ADDITIONAL PRACTICE SCIENCE 9

Preeti Singh
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INDEX

Chapter 01 MATTER IN OUR SURROUNDINGS

WORKSHEET 1

Q.1 A gas be liquified either by increasing the pressure or by lowering the temperature. In most of the cases, the combination of both these factors is used to liquefy the gases.

Q.2 Solids have more denity as the particles are closely packed and the interparticle spaces are strong enough to hold the particles together as compared to the liquids and gases.

Q3. The clothes take time more in drying on a rainy day because the humidity in air is high. Thus, due to high percentage of water vapour in the air delays the drying of clothes.

Q.4 Physical state of water at –
(a) 25^0 C – liquid
(b) 100^0 C – either a liquid or a gas (steam)

Q.5 Conversion of temperature from Kelvin to Celsius scale–
(a) 300K = 300 – 273 = 27^0 C
(b) 573K = 573 – 273 = 300^0 C

Q.6 Two methods to convert a gas into a liquid–
(a) Condensation method
(b) By applying low temperature and high pressure

Q.7 The particles of water are held together by forces of attraction. But these forces of attraction are not strong. Therefore, by applying the greater force, a diver can cut though water in a swimming pool by overcoming the weaker force of attraction present among the particles of water. This observation shows that particles of matter attract each other.

Q.8 If a substance has no mass, it cannot be considered as a matter because a substance must have some mass to be called a matter.

Q.9 After a heavy exercise, the temperature of our body tends to rise. Due to increase in temperature, our body starts sweating. When the sweat evaporates, it absorbes heat form our body. By loosing heat, our body feels cool.

Q.10 The state of a substance can be determined by the attractive force and kinetic energy. The force of intermolecular of attraction tends to draw the particles together while the kinetic energy tends to keep the particles moving apart.
Order of force for attraction:
Solid > Liquid > Gas
Order of kinetic energy:
Solid < Liquid < Gas

Q.11 (a) Maximum force of attraction present between the particles of solids. This is because the molecules in solid remain very close to each other with least kinetic energy, due to which solid has definite shape and size.
(b) Due to the maximum and strongest force of attraction between the particles of solid, the space between its constituent particles is minimum.

Q.12 Activity to show that particles of matter have spaces between them.
(a) Take a 100 ml beaker.
(b) Fill half of the beaker with water and mark the level of water.
(c) Dissolve some salt/suger with the help of a glass rod.
(d) Observe any change in water level.
You will observe no change in the water level because the particles of sugar/salt occupy the spaces between the water particles, This shows that particles of matter have spaces between them.

Q.13 Tow factors which determines the rate of diffusion of a liquid in another liquid –
i) Temperature : It affects the rate of diffusion, as the temperature rises, the rate of diffusion increases.
ii) Density : If any liquid has more density, the rate of diffusion will be lesser. In other words, rate of diffusion of liquids is inversely proportional to their density.

Q.14 In summer we perspire more. Therefore, to keep our body cool, we must wear cotton clothes. Since cotton clothes are good absorber of water, they absorb the sweat quickly and expose it to the atmosphere for evaporation. Since, evaporation causes cooling, therefore, cotton clothes help us in keeping our body cool.

Q.15 When ice at 273 K melt to form water, it absorbs heat energy equal to the latent heat of fusion form the surroundings. The ice at 273 K has less heat energy than the water at 273 K. Hence ice is more effective in cooling than water at the same temperature.

Q.16 The intermixing of particles of two different types of matter on their own is called diffusion. The rate of diffusion increases with the rise of temperature, Thus, it is faster in summer season than the winter season.

Q.17 (a) Camphor is a volatile solid. It undergoes sublimation slowly at the room temperature. As a result, solid camphor gets converted into vapours which become a part of the air around us. Therefore, camphor disappears without leaving any solid remains.
(b) Wet clothes do not dry easily on a rainy day, because of the high humidity of the air. The water vapours are already present in the air which slows down the evaporation.
(c) We sweat more on a humid day. In hot and humid weather, the air around us already has a high percentage of water vapours, therefore, the sweat does not evaporate and gives us a sticking feeling.

Q.18 **Activity** : To show that gases are more easily compressible than the liquids and the solids.

(a) Take three 100ml syringes and close their nozzles by rubber corks.

(b) Remove the piston from all the syringes.

(c) Leaving one syring untouched, fill water in the second and pieces of chalk in the third.

(d) Insert the piston back into the syringes. You may apply some vaseline on the pistons before inserting them into the syringes for their smooth movement.

i) Now try to compress the contents by pushing the piston in each syringe.

ii) What do you observe? In which case was the piston easily pushed in?

iii) What do you infer from your observation?

Discussion :

(a) The syringe which was left untouched is the first syringe which contained air. The piston was easily pushed in.

(b) The piston of the second syringe which contained water was pushed only a little while the piston of the third syringe which contained chalk pieces could not be pushed at all.

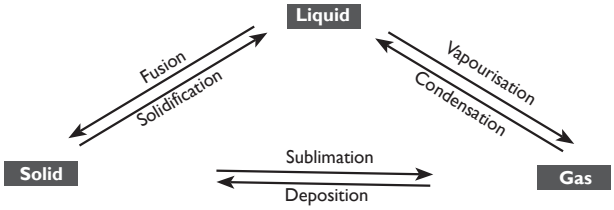
(c) Thus, air is easily compressible, water is almost incompressible while chalk pieces are completely incompressible.

(d) This shows that gases are more compressible than the solids and the liquids.

Q.19 (a) Latent heat of fusion : It is the energy required to convert 1kg of solid into liquid at its melting point at atmospheric pressure.
The latent heat of fusion of ice is 3.347×10^5 J/ kg (80 kcal/kg). This means that 3.347×10^5 Joules of heat is required to change 1kilogram of ice at its melting point, i.e., 273k (0^0C). Thus, at 0^0C, both ice and water exist together.

(b) Latent heat of vaporization : The amount of heat energy that is required to change 1kg of a liquid into vapours at atmospheric pressure at its boiling point is called latent heat of vaporization.
Example : The latent heat of vaporization of water is 22.59×10^5 J/kg or 540 Kcal/kg. This means that 22.59×10^5 Joules of heat is required to change 1 kg of water at its boiling point 373K(100^0C) into steam at the same temperature 373K(100^0C). Thus, at 100^0C both water and steam exist together.

Q.20 Gas can be liquefied by increasing pressure and decreasing temperature. However, the effect of decreasing temperature is more important as compared to that of increasing pressure. That is why for every gas there is a certain temperature above which the gas cannot be converted into the liquid state, i.e. Higher classes concept. Not relevant here.
Form the above discussion, it is clear that both temperature and pressure determine the state of a substance whether it will be a solid, liquid or a gas. The entire change has been represented in the given figure.



Interconversion of three states of matter

Q.21 (a) Properties of liquids have in common with gases.

(i) Liquids and gases both possess fluidity.

