even a small amount of impurity makes water a good conductor of electricity.

2. Take one lemon and make two parallel slits, 2 cm a part in it. Insert a copper strip in one slit and a zinc strip in the other. Ensure that the metals do not touch each other. Make a small nail hole in each of the metal strips. Now, take two pieces of copper wire and connect one each to the copper and zinc strips (by looping the wires through the holes). Repeat the procedure with the other lemons and join the pieces. After this connect the free ends of the wire on either ends of the arrngement to a LED. We obser the LED glows. It proves that lemon is able to generate its own electricity. 3. To know about the chemical effects of electric current we take some water in a beater and add a few drops of dilute sulphuric acid (HSO) into it. Take two connecting wire and connect one end of each to a dry cell and dip the other ends into water. We observe that bubbles of gases comes from the water near the wires. These bubbles are of hydrogen and oxygen. Thus we conclude that when electric current is passed through certain liquids or solutions that conduct electricity chemical change occur. This is called chemical effect of electric current. 4. Take one lemon and make two parallel slits, 2 cm a part in it. Insert a copper strip in one slit and a zinc strip in the other. Ensure that the metals do not touch each other. Make a small nail hole in each of the metal strips. Now, take two pieces of copper wire and connect one each to the copper and zinc strips (by looping the wires through the holes). Repeat the procedure with the other lemons and join the pieces. After this connect the free ends of the wire on either ends of the arrngement to a LED. We obser the LED glows. It proves that lemon is able to generate its own electricity.

5. Electroplating is the process of depositing a thin layer of any superior metal over an object of a cheaper metal, with the help of electric current. For e.g., deposition of silver on brass or copper objects and that of copper, nickel, chromium, etc. on object made of iron is done by electroplating. Process of electroplating : Take a spoon which is to be electroplated. Put the spoon and a silver rod in a vessel containing potassium argentocynide solution. Connect the negative terminal of battery to the spoon and positive terminal to the silver rod. The spoon acts as the cathode (-ve) and silver rod acts as anode (+ve). Now pass he electric current through the solution. The positively charged ions of silver are attracted to the cathode and the coating is deposited on the spoon surface.

Advantages of electroplating :

(a) for decoration purpose : silver or gold plating on brass.(b) For preventing corrosion : e.g., on iron, nickel electroplating is done to protect it from rust.

11. Fuels and Combustion

A. 1. (d) 2. (a) 3. (a) 4. (a)

B. 1. pollution 2. Oxygen/air 3. ignition temperature 4. L.P.G. 5. non-luminous.

C. 1. ✓ 2. ✗ 3. ✓ 4. ✗ 5. ✓

D. 1. Combustion is a chemical process wherein a substance burns to give heat and light. 2. Inflamable substances are the subsances which have very low ignition temperature and can easily catch fire with a flame. fog e.g., petrol, alcohol, LPG etc. 3. Solid fuels : wood, charcoal, coal etc. Liquid : Petrol, kerosene, diesel Gas : Methan, (CH_4) (Nalural gas) Producer gas (N_2 + CO), LPG etc. 4. **Fuels :** Fuel is any material that releases heat and light on burning.

Fuel releases its energy through chemical means such as combustion or burning. 5. **Biogas :** Biogas is a mixture of methane and carbon dioxide gas. It is a combustiable gas. It can be burnt directly like LPG. Biogas is produced from organic waste such as cattle dung when bacteria decompose the waste in absence of oxygen.

E. 1. Differentiate between solid and liquid fuels :

Solid Fuels : (i) These require much space for storage. (ii) These emit smoke and ash on burning. (iii) e.g., wood, charcoal.

Liquid fuels: (i) These require less space for storage. (ii) These leave no smoke or residue when burnt. (iii) e.g., petrol, kerosene, diesel.