(ii) Both liquids and gases have the property of diffusion.

(b) An iron almirah is solid at room temperature because

(i) It has a fixed shape as well as a fixed volume.

(ii) It is not compressible.

(c) During the change of state of a substance at its melting point or the boiling point, the temperature remains constant because the heat energy supplied to the substance is used up in overcoming the force of attraction without increasing their kinetic energy.

Q.22 (a) Three characteristics of particles matter:

(i) Particles of matter have spaces between them.

(ii) Particles of matter are continuously moving and the movement of particles of matter depends on their kinetic energy. The solids have the least kinetic energy in their particles.

(iii) Particles of matter attract each other. Particles of matter have a force acting between them. This force keeps the particles together. When we add some sugar or salt in a beaker containing water, after sometime it dissolved and form a homogeneous mixture or solution. We also observe that there is not detectable rise in a level of water. This shows that spaces are present in between the particles of water. These are called interparticle spaces or wides.

(b) When ice is melted, water is produced and when water is heated, steam is produced. Conversely, when steam is cooled, water is produced and when water is cooled further, ice is produced. Therefore ice, water and steam are the three states of a substance and not different substances.

WORKSHEET 2

Q.1 If vapour pressure increases then boiling point decreases since liquid A hasmore vapour pressure than B so liquid A has low boiling point.

Q.2 Gas – It is defined as that form of matter which possesses fluidity but is highly compressible and hence has neither definite shape nor definite volume.

Q.3 Evaporation :- The phenomenon of changing of a liquid into vapours at any temperature below its boiling point is called evaporation.

Q.4 When ice is melted, water is produced and when water is heated, steam is produced. Conversely, when steam is cooled water is produced and when water is cooled further, ice is produced. Therefore, ice, water and steam are the there states of the water (of the same substance) and not the three different substances.

Q.5 When sugar is heated, it does not vapourize instead it becomes brownish and then later it becomes black but when ammonium chloride is heated chlorine gas is released.

Q.6 (i) -40^0 C $\rightarrow (-40) + 273.16 = 233.16$ K

(ii) -100^0 C $\rightarrow (-100) + 273.16 = 173.16$ K

Q.7 LPG and oxygen are the two gases which are supplied in compressed form in homes and hospitals.

Q.8 If the food is being cooked in the kitchen, its smell spreads and bring to us by a process called diffusion.

Q.9 (a) Water exists at 100^0 C – can be either liquid or gas

(b) Water exists at 0^0 C – can be either a solid or liquid.

Q.10 Kelvin scale temperature is 270 K then Celsius scale temperature is – 270 – 273 K = -3^0 C

Q.11 An activity to show the different states of matter have varied force of attraction between the particles.

(a) Play this game in the field – make four group and form human chains.

(b) The first group should hold each other form the back and lock arms like bihu dancers as shown in figure.

(c) The second group should hold hands to form a human chain.

(d) The third group should form a chain by touching each other with only their finger tips.

(e) Now, the fourth group of students should run around and try to break the three human chains one by one into as many small group as possible.

From the above we can infer that:

(a) The first group of student who formed bihu dancers like human chain was most strongly held and their human chain was the most difficult to break.

(b) The second group of student who formed human chain by holding their hands was the next strongly held while the student of the third group who formed human chain by just touching their fingers was the most weakly held and hence their human chain was the easiest to break.

Hence, the particles of matter which are most strongly held are the most difficult to separate while the particles of matter which are most weakly or loosely held are the most easy to break.

Q.12 Take a certain volume of a gas in a cylinder provided with a piston. Now compress to a small volume. Consequently, interparticle distances decrease, and gas particles come so close that they start attracting one another strongly to form a liquid. In other words, the gas gets liquefied by application of pressure.

Q.13 The particles of the aroma(incense stick) mix with the particles of air and due to high speed of these particles, the smell quickly reaches us and spread in the whole room quickly.

Q.14 (a) **Incompressible, no fixed shape**:
Liquids are incompressible and have no fixed shape, because the particles have spaces between them due to which they do not have the fixed positions.

(b) **Incompressible high melting point:**
Solids are the states of matter which are incompressible and possess high melting points. It is because of the small interparticle distances and strong interparticle force of attraction.

(c) **Compressible, no definite volume:**
Gases are compressible and no definite volume. It is due to the high interparticle spaces, which can be easily compressed.

(d) **Incompressible, high fluid**:
Liquids are incompressible and possess high fluidity. It is because of the larger interparticle distances and weaker force of attraction as compared to that of solids. Thus, liquids are not rigid but possess fluidity. Liquids have definite volume they are incompressible.

Q.15 Liquid like ether and acetone are kept in a cool place because these liquids have low boiling points. (E_{bp} = 308 K & $A_{b.p}$ = 329 K) and also have weak force of attraction. Such liquids are called volatile liquids.

Q.16 The boiling point of a liquid is the temperature at which its vapour pressure becomes equal to the atmospheric pressure. Since the atmospheric pressure is in lower on mountains (Shimla) than on plains (Delhi), therefore, the vapour pressure of water becomes equal to the atmospheric pressure at a lower temperature in Shimla than in Delhi, as a result, boiling point of water is lower in Shimla than in Delhi.

Q.17 (a) Water starts boiling at 100^0 C temperature. After attaining that temperature even with the supply of heat, there will be no rise in the temperature and it becomes constant. This is because all the heat that is supplied is utilized by the molecules of water to overcome the force of attraction between them and change into vapours.

(b) Evaporation is a surface phenomenon,i.e., it is only the surface particles of the liquid get converted into the vapours. Thus, greater is the surface area more is the rate of evaporation.

(c) Due to the lack of force of attraction between the gas particles, the spaces between the constituent particles is maximum. It is also due to the high kinetic energy of the gas particles.

Q.18 (a) Due to the presence of much smaller spaces amongst the particles of solids and liquids as compared to those in gases, the solid and the liquid states are collectively called the condensed phase of matter.

(b) At 0^0 C, the solid and liquid state of state of water exist together

(c) Gases are compressible because of the low forces of attraction in the gaseous particles. On the other hand, liquids are incompressible because they have fixed volume due to the more force of attraction and minimum interparticle spaces. Thus gases are more compressible than the liquids.

Q.19 **Melting point**: The temperature at which a solid melts to become a liquid at atmospheric pressure is called its melting point. Each pure solid has a fixed melting point which is a measure of the strength of the force of attraction between its constituent particles. Higher the melting point, stronger are the forces of attraction.

(b) The common substances which undergo sublimation are:
(i) Naphthalene (ii) Ammonium chloride (iii) Camphor (iv) Anthracene

Q.20 **Condensation** : The process of changing a gas (or vapour) to a liquid by cooling is called condensation.
Freezing : The process of changing a liquid to a solid by lowering the temperature is called freezing.
The main difference between the condensation and freezing is the –

(i) Condensation involves the conversion of gas → liquid.

(ii) Freezing involves the conversion of liquid → solid.