2. Fossil fuels are the most important source of energy for us today. They are concentrated stores of energy and give off heat and light on burning. The heat can be used to cook food or to run engines such as automobile engines. It can be used to generate electricity as in powerhouses where the most. Common fuel used is coal kerosene in used as a household fuel for cooking and lighting. Refined kerosene is used as a fuel in jet aeroplanes. ❖ Petrol is used in two-wheelers, three-wheelers and in cars. ❖ Diesel is used to run trucks, buses and railway engines and to run water pumps in villages. ❖ Compressed natural gas (CNG) is now being used as a non-polluting fue for vehicles. ❖ LPG is used as a domestic fuel. 3. When coal burns, it procues sulphur dioxide and nitrogen oxide gases. These gases react with water and produce acid causing acid rain. This acid rain pollutes water sources such as ponds and lakes in the region. Burning of fossil fuels has increased the level of carbon dioxide in atmosphere. This increased level of CO could lead to a rise in the average temperature of the earth. 4.An ordinary candle is a column of wax. In the middle of the wax column, a cotton wick is fixed, when the wick is lighted, it reaches its ignition point and begins to burn. As the wick begins to burn, it produces heat. The air around the flame becomes warm and rises upwards and its place cool air rushes in from all sides of the candle. This cool air keeps the edges of the cancle cool. Hence, the wax at the edges does not melt and a cuplike structure is formed just below the lighted wick. The cup gets filled with warm liquid wax. The cool air does not allow this melted wax to reach its ignition point and hence it does not burn the wick does not burn all the way down because the melted wax extinguishes the flame.

F. 1. Energy released by burning 1 kg of fuel in pure oxygen is called the calorific value of that fuel. Criteria for ideal fuel or efficiency of a fuel :

(i) A fuel should have high calorific value. (ii) The fuel should have a moderate rate of combustion. (iii) A fuel should be easily stored or transported. (iv) The ignition temperature of an ideal fuel should not be too high or too low. (v) An ideal fuel should not pollute the air when it burns. (vi) The fuel should be easily available and cheap. 2. **Combustion :** Burning of a substance is called combustion. Types of combustion : 1. Rapid combustion

2. Spontaneous combustion and 3. explosion In rapid combustion : like gas, it burns rapidly and produces heat and light. Spontaneous combustion in this a material suddenly bursts into flames, without the application of any apparent cause.

Explosion : When a cracker in ignited a sudden reaction takes place with the

evoution of heat, light and sound. A large amount of gas is liberated. Such a reaction is called explosion, combustible substances are that which burn readily e.g., petrol, LPG, paper wax etc. while non-combustable substance do not burn for e.g., glass, water, stones etc. 3. Combustion is a chemical reaction in which oxygen reacts with a combustible substance and procues heat. All combustible substances produce heat when they burn. Depending on the type of substances that is burnt, combution also produces carbondioxide or water vapour or both.

Carbon (charcoal) + oxygen $\xrightarrow{\text{combustion}}$ carbon dioxide + heat

Hydrogen + oxygen $\xrightarrow{\text{combustion}}$ water vapour + heat

Methane + oxygen $\xrightarrow{\text{combustion}}$ carbondioxide + water + heat

4. Wt. of fuel = 4.5 kg

heat produced = 18,000 kg

$$\text{calorific value} = \frac{180000}{4.5}$$

$$= 40{,}000 \text{ kJ}$$

12. Conservation of Forest and Wildlife

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

B. 1. ✓ 2. ✓ 3. ✗ 4. ✗ 5. ✓

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

D. 1. **Biodiversity :** All forms of earth are collectively called biodiversity. 2. **Endangered species :** Many animals and plants species are threatened and on the verge of extinction that are called endangered species for e.g., tigers, elephants etc. 3. IUCN : International union for conservation of nature and natural resources. 4. There are about 1600 botanical gardens all over the world. 5. **Migration :** The seasonal movement of animals from one habitat to another is called migration.

E. 1. **Conservation of biodiversity:** All the components of environment are interdepent and in perfect balance. Every species in nature not only exerts of biological control over the other but all species also support and cooperate with each other directly or indirectly. Human beings are a part of this system. Any damage to this biodiversity can threaten the whole life support system including humans. Hence it is very important to conserve biodiversity.

2. **Botanical Garden :** To conserve rare plants and threatened plants and threatened ones, botanical gardens have been established forests reserves aim at protecting natural habitats but botanical gardens are the zoos of the plant world. There are about 1600 botanical gardens world over. Most botanical gardens alow serve as seed bank and have reserves of seed of several species of plants which are preserved under controlled conditions.

3.**Red data book :** IUCN (international Union of Conservation of Nature and Natural Resources) works towards assessing the global conservation status of plant and animal species. IUCN also published a cat alogue, called the Red Data Book, on animals in 1991. The Red Data Book carries informa-tion on plants and animals that have become extinct or rare, facing the danger of extinction. It also shows the risk of extinction of wildlife based on biological data. 4. To conserve wildlife we need to take the following steps : (i) **Habitat protection :** by protecting forests from being exploited. (ii) **Hunting regulation :** like in 1973 the world wild life fund with the co-operation other Indian government launched project Tiger to save animals, (iii) **Gene banks :** in the form of botanical gardens, zoological parks and culture collection. (iv) **Biosphere reserve :** to conserve biodiversity and

to educate about eco-friendly living.

(v) **Protected areas :** like sanctuaries, national parks and biosphere.

5. **Chipko movement :** This movement to save trees is believed to have started in April 1973, in the village of Gopeshwear in Chamoli district (Uttrakhand). The village rebuffed the attempt of a contractor to cut down trees for a sport goods factory by huging trees. Once the contractor purposely arrived there when the mon were way protesting against the auction of a forest. However, the women of the village, led by 50 years old Gauridevi, forced the contractor and his men to leave resistance offered by the villagers to stop deforestation of their land inspired environmentalists all over the world. And the Chipko Andolan spread rapidly across the Himalayan region under the leadership of activities like Sunderlal Bahuguna and Chandi Prasad Bhatt.

F. 1. **Extinct Species :** Species which have completely vanished from the earth. Extinction in the termination of a kind of organism or of a group of kind, usually a species. Four species of founa (animals) and 18 species of flora (plants) have gone extinct in India in the past few centuries, according to wildlife survey organisations. Among 18 species of plants four non-flowering and 14 flowering have gone extinct. Among mammals, the cheetah and the sumatran rhimeceros are considered extinct in India. 2. **Biosphere reserve :** Biosphere reserves are the multi-purpose protected areas. There are twelve biosphere reserves in our country. **Main objective :** Objective to set up biosphere reserve is : ❖ To conserve biodiversity and integrity of plants, animals and microorganisms. ❖ To educate, train and create awareness about environ-mental aspects and eco-friendly living. 3. **Migration :** The seasonal movement of animals from one habitat to another is called migration. Animals migrate between their wintering and breeding habits. The longest migration is made by the Arctic tern which involves a travel from North Pole to South Pole and back every year. Whales, fish, butterflies, turtles and some birds able migrate. Birds migrate : (i) To escape the extreme climate. (ii) due to shortage of food (iii) for breeding.

13. Light

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

B. 1. refracting or prism 2. transparent 3. retina 4. retina of eye

C. 1. ✓ 2. ✗ 3. ✓ 4. ✗

D. 1. Light is electromagnetic radiation within the portion of the electro-magnetic spectrum that can be perceived by the human eye. 2. Spectrum has 7 colurs : VIBGYOR Violet, Indigo, Blue, Green, Yellow, Orange and Red. 3. **Hypermetropia :** A person suffering from hypermetro-pia (long sightedness) can see the distant objects clearly, but cannot see the nearby objects clearly. 4. Concave lens.

E. 1. When light rays travel from one optical medium into another, they appear to bend at the surface of separation of the two media. This bending of light rays on the change of direction of light rays is called refraction of light. e.g., when a beam of light is passed from air into water, the beam show bending and change in direction. This is refraction of light.