Q.21 Difference between Boiling and Evaporation

Boiling	Evaporation
a. Boiling takes place at a particular temperature when the liquid is heated.	a. Evaporation occurs on its own at all temperatures.
b. Boiling is a bulk phenomenon. It involves the formation of bubbles of the vapours form bulk (whole) of the liquid.	b. Evaporation is a surface phenomenon. It takes place only from the surface of the liquid.
c. No cooling is caused during boiling.	c. Evaporation always causes cooling.

Q.22 (a) The gas jar containing air also becomes completely reddish-brown. It is due to the movement of gaseous particles as they possess kinetic energy. It is because the gaseous particles have least or almost no forces of attraction between them. That's why this happened.

(b) The process involved here is called diffusion. It is the intermixing of the particles of different substances of matter on their own is called diffusion.

Q.23

Property	Solid	Liquid	Gas
a. **Interparticle force of attraction**	Interparticle force of attraction are the strongest.	Interparticle forces of attraction are weaker than the solids but stronger than those of gases.	Interparticle forces of attraction are the weakest.
b. **Density**	They have high density.	They have density lower than solids but more than gases.	They have generally very low density.
c. **Kinetic energy of particles**	These particles have the least kinetic energy.	These have kinetic energy less than the gases and more than the solids.	They have the highest kinetic energy.
d. **Diffusion**	Generally they do not show the diffusion although some rare examples are known.	They show the property of diffusion.	They diffuse very rapidly.
e. **Fluidity**	They do not possess fluidity as they are rigid.	They possess fluidity that is why they can flow.	They have the highest fluidity.

Q.24

Chapter 02 IS MATTER AROUND US PURE?

MULTIPLE CHOICE QUESTIONS

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

WORKSHEET 1

Q.1 Mercury and bromine.

Q.2 Water and carbon dioxide gas

Q.3 Brass is a mixture because brass is an alloy of zinc and copper.

Q.4 (i) Sugar and sand (ii) Iodized salt

Q.5 Ethyl alcohol = solute, water = solvent

Q.6 Yes, naphthalene has a property of sublimation, i.e., solid converting directly into vapour. Thus, naphthalene having lower sublimation temperature disappear with time.

Q.7 Chromatography based on adsorption. It can be used for separating components of a mixture in which all the components are soluble in the same solvent.

Q.8 Oil from water is separated by using separating funnel. The technique is based upon the principle that when a mixture of two immiscible liquid is allowed to stand they separate out in two separate layers depending upon their densities.

Q.9 Only colloidal mixture shows the Tyndall effect. Salt water is a true solution, so it does not show the Tyndall effect. However, milk in water is a colloidal solution which shows the effect.

Q.10 The wool being knitted into a sweater is a physical change because no new substance is formed.

Q.11 Volume of solution = Volume of solute + Volume of solvent
= 50 + 150
= 200 ml

$$\text{Percentage volume} = \frac{\text{Volume of solute} \times 100}{\text{Volume of solution}} = \frac{50}{200} = 0.25$$

Q.12 Aerated drinks , solute = CO_2
solvent = water
Tincture of iodine, solute = Iodine
solvent = alcohol
Lemon water, solute = Lemon
solvent = water

Q.13 By distillation, we can check the pure water and a solution of salt or sugar.

Q.14 Total mass of solution = mass of solute + mass of solvent
= 36 + 100
= 136 g

$$\text{Mass by mass percentage} = \frac{\text{Mass of solute} \times 100}{\text{Mass of solution}}$$
$$= \frac{36 \times 100}{136}$$
$$= 26.47\ \%$$

Q.15 Sugar contain : Carbon, hydrogen and oxygen
Common salt : Sodium, chlorine

Q.16

Homogeneous mixture	Heterogeneous mixture
a. It has no visible boundary between the constituents.	a. It has a visible boundary between the constituents.
b. It has a uniform composition.	b. It does not have a uniform composition.

Q.17 Air is a homogeneous mixture of number of gases such as oxygen, nitrogen, carbon dioxide, inert gases (mainly argon), water vapour.

Q.18 **Sol**: A sol is a colloidal solution which have a particle size ranges between 1nm to 100 nm.
Solution: A solution is a homogeneous mixture of two or more substance. The major component of the solution is called the solvent and the minor component is called the solute.
Suspension: A suspension is a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. The particle size ranges more than 100 nm.

Q.19 First of all we put a magnet in the mixture of iron filings, sulphur powder and sugar. Now we observe that iron particles are attracted by the magnet, and get separated from the mixture. After that remaining mixture dissolves in water. During this activity, we can observe sugar soluble in water while sulphur does not. On filtration, sulphur can be obtained on the filter paper, while sugar is recovered from the filtrate by distillation or evaporation.

Q.20 (1) **Distillation**: Distillation involves the conversion of a liquid into vapours by heating followed by condensation of the vapours. It is used for the separation of components of a mixture containing two miscible liquids which have sufficient difference in their boiling points.

(2) **Sublimation**: A process in which solid directly changes to gaseous state without passing through the intermediate liquid state. Sublimation can be used to separate volatile component from the non-volatile component of mixture.

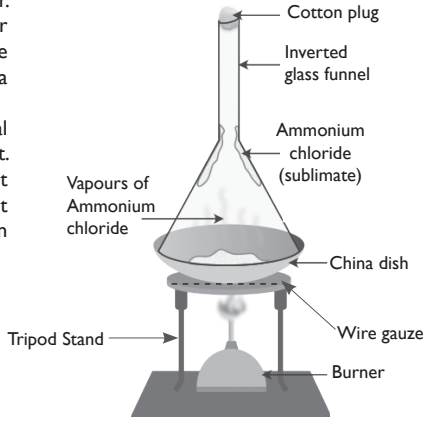
(3) **Chromatography:** It is the most modern and versatile method used for the separation, purification and testing the purity of inorganic and organic compounds. Now this method is widely used for separation, purification, identification and characterisation of both colourless and coloured components of a mixture.

(4) **Centrifugation**: Centrifugation based upon the principle that when a mixture is rotated at a high speed, the lighter particles stay on the surface of the liquid while the heavier particles are forced to the bottom of the liquid.

(5) **Fractional Distillation**: If however, the boiling point of two miscible liquid differ by less then 25K, they can by separated by the technique of fractional distillation. For example, separation of petroleum or separation of components of air.

Q.21 Sublimation is the property of substance in which they are converted directly from solid to gas or vice-versa. Such substances are known as sublime. Some examples of solids which sublime are ammonium chloride, camphor, naphthalene and anthracene. Let us perform an activity to separate a mixture of ammonium chloride and salt.

Experiment: Take a mixture of ammonium chloride and salt in china dish and cover it with inverted conical transparent funnel. At the other end of the funnel, put a cotton plug so that vapour could not come out. Now place china dish on a burner. As the ammonium chloride is sublimed after heating it will be converted directly into vapour and this vapour will again condense at the upper colder part of funnel to form solid ammonium chloride. In this way the mixture of ammonium chloride and salt can be separated by the sublimation method.