2. In a dark room, when we light a torch and direct the light ray on the surface of water kept in a glass container, we notice that as the light enters water. it bends at the surface. The bending of light as it passes from one medium to another is called refraction. In this case

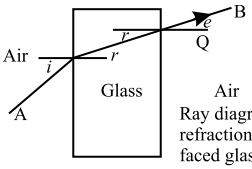
light enters from the air to water and bends towards the normal. 3. **External Structure of human eye :** The eye is a hollow globe like structure which is held in position by muscles. Sclera the tough layer creates the white of the eye except in the front where it forms the transparent cornea. A delicate membrane called the conjuctiva lines the cornea. The cornea admits light to the interior of the eye and bends the light rays so that they can be brought to a focus. The surface of the corernea is kept moist and dust free by the fluid secreted by the tear glands. The niddle layer is pigmented named choroid. The inner most of the eye is called retina, on which image is focused. 4. **Myopia :** or short sightness : A person suffering from myopia or shortsigntedness can see the nearby objects clearly but cannot see the far off objects clearly this, shortsightedness (or myopia) is the defect due to which a person is not able to see the distant objects clearly.

Causes of myopia are :

(a) Decrease of the focal length of the eye lens. (b) Elongation of teh eyeball, i.e., increase in the length of the eyeball. **Correction of myopia :** The myopia can be corrected by making the eye lens less convergent. This is done by placing a concave lens of suitable focal length before the eye lens.

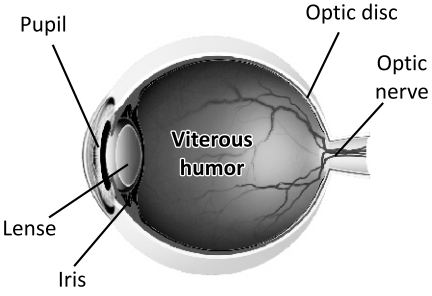
5. **Braille system :** Braille is a system of touch reading and writing for blind persons in which raised dots represent the letters of the alphabet. It was invented almost 200 years ago, by a blind teenager Louis Braille in 1834. It also contains equivalents for punctuation marks and provides symbols to show letter groupings. Braille is read by moving the hand or hands from left to right along each line.

F. 1.



Ray diagram to illustrate the refraction of light by a parallel faced glass slab.

Laws of refraction : (1) The incident ray, the refracted ray and the normal to the interface of two transparent media at the point of incidence, all lie in the same palne. (2) The ratio of sine of the angle of incidence and sine of the angle of refraction is constant. 2. **Structure of Human Eye :** The eye is a hollow globe like structure which is held in position by muscles. The human eye is wrapped in 3 layers of tissue : The sclera : This touch layer creates the white of the eye except in the front where it forms the transparent cornea. A delicate membrane called the conjuctive lives the cornea. The surface of the cornea is kept moist and dust free by the fluid secreated by the tear glands.



The choroid coat : This middle layer is pigmented. The choroid coat forms the iris in front of the eye which is responsible for eye colour. In the centre of the iris, is an opening called the pupil. Light enters the eye through the pupil. Behind the iris in the lens. Lens devides the eye in two chambers : aquous and vitreous chambers filled with aquous and vitreous humors respectively. **Retina :** The inner layer of eye is called retina. It is madeup of two

types of light sensitive cells : rods and cones. The portion on the retina where the imge is focussed is called the fovea. The portion of the inner surface of the eye where the retina is not continuous and there are no rod or cone cells is called blind spot. 3. **Braille :** Braille is a system of a series of raised dots that a blind person can read with his finger tips. It was invented almost 200 years ago, by a blind teenager Louis Braille in 1834. Braille consists of touch reading and writing for blind persons in which raised dots represent the letters of the alphabet. It also contains equivalents for punctuation marks and provides symbols to show letter groupings. Braille is read by moving the hand or hands from left to right along each line. Today, virtually in every language around the world, the code is the standard form of writing and reading used by blind people. the system of letters, numbers and punctuation marks consists of six raised points or dots used in 63 possible combinations.