Sublimation

WORKSHEET 2

Q.1 Heterogeneous mixture

Q.2 A colloidal solution in which gas is a dispersion medium and liquid is a dispersion phase.
For e.g. - clouds, mist and sprays.

Q.3 Oxygen

Q.4 A pure substance consists of particles of only one kind of matter which are similar to one another and which cannot be separated into other kind of matter by any physical process.
Impure substances are normally called mixture. Since they have no definite composition They have no fixed melting and boiling point.

Q.5 Yes, both physical and chemical changes can happen at the same time.
For e.g. - burning a candle.

Q.6 (a) Mixture of water and milk (b) Sky looks blue

Q.7 When sulphuric acid is mixed with water, mixture is obtained.

Q.8 (a) Sugar in water (b) NaCl in water

Q.9 Simple distillation is used for the separation of components of a mixture containing two miscible liquids which boil without decomposition and have sufficient difference in their boiling points. Whereas fractional distillation is used to separate many different components from the mixture.
For e.g.- crude oil in petroleum industry is separated into various fractions such as gasoline, kerosene oil, diesel oil, lubricating oil etc. by fractional distillation.

Q.10 80% ethyl alcohol with water means 80 ml of ethyl alcohol dissolve in 20 ml of water. So, water is solute and ethyl alcohol is solvent.

Q.11 Mass of solute = 2.5 g
Mass of solvent = 50 g

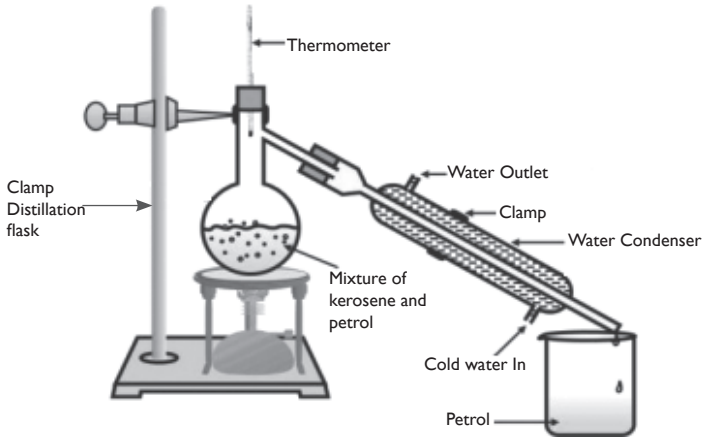
$$\text{Concentration (w/w)} = \frac{\text{Mass of solute} \times 100}{\text{Total mass of solution}} = \frac{2.5 \times 100}{52.5} = 4.76 \text{ g}$$

Q.12 (a) Solute: The component of the solution which is present in the small amount is called solute.
(b) Solvent: The component of the solution which is present in the large amount is called solvent.

Q.13 (1) Cooling of food – Chemical change (2) Boiling of water – Physical change
(3) Cutting of trees – Physical Change (4) Dissolving salt in water – Physical change

Q.14 Air is mixture, because
(i) it contains different gases.
(ii) it does not have fixed boiling point.
(iii) the constituents of air can be separated.
(iv) the all constituents of air have their own properties.
Water is a compound because
(i) it is made up of two element by the fixed ratio by mass.
(ii) it has fix boiling point.
(iii) it can not be separated by physical methods.

Q.15 Set up the apparatus as shown in the figure. Take the given mixture in a distillation flask. Heat the mixture slowly keeping a close watch at the thermometer. At a certain point, temperature becomes constant. Petrol vaporizes first as it has the lower boiling point. It condenses in the condenser and is collected from the condenser outlet. Stop heating when the temperature further starts rising. Kerosene is left behind in the distillation flask.



Distillation process

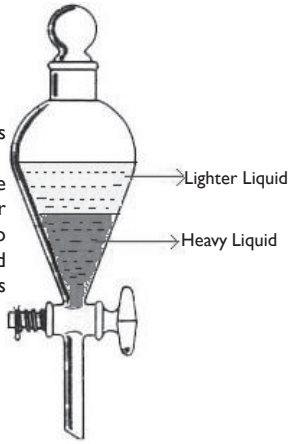
Q.16

Property	True solution	Colloidal solution	Suspension
Appearance	Homogeneous and transparent	Heterogeneous and translucent	Heterogeneous and opaque
Particles size	< 1 nm (10^{-7} cm)	1 nm 100nm	> 100 nm (10^{-5} cm)
Visibility	Particles are not visible even with a powerful microscope.	Particles can be seen with a high power microscope.	Particles can be seen with naked eyes.
Stability	Stable	Stable	Unstable
Diffusion	Diffuse rapidly	Diffuse slowly	Does not diffuse
Filterability For example	Passes through filter paper Sodium chloride dissolved in water.	Passes through filter paper Blood	Can be separated by filter paper Mud water

Q.17 Step I: Heat the mixture and we will observe that iodine sublimes. It can be collected separately by condensation.
Step II: Now NaCl and sand are left, which can be separated by using water .As NaCl is water soluble while sand is not, so sand is now left in the solution. It can be separated from the solution with the help of filtration.
Step III: With the help of simple distillation or evaporation we can collect the NaCl.

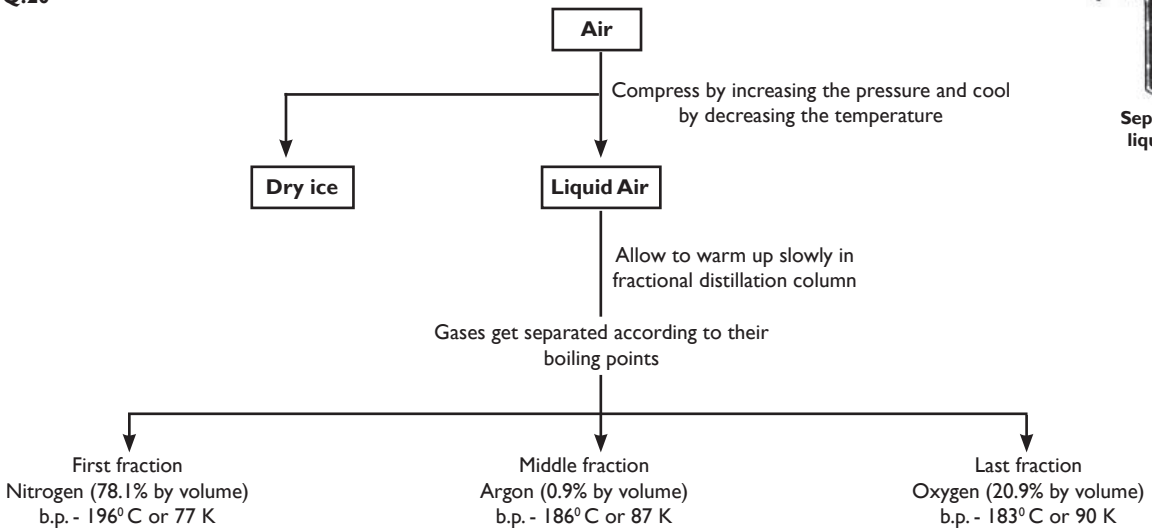
Q.18 (a) Metals are malleable and ductile while non-metals are not.
(b) Metals are good conductors of electricity while non-metals are insulators.
(c) Metals are lustrous while non-metals are non-lustrous.