14. Universe

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

B. 1. Neplune 2. Constellation
3. Mars and jupiter 4. earth
5. rings around the saturn

C. 1. × 2. ✓ 3. × 4. × 5. ✓

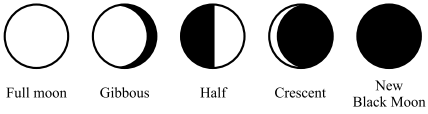
D. 1. (d) 2. (b) 3. (e) 4. (a) 5. (f) 6. (c)

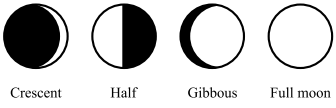
E. 1. **Astronomy :** Branch of science which deals with the study of stars, planets and other heavenly bodies is called 'Astronomy'. 2. Yes, earth is a part of universe. 3. **Star :** Celestical bodies that produce their own light and heart. 4. **Pole star :** A special star in the northern hemisphere, that always appears to remain fixed to us. 5. Richter scale. 6. **Natural Satellite :** A heavely body which revolves around a planet is called a natural satellite.
Artificial : Satellite (man made), which continuously ability the earth and helps in the forcating of the weather is artifical satellite. e.g., INSAT 1-B.

F. 1. **Universe :** Everything that exists make up what we call the universe. It is made up of matter, energy and space. The universe has vast regions, made up mostly of empty space which is dark, silent and extremely cold. The earth is very small part of the universe. So the space surrounding the earth which contains stars, planets, satellites, asteroids, comets, constellations etc. is known as the universe. 2. **(a) Jupiter :** It is fifth and the largest of all the planets. Jupiter takes a hr 54 minutes to rotate about its axis and 12 years to complete its revolution around the sun. **(b) Mercury :** It is nearest to the sun. It is the smallest planet of our solar system. Because mercury is very close to sun, it is very difficult to observe it. It is observed just before sunrise or after sunset. **(c) Saturn :** It is sixth and second largest planet. Saturn takes 10 hr 14 mins. to complete its revolution around the sun. It has rings made of ice and dust that surround the planet. **(d) The Sun :** The sun is only one of the billion of starts in the universe. It is about 4.5 billion years old. It is the largest object in the solar system. It's diameter is about 109 times the diameter of the eath. 3. Planets do not have light of their own. They shine with a steady light, reflected from the sun. 4. The earth's atmosphere is made up of 77% nitrogen, 21% oxygen, with traces of argon, carbondioxide eand water vapour. The oxygen in the earth's atmosphere is produced and maintained by several biological processes. 5. **Tsunami :** It is a Japanese word, its meaning is harbour wave. Earthquake below the sea floor sometimes generate powerful sea

waves called tsunamis. These waves travel aross the ocean at a speed of upto 1000 km/h and may be 40 m or more high. Tsunamis occur quite frequently in pecific ocean. The Tsunamis which hit south and south east Asia in 2004 was triggered by an earthquake near sumatra measuring 9.00 on Richter scale. Near 3,00,000 people were killed in the disaster.

G. 1. **Solar system :** The solar system is the gravitationally bound system of the sun and the objects that orbit it. Of the objects, the largest are the 8 planets : Mercury, Venus, Earth, Mar,s Jupiter, Saturn, Uranus and Nepture. Each planet moves around the sun in an orbit. Apart from these eight planets, three dwarf planets orbit the sun, these are ceres, pluto and Eris. Small solar system body (SSSB) is a term coined by the international Astronomical Union to describe objects that are neither planets nor dwarf planets. These include the asteroids, comets and other small bodies that orbit the sun at a greater distance than Neptune. 2. **Phases of the Moon :** On a full-moon day, full disc of the moon is visible. Thereafter, every day shape of the bright. Part of the moon appears to change gradually in size.





On the fifteenth day, the moon is not visible to us. Next day only a crescent moon appears. Then again the shape of its bright portion becomes bigger and bigger every day, till on the fifteenth day we get a full view of the moon. These are called the phases of moon. the phases of the moon are due to the fact that the moon does not emit light like the sun and other stars. Actually we see the moon because sunlight falling on it gets reflected towards the earth, therefore, we see only that part of the moon which is lighted by the sun. As we know the moon revolves around the earth and around the sun along with the earth. As a result, the relative positions of the earth and the moon keeps on changing everyday.

3. **Safety measures during an earthquake :**

1. We should take cover immediately under a sturdy table or desk, we should cover our eyes with our arm and hold on tightly to something secure.

2. We should not go to another room. We should always stay inside unitl the shaking stop and we are sure it is safe to exit.

3. We should shut of kitchen gas.

4. We should keep water, food stuff and first aid materials ready. 5. We should not light candles or switch on electric mains immediately after an earth-quake.

6. When we are out and a quake begins, we should move away from buildings, trees and power lines. 7. If driving a car, slow down and drive to a place away from power lines, buildings and trees. 8. Aftershoks are expected after the earthquake stops so we should be careful and follow the same precautions.

15. Pollution

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

B. 1. four 2. 22000 an 16 kg

3. three fourth

4. micro organism and harmful substances.

C. 1. ✓ 2. ✗ 3. ✗ 4. ✓

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

E. 1. **Pollution :** The contamination of the environment such as air, water or land with substances that are harmful to living beings.

2. Compressed Natural Gas.

3. **Water Pollution :** Addition of harmful and unwanted materials into water is called water pollution.

4. Petroleum and Coal.

F. 1. **Potable Water :** Water that can be safely used for human consumption is called potable water. For water to be fit for human consumption, it should be free from microorganisms, should not contain any harmful substance or dissolved matter beyond a certain limit. High amount of particles even of harmless substances make. Water less suitable for human consumtpion. For e.g., a high amount of sand is fresh water makes it unsuitable for drinking.

2. **Acid rain :** During of fossil fuels besides other things adds sulphur dioxide and nitrogen oxides into the atmosphere when air is polluted by at least on of these gass in large amounts, it causes acid rain. Sulphur dioxide reacts with water and produces sulphuric acid. Similarly, nitrogen oxide reacts with water and produces nitric acid. Both these are strong acids. Acid rain can affect large areas, it causs corosion and damage crops and forests.

3. 1. it should be colourless and odourless. 2. it should be transparent. 3. it should be free from harmful micro organisms.

4. it should be free from suspended impurities.

5. it should contain some minerals and salts, necessary for our body and some dissolved gases to add taste. 4. The presence of unwanted harmful substances in the air makes it impure. As a result of human activities for development and efforts to make life more comfortable, the quality of air is deteriorating everyday. As a result of scientific progress attained by men new gases now being released into the air. e.g., The Bhpal Gas Tragedy had happened in December 3 1984, in that several thousands people were killed and affected several thousands people and other living beings.

G. 1. **Effect of water pollution on aquatic life :** Decomposed organic matter and run-off water containing fertilizers, when mixed with a water body such as a lake provides large amounts of nutrients to the aquatic plants and algae growing in the water body. The nutrients stimulate excessive growth of aquatic plants and algae which block light from reaching the deeper regions of the water. This kills many types of aquatic organisms. When the plants dies they decompose. The decomposing plant and aquatic organisms use up most of the oxygen present in the water. As a result, the water is left with very little dissolved oxygen. This results in the death of the fish and other aquatic animals which depend on dissolved oxygen. Ultimately the water body is left with very few life forms. Such areas are commonly known as dead zones.

2. **Air pollution :** Presence of undesirable substances in air which may be harmful to plants and animals is called air pollution and these undesirable substances are pollutants. Air pollution may be caused due to human activities for development and efforts to make life comfortable. And due to natural reasons also air is occasionally polluted by dust, storms, forest fires (which adds carbon dioxide, carbon mono oxide, nitrogen, oxide and sulphur oxide into air) and volcanic eruptions (which adds large amount of ash and sulphur dioxide in to air).