Q.19 When two liquids do not mix, they form two separate layers and are known as immiscible liquids. These two liquids can be separated by using a separating funnel.
Experiment: A separating funnel is a special type of glass funnel, Which has a stopcock in its stem to regulate the flow of liquid. It will separate the immiscible liquids into two distinct layers depending on their densities. The heavier liquid forms the lower layer while the lighter one forms the upper layer. Remove the stopper and open the tap to run the lower layer into a beaker. You will be left behind with just the upper layer in the funnel. Collect this liquid into another beaker. For example, kerosene and water mixture is separated by using separating funnel method. This method is also used to extract iron form its ore.



Separation of immiscible liquids using separating funnel

Q.20



Flow diagram showing the separation of gases from the air

Q.21 (i) Magnetic Separation (ii) Reverse osmosis (iii) Evaporation (iv) Filtration
(v) Sublimation (vi) Filtration (vii) Chromatography

Chapter

03 ATOMS AND MOLECULES

WORKSHEET 1

Q.1 It is the number of atoms present in a molecule.

Q.2 It is the symbolic representation of its composition. It gives the number and kinds of atoms which are chemically united in a compound.

Q.3 Ion is a charged particle.

Q.4 A mole is the amount of the substance which contain same number of particles as there are in C–12 isotope atoms in 12 gm.

Q.5 A group of atoms having a charge is called as polyatomic ions.

Q.6 O_3 (ozone)

Q.7 Al_2O_3

Q.8 16 gm

Q.9 H_2O, HCl

Q.10 1 mole = 6.022×10^{23} particles

Q.11 1 mole of sodium atom = 6.022×10^{23}
Now 6.022×10^{23} atoms of sodium weigh = 23
In one atom of sodium weigh = $\frac{23 \times 1}{6.022 \times 10^{23}} = 3.8 \times 10^{-23}$

Q.12 A formula unit mass of a substance is a sum of the atomic masses of all atoms in a formula unit of a compound.
So, unit mass of Na_2SO_3 (2x23+32+3x16 =126)

Q.13 Molecular mass of $CaCO_3$ (40+12+3x16 = 100)
100g of $CaCO_3$ have molecule = 6.022×10^{23}
50g of $CaCO_3$ have molecule = $\frac{6.022 \times 10^{23} \times 100}{100} = 3.011 \times 10^{23}$

Q.14

S.N	Name of element	Percentage	Atomic mass	Moles	Relative Ratio
1	C	75	12	6.25	$\frac{6.25}{6.25} = 1$
2	H	25	1	25	$\frac{25}{6.25} = 4$

Empirical formula = CH_4

Q.15 (i) Atomic mass of nitrogen = 14
mass of 1 mole of nitrogen = 14x1 = 14 g
(ii) Atomic mass of aluminium = 27
mass of 3 mole of aluminium =27x3 = 81 g

Q.16 **Law of conservation of mass** : According to law of mass of conservation, mass is neither be created nor be destroyed in a chemical reaction. Antoine Lavoisier proposed the law of conservation of mass.

Q.17 (i) Acetic acid = $CH_3COOH = 12+3\times1+12+16+16+1 = 60$ g
(ii) Ethanol = $CH_3CH_2OH = 12+3\times1+12+2\times1+16+1 = 46$ g
(iii) Carbon dioxide = $CO_2 = 12+2\times16 = 40$ g

Q.18 (a) Calcium fluoride = CaF_2
(b) Ammonium carbonate = $(NH_4)CO_3$
(c) Aluminium oxide = Al_2O_3

Q.19 (i) Glucose = $C_6H_{12}O_6 = 6\times12+12\times1+6\times16 = 72+12+96 = 180$ g
(ii) Sulphuric acid = $H_2SO_4 = 2\times1+32+4\times16 = 98$ g

Q.20 (i) Mole of 52 g of Helium = $\frac{52}{4}$ atomic mass of He = 4
(ii) 6.022×10^{23} particles of He = 4 g
12.044×10^{23} particles of He = $\frac{4\times12.044\times10^{23}}{6.022\times10^{23}} = 8$ g

Q.21 (i) Moles = $\frac{\text{Mass}}{\text{Atomic mass}}$
Number of atoms = Moles × Avogadro's number = $\frac{0.08}{1} \times 6.022\times10^{23} = 0.48\times10^{23}$ atoms
(ii) Number of atoms = Moles × Avogadro's number = $\frac{0.8}{56} \times 6.022\times10^{23} = 0.086\times10^{23}$ atoms
(iii) Number of atoms = Moles × Avogadro's number = $\frac{0.008}{32} \times 6.022\times10^{23} = 0.0015\times10^{23}$ atoms
(iv) Number of atoms = Moles × Avogadro's number = $0.5 \times 6.022\times10^{23} = 3.011\times10^{23}$ atoms

WORKSHEET 2

Q.1 Mole of sodium = $\frac{\text{Mass of sodium}}{\text{Atomic Mass}} = \frac{0.5}{23} = 0.0217$

Q.2 A_3B_2

Q.3 Matter neither be created nor be destroyed.

Q.4 The formula unit mass of a substance is a sum of the atomic masses of all atoms in a formula unit of a compound. The constituent particles of formula unit mass are ions and constituent particles of molecular mass are atoms.

Q.5 6.022×10^{23}

Q.6 Mole = $\frac{\text{Mass}}{\text{Atomic Mass}}$

Mass = mole x atomic mass = $0.2\times16 = 3.2$ g

Q.7 NH_4^+

Q.8 $Al_2(SO_4)_3$

Q.9 $Mg(OH)_2$, Ca_3N_2

Q.10 6.022×10^{23} particle

Q.11 Molar mass of H_2O (2 + 16) = 18

Molecules in H_2O = $\frac{\text{Mass of mass}\times\text{Avogadro's number}}{\text{Molecular mass}}$

$= \frac{0.9 \times 6.022\times10^{23}}{18} = 16.2 \times 10^{23}$

Q.12 6.022×10^{23} particles contain of mass of nitrogen = 14 g

3.011×10^{23} particles contain of mass of nitrogen = $\frac{14}{2} = 7$g

So, moles = $\frac{\text{mass}}{\text{atomic mass}} = \frac{7}{14} = 0.2$ mole

Q.13 i) Atomic number 5= 2, 3 So, valency = 3

ii) 2 iii) 4 iv) 1

Q.14 The atomic mass of an element is numerically equal to the mass of 1 mole of its atoms.

1 mole of atoms = 6.022×10^{23} atoms.

Now, 1 atom of element X has mass = 2.65×10^{-23}g.

So, 6.022×10^{23} atoms of element X have mass = $2.65 \times 10^{-23}\times6.022 \times 10^{23}=16$

Q.15 Moles = $\frac{\text{Mass of carbon dioxide}}{\text{Molecular mass of carbon dioxide}}$

$= \frac{22}{44}$ Molecular mass of CO_2 = 12 +32 = 44

= 0.5 mole

Q.16 Sodium atom is defined as the smallest particle of an element which may or may not be capable of free existance. However, it is the smallest particle that takes part in a chemical reaction.

Sodium ion carry positive charge after lose one electron from the outermost shell.

Q.17 Mass percentage of sodium = $\frac{\text{Mass of Sodium} \times 100}{\text{Total mass of NaCl}} = \frac{23 \times 100}{50.5} = 39.31\%$

Mass percentage of chloride = $\frac{\text{Mass of Chloride}}{\text{Total mass of NaCl}} = \frac{35.5 \times 100}{50.5} = 66.68\%$

Q.18 Number of moles of water molecules=0.5 mol

Number of moles of hydrogen atom= $0.5\times2=1$

Number of hydrogen molecules=6.022×10^{23} atoms.

Number of moles of oxygen atom =$0.5\times1=0.5$

Number of molecules of oxygen atom= 3.011×10^{23} atoms.

Q.19 (a) Polyatomic ion: The ions which combine more than one atom and behave as a single unit are called polyatomic ions. For example, NH_4^+, CO_3^{2-}

(b) Atomic mass unit: A unit of mass used to express atomic and molecular weights, equal to $1/12^{th}$ of the mass of an atom of carbon 12. The relative atomic of all elements have been found with respect to an atom of carbon-12

(c) Avogadro's number: A mole of particle is, therefore, defined as that amount of the substance which contains Avogadro's number of particles that is 6.022×10^{23} particles.

Q.20 a. Every element is composed of extremely small particles called atoms.

b. Atoms of a given element are identical, both in mass and properties. Different chemical elements have different kinds of atoms; in particular, their atoms have the different masses.

c. Atoms cannot be created, destroyed or transformed into atoms of other elements.

d. Compounds are formed when atoms of different elements combine with each other in small whole number ratio.

e. The relative number and kinds of atoms in a given compound are constant.

Q.21

1.	$CuBr_2$	2.	AlN	3.	$Ca_3(PO_4)_2$	4.	FeS	5.	CaO
6.	$NaHCO_3$	7.	Na_2CO_3	8.	$HgCl_2$	9.	$Al_2(CO_3)_3$	10.	MgO

Q.22 (a) Mass of 5 moles of CO_2 = 5 x 44 = 220 g

Mass of 5 moles of H_2O = 5 x 18 = 90 g

(b) 23 gram atomic unit = 6.022×10^{23} atoms

100 gram atomic unit = $\frac{6.022\times10^{23}\text{x } 100}{23} = 26.18 \times 10^{23}$ atoms

17 molecular unit = 6.022×10^{23} atom

100 gram atomic unit = $\frac{6.022 \times 10^{23} \times 100}{17} = 35.42\times10^{23}$ atom

Chapter

04 STRUCTURE OF ATOM

WORKSHEET 1

Q.1 The species containing the same number of electrons are called isoelectronic. For example, O_2^-, F^-, Na^+, Mg_2^+

Q.2 Helium atom has only one shell (k-shell) which can have maximum 2 electrons. Thus, its shell is already completed. Hence, its valency is zero. It is called noble gas or inert gas.

Q.3 $_{19}K$= 2, 8, 8, 1

Q.4 No, because atom will not carry any charge because electron carries one unit negative charge whereas proton carries one unit positive charge. The net charge on the atom will, therefore, be zero.

Q.5 The electrons present in the outermost shell of the atom of an element are called valence electrons. The outermost shell is also called the valence shell.

Q.6 10

Q.7 Atomic number 8, Atomic mass number 16, so name of the element is oxygen.

Q.8 The isotopes of an element have different mass numbers and hence, they differ in the number of neutrons present in the nucleus.

Q.9 If Z=3, the valency will be equal to 1.

Q.10 Number of Neutron = Number of mass number - Number of proton
= 4 - 2
= 2

Q.11 Atomic number of Al = 13, Numbers of electrons in Al_3^+ will be 13 - 3 = 10
Atomic number of Cl = 17, Number of electrons in Cl^- will be 17 + 1 = 18

Q.12 Charged bodies, when move in circular motion, emit radiations. Thus, electrons revolving round the nucleus, as suggested by Rutherford, will lose energy and will come closer and closer to nucleus and will finally collapse into the nucleus. This means atoms are quite unstable which is untrue.

Q.13 Atomic mass number = 23
Number of neutron = 12
So, Number of electrons = 23 - 12 = 11
Symbol of the element = $_{11}Na^{23}$

Q.14 Electronic structure of Sodium (11) = 2, 8, 1
Electronic structure of Calcium (20) = 2, 8, 8, 2

Q.15

Property	Cathode Rays	Anode Rays
1) Type of charge present	They are deflected towards the positive plate of external electric field showing that they carry negative charge.	They are deflected towards negative plate of external electric field showing that they carry positive charge.
2) Particles present	Particles present in cathode rays are electrons.	Particles present in anode rays are positvely charged particles.
3) Quantity of charge and mass	Electrons present in the cathode rays always have the same charge (-1 unit) and same mass (1/1840th of that of H-atom.)	The charge on the particles may be +1,+2 etc. which depends upon the number of electrons lost by atoms. Mass of the particles is nearly same as that of the atom of the gas taken in the discharge tube.
4) Origin	They originate from the cathode	They are produced in the space between anode and cathode.

Q.16 (a) Electrons
(b) Total number of electron in NO_3^- ion = 7+3 x 8+1 = 7+24+1 = 32

Q.17 (a) The atom of an element consists of a small positively charged nucleus which is situated at the centre of the atom and which carries almost the entire mass of the atom.
(b) The electrons are distributed in the empty space of the atom and are revolving around the nucleus at high speed.
(c) The number of electrons in an orbit is equal to the number of positive charges (protons) in the nucleus. Hence, the atom is electrically neutral.
(d) The volume of the nucleus is negligibly small as compared to the volume of the atom.
(e) Most of the space in the atom is empty.
(f) The arrangement of electrons in an atom is just like a solar system.

Q.18 (a) The atomic mass of two isotopic atoms are 35(75%) and 37(25%).

Thus, average mass = $\frac{35 \times 75}{100} + \frac{37 \times 25}{100}$ = 26.25 + 9.25 = 35.5 u

(b) (i) An isotopes of uranium is used as a fuel in nuclear reactors.
(ii) An isotope of cobalt is used in the treatment of cancer.