Effects of air pollution :

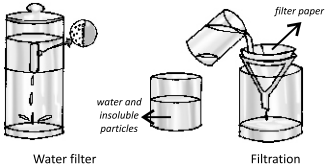
Sulphur di oxide (SO_2) : Causes heart diseases, respiratory problems, cancer, irritation in eyes and headaches in humans.

Nitrogen Oxide (NO_2) : Causes lung irritation and chest pain in human beings.

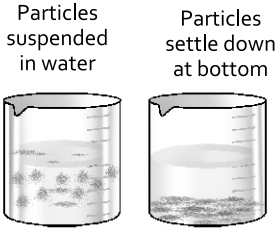
Carbon mono oxide (CO_2) : Casues unconciousness and death.

Lead (Pb) : Causes decreased haemo-globin is blood, damage to the nervous system and kidneys.

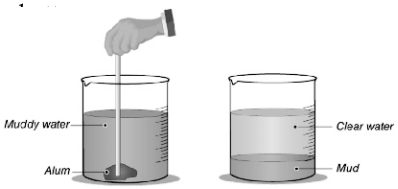
3. **Purification of Water : (i) Filtration :** Filtration of water can be done using a porous device or cloth or a device having fine pores that is used in waterfilters.



(ii) Sedimentation : The process allows the separation of unwanted particles as heavier substances settle down at the bottom of the container.

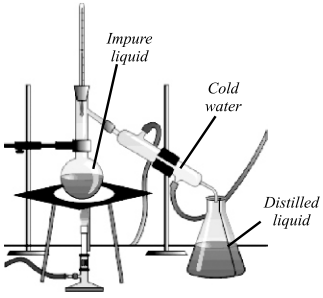


(iii) Loading : It is used when water contains extremely small insoluble particles. In this method some chemicals like alum that binds itself tothe suspended particles is added into the water. It settles the particles at the



(iv) Distillation : The distillation process is mainly used to obtain pure water for industrial purpose. It removes salt from water.

These above fourmethods - filtration, sedimantation, loading and distillation are physical methods to purify water.



Chemical purification of water : In this method water is treated with chemicals like chlorine or iodine to mainly kill microorganisms present in the water. Water may be filltered or sedimented after adding chemicals if required.

16. Rain, Thunder and Lighting

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

B. 1. electron, 2. stationary,
3. attract, 4. an un charged
5. lightening

C. 1. ✗ 2. ✗ 3. ✗ 4. ✗ 5. ✓ 6. ✓ 7. ✗

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

E. 1. **Static charge :** Static electricity is released in the form of charges i.e.,

positive and negative charges, called static charges.

2. **Insulators :** Substances that do not allow electrons to pass through them are called insulators.

3. **Conductors :** Substances that allow electrons to pass through them are called conductors.

4. **Induction :** When an electric charge of one kind produces a charge of another kind on a nearly body when there is no direct contact, the phenomenon is called induction.

5. Clouds may be of opposite charges having negative and positive charges.

6. **Lightening conductor :** Lightening conductor is a thick copper strip fixed to the outside wall of the building. The upper end of the strip has several sharp spikes and the lower end is connected to a copper plate burried in the earth.

F. 1. **Static electricity :** Static means stationary or at rest. When electric charges are produced through the friction of one material upon another, charges produced are called static electricity.

2. The bottoms of clouds are negatively charged. When theal clouds pass over tall buildings, the distance between the roofs of the buildings and bottoms of the clouds is small. The negative charges of the clouds induce positive charge on the building roofs. The buildings are induced with negative charge at their bases (due to electric induction). The moist air of the atmosphere acts as a conductor and free electrons from the clouds move in the air towards the buildings. On contacting with the building these electrons form a path for other charges of the cloud to rush towards the building. The building comes under the heavy rush of these electrons and catches fire.