Q.19 (a) 3 (b) 2 (c) 4 (d) 1

Q.20 Isotopes: Isotopes are atoms which have the same number of protons but the number of neutrons differ. This leads to the variation in mass number too. Example: The simplest example is the carbon molecule which exists as $_6C^{12}$ and $_6C^{14}$ but when their electronic configuration is noticed, both have K-2 L-4

Isobars: Isobars are the pair of atoms which have the same mass numbers but differ in their atomic numbers.

Electronic cofiguration of an isobar pair is as follows,

$^{40}Ca_{20}$: K-2 L-8 M-8 N-2

$^{40}Ar_{18}$: K-2 L-8 M-8

Isotopes of hydrogen:

a. H(Protium) (11H)
Atomic number=1
Mass number = 1
Number of protons = 1
Number of electrons = 1
Number of neutrons = Nil

b. D(Deuterium) (21H)
Atomic number=1
Mass number = 2
Number of protons = 1
Number of electrons = 1
Number of neutrons = 1

c. T(Tritium) (31H)
Atomic number=1
Mass number = 3
Number of protons = 1
Number of electrons = 1
Number of neutrons = 2

Q.21

Name of Element	Symbol	Atomic number	Distribution of electrons			
			K	L	M	N
Hydrogen	H	1	1	-	-	-
Helium	He	2	2	-	-	-
Lithium	Li	3	2	1	-	-
Beryllium	Be	4	2	2	-	-
Boron	B	5	2	3	-	-
Carbon	C	6	2	4	-	-
Nitrogen	N	7	2	5	-	-
Oxygen	O	8	2	6	-	-
Fluorine	F	9	2	7	-	-
Neon	Ne	10	2	8	-	-
Sodium	Na	11	2	8	1	-
Magnesium	Mg	12	2	8	2	-
Aluminium	Al	13	2	8	3	-
Silicon	Si	14	2	8	4	-
Phosphorus	P	15	2	8	5	-
Sulphur	S	16	2	8	6	-
Chlorine	Cl	17	2	8	7	-
Argon	Ar	18	2	8	8	-
Potassium	K	19	2	8	8	1
Calcium	Ca	20	2	8	8	2

WORKSHEET 2

Q.1 Proton

Q.2 It is the combining capacity of an atom.

Q.3 Due to different atomic mass numbers.

Q.4 Absorbed

Q.5 18 electrons

Q.6 Protons located in the nucleus of atom, while electron are revolve around the nucleus.

Q.7 Electronic configuration of element having atomic number 12 is 2, 8,2.

Q.8 Argon (20), Calcium (20)

Q.9 -1.6×10^{-19} coulomb

Q.10 The total number of protons and neutrons is called mass number.

Q.11 According to J. J. Thomson's model of an atom, the electrons are embedded all over in the positively charged spheres. But experiments done by other scientists showed that protons are present only in the centre of the atom and electrons are distributed around it.

Q.12 Valency of magnesium (12), electronic configuration of Mg is 2, 8, 2, so valency of magnesium is 2.
Valency of oxygen (8), electronic configuration of oxygen is 2, 6, so valency of oxygen is 2.

Q.13 S^{2-}
atomic number of S^{2-} = 16 +2 = 18
K= 2 L= 8 M= 8

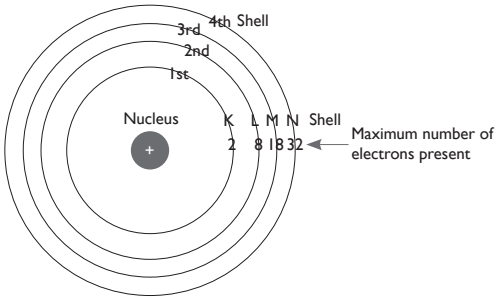
Q.14 Number of protons = 5
Number of neutrons = 6
So, atomic mass number = Number of protons + Number of neutrons
= 5 + 6 = 11
Atomic number will be = 5
So, Number of electrons = 5
Electronic configuration = 2, 3
So, valence electron is 3

Q.15 Electronic configuration of element having atomic number 16 is 2, 8, 6
So, electron distribution in K, L, M are 2, 8, 6 respectively.
Electrovalency of atomic number of 16 will be 2.

Q.16 Isotopes show similar chemical properties. Since, isotopes of an element have same number of electrons, they have same electronic configuration and hence, the same number of valence electrons. Since chemical properties depend upon the number of valence electrons, therefore, they have same chemical properties.
Application of isotopes:
(i) In the nuclear reactor, an isotopes of uranium (U-235) is used as a nuclear fuel.
(ii) Some radioisotopes are widely used for the treatment as well as diagnosis of total diseases like cancer, tumour, etc.
(iii) Radioisotopes are used to detect the leakage in the underground oil pipes, gas pipes or water pipes.

Q.17 (i) The maximum number of electrons that can be present in the nth shell is equal to $2n^2$. Thus, we have

Shell	Maximum number of electrons present
1st shell or K-shell (n=1)	2x12 = 2
2nd shell or L-shell (n=2)	2x22 = 8



Maximum number of electrons present in different shells

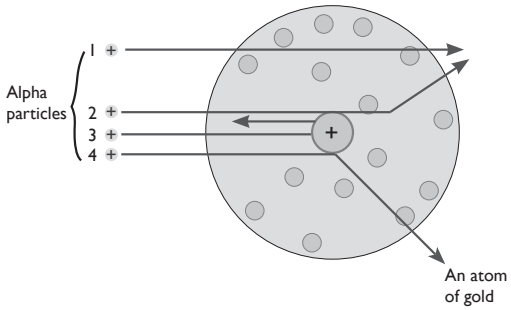
3rd shell or M-shell (n=3)	2x32 = 18
4th shell or N-shell (n=4)	2x42 = 32

(ii) The outermost shell cannot have more than 8 electrons even if the first rule is violated. For example 3rd shell (M-shell) can accommodate upto 18 electrons but as soon as it has acquired 8 electrons, the filler of the 4th shell (N-shell) starts. Thus, for the first 18 elements, rule(iii), as given below, can be applied.
(iii) Electrons can not enter into a new shell unless the inner shells are completely filled. In other words, the shells are filled in a step-wise manner.

Q.18 (a) Number of electrons in Rn= 86
Number of protons in Rn=86
Number of neutrons in Rn=136
(b) He, Ne and Ar are noble gas atoms, i.e., they have complete valence shell due to which they show zero valency.

Q.19 The number of neutrons in an element M has atomic mass 24 and atomic number 12 is 24-12=12.
The electron distribution in K, L and M shells is 2, 8, 2 respectively.