3. **Lighting is useful to us too as :** (1) Soil nutrients are formed due to lighting as atmospheric nitrogen and oxygen rect together during lighting to form nitrogen-oxide gas which is dissolved in water and comes down as weak nitric acid. Nitric acid reach. **Example :** When an ebonite rod is rubbed with a woollen cloth (or fur) some of the outer electrons get scraped off the woollen cloth and move to the ebonite rod. As a result, the ebonite rod becomes negatively charged and the woolen cloth becomes positively charged. Since the number of electrons lost by woolen cloth and gained by the ebonite rod are equal the charges on the two bodies are euqal in magnitude but opposite in sign.

G. 1. When a body is rubbed against another, electric charge is not created. Instead the two bodies aquire equal but opposite charges due to transfer of electrons lightning passes the air, oxygen gets converted into ozone. Ozone protects from the hazards of ultraviolet rays coming from the sun. It filters the sun rays before they fall on earth. (iii) The evolutionary phases of life on earth are associated with lightning which is believed to have helped the process of evolution on earth. (iv) Lightning has provided water to certain desert areas which got converted into green areas.

2. **Lightning :** Rapid flow of charge through the air between two oppositely charged clous is called lightning.

Clouds get electrically charged due to rubbing of the clouds with the air and due to the presence of dust, carbon and other charged particles in the air, when the two clouds carrying opposite charges approach each other, a large quantity of electric charge flows rapidly from one cloud to the other through the air. Thus an intense spark of electricity is seen in the sky. Such rapid flow of charge through the air between the two oppositely charged clouds, causes lightning. This produces a lot of heat and light.

3. The bottom of clouds are negatively charged. When these clouds pass over tall buildings, the distance between the roofs of the building and bottoms of the clouds is small. The negative charges of the clouds induce positive charge on the building roofs. the buildings are induced with negative charge at their base (due to electric induction). The moist air of the atmosphere acts as a conductor and free electrons from the clouds move in the air towards the building. On contacting with the building these electrons form a path for other charges of the cloud to rush towards the building. The building comes under the heavy rush of these electrons and catches fire.

4. **Benjamin franklin's Experiment :** Franklin made a silken kite using wooden stickes as its frame. He fixed a thin metallic wire along the central wooden rib of the fame whose one and was put outside the kite frame by about 30 cm. He tied another end of the metal wire with the string of the kite. He tied a metal key with the end of the string he hold with the help of silk ribbon. On a stormy day, he set out to fly his kite. When the kite went up in the sky, he observed that the toose string got stretched due to the electric charge from the clouds. At this moment, he slightly touched the key an received a shock. Fortunately the charge was mild, otherwise the shock could have been total. Through this experiment Franklin proved that the lightning clouds carry electric charges. On the basis of this experiment he provided the principle of lightning conductors for the safety against the devastating effects of lightning. 5. Precautions we should take to protect from lightning : (i) We should never take shelter under the trees during a thunderstorm or lightning, the lightning could strike the tree and could injure or kill us as it runs down to earth through the tree. (ii) It is best to kneel down in the open air with our head as low as possible and our hands resting on our kees with fingers pointing towards the ground. If the lightning strikes us, it should hit our shoulders, and run down our arms and out of our fingers into the earth. This position in this way protects our head and vital organs such as our heart etc.

6. **Lightning is beneficial in following ways : (i) Soil nutrients are formed due to lightning :** The atmospheric nitrogen and oxygen react together during lightning to form nitric oxide gas. This gas on reacting with oxygen again forms nitrogen oxide gas, which dissolves with the water droplets in the clouds and comes down with the precipitation as nitric acid in a weak form. This nitric acid reacts with the

carbohydrates already present in the soil and forms the carbonates of calcium and magnesium which are very rich nutrients for the plants.

(ii) Oxygen gets converted into ozone : When with carbonates from absorbable nutrients for plants.

(ii) Oxygen gets converted into ozone : During lightning. Oxygen and air combine to form ozone which protects us from ultravoilet rays of sun. (iii) Evolutionary phass of life are associated with lighting. (iv) Lightning provides water to desert areas.