Q.20 Ernest Rutherford discovered the nucleus within an atom in his alpha-ray scattering experiment. The arrangement of the alpha-particle scattering experiment is as follows:



Rutherford produced a narrow beam of particles from a radioactive source (e.g., radium or polonium), which was allowed to strike an extremely thin gold foil. Rutherford proposed that if the spherical model proposed earlier which made for a uniform distribution of positive and negative particles was correct then the alpha particle striking the gold atoms would be uniformly deflected. However, the observations were:
a. Most of the alpha particles passed straight through the gold foil without suffering any deflection from their original path
b. A few of them were deflected through small angles, while a very few deflected to a large extent.
c. A very small percentage (1 in 100000) was deflected through 90°(turned back)

Drawbacks of Rutherford's model of an atom:
The orbital revolution of the electron is not expected to be stable. Any particle in a circular orbit would undergo acceleration and the charged particles would radiate energy. Thus, the revolving electron would lose energy and finally fall into the nucleus. If this were so, atom should be highly unstable and hence, matter would not exist in the form that we know.

Q.21

Electrons	Protons	Neutrons
Negatively charged	Positively charged	No charge
Present outside the nucleus	Present inside the nucleus	Present inside the nucleus of an atom
Negligible mass	1 a.m.u	1 a.m.u
Get attracted towards positive charge	Get attracted towards negative charge	Do not get attracted to any charged particle

Chapter 05 THE FUNDAMENTAL UNIT OF LIFE

WORKSHEET 1

Q.1 1. True 2. False 3. True 4. True 5. True
6. True 7. False 8. False 9. True 10. True

Q.2 1. Robert Hooke 2. Lysosomes 3. Mitochondria 4. Metabolism 5. Osmosis
6. Nuclear membrane 7. Diffusion 8. Endoplasmic reticulum 9. Lysosomes 10. Chloroplasts and mitochondria

Q.3 1. Cell theory 2. Cristae 3. Mycoplasm 4. r RNA and proteins 5. Gene
6. Nucleus 7. Nucleus 8. virus 9. DNA and RNA 10. Chromoplasts

Q.4 1. **Osmosis** : Osmosis is the passage of water from a region of high water concentration through semipermeable membrane to a region of low water concentration.
2. **Hypotonic solution** :The external solution has less osmotic concentration as compared to that of cell. There is a high concentration of water in the outside solution as compared to the water concentration present inside the fluid cell.
3. **Hypertonic solution** :The external solution has more osmotic concentration as compared to that of cell. There is less concentration of water in the outside solution. More water concentration is present inside the cell.
4. **Isotonic solution** : The external solution has the same concentration as that of the cell. Therefore, water content is equal on both sides.
5. **Genes** : A gene is defined as a functional unit of DNA or chromosome that carries hereditary information for one or more functions.

Q.5 1. Animal cell is enclosed by a thin, flexible, living plasma membrane only. Cell wall is absent.
Plant cell is enclosed by a thick, rigid, dead cell wall in addition to a plasma membrane.
2. In prokaryotic cell, genetic material is not surrounded by a nuclear membrane and is in direct contact with cytoplasm.
In eukaryotic cell, distinct nucleus is present. Nuclear material is surrounded by a nucleus membrane and is not in direct contact with cytoplasm.
3. Chloroplast are plastids containing cholorophyll, a green pigment, mainly found in leaves.
Chromoplast are plastids containing red, orange or yellow pigment and mainly foucd in fruits or flowers.
4. Organs are the collection of tissues performing the similar function. Organ is large and forms a part of the body.
Organelles are small structures which lie inside the cell and perform certain functions of the cell. Organelles collectively form a cell.
5. SER is well developed in cells specialized to synthesise proteins. The products pass into the lumen of endoplasmic reticulum for transport to other places.
RER is well developed in cells specialized to synthesise lipids and steroids. The products do not pass into lumen of endoplasmic reticulum.

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

Q.7 1. Both chloroplasts and mitochondria possess their own DNA, RNA, and 70S ribosomes which helps them synthesize some of their proteins and enzymes. Due to this functional independence they are semi-autonomous.
2. Mitochondria are commonly known as power house of the cell because they contain enzymes necessary for the total oxidation of food and for release of high amount of energy in the form of ATP. The body uses energy stored in ATP for synthesis of new chemical compounds and for mechanical work.
3. Nucleus is called the brain of the cell because it controls all the metabolic activities of the cell.
4. The ribosomes provide space for the synthesis of protein in the cell. Hence, they are known as the protein factories of the cell.
5. Nuclear membrane is a double layered covering which has pores that allow the transfer of material from inside the nucleus to its outside. These pores have complex structure that selectively allow passage of substances. Therefore, nuclear membrane is selectively permeable.

Q.8 1. (a) 2. (a) 3. (a) 4. (c)

Q.9 1. No
2. Centrioles
3. The nucleolus is located in within the nucleus of the cell
4. Ribosomes
5. Chloroplasts
6. Cellulose
7. Swollen raisin will shrink
8. Synthesis of ATP in mitochondria occur on the inner mitochonrial membrane.
9. Iodine solution is used as a starch indicator in science experiment. When iodine solution is introduced to a substance that contains starch it will turn to a dark blue or blue-black hue.
10. The functional segment of DNA is gene.

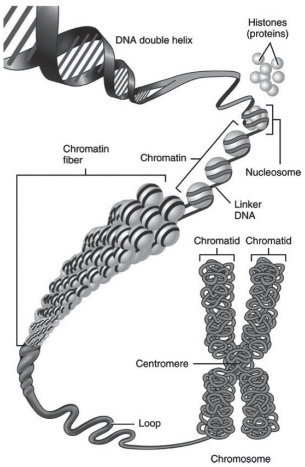
Q.10 1. If plant cell is kept in sugar solution the solvent of cell move to sugar solution, due to osmosis. Consequently, they shrink.
2. The water can penetrate the outer layer of skin. This causes skin to become waterlogged and wrinkly.
3. Plant cells possess large-sized vacuoles because vacuoles store water or sap in them which when full provide rigidity and turgidity to plant cell.
4. It is a type of active transport that moves particles, such as large molecules, parts of cells and even whole cell into a cell.
5. The plant cell as well as cell of bacteria and fungi possess an additional layer outside the plasma membrane called the cell wall. Plant cell wall is mainly made of cellulose.
6. Because, chloroplast is the main site for the food production by plant. If there is no chloroplast, no food is prepared by plant. Therefore, plants will not be able to survive..
7. Animals do not have rigid walls because cell walls are incompatible with the way in which an animal moves and grows. The plant cell membrane provides animal cell freedom of mobility and formation of stress in tissues which is not present in plant.

8. Living organisms continuously need materials produced in one area to be brought to another area in order to carry out their essential life activities. This requires a transport system to be present which can transport the materials from one place to another within the living body.

Q.11 1. The three similarities between mitochondria and plastids are:
(a) Both are double membrane bound organelles.
(b) Both are capable of producing some of their own protein due to possession of DNA, RNA, ribosomes and enzymes.
(c) Both can make their own copies by division
Difference is that mitochondria occur in the cells of aerobic organisms with the exception of RBCs whereas plastids occurs in the cells of green photosynthetic parts of the plant.

2. (a) When dry apricots are left for sometime in pure water, they will swell because water will enter into them through the process of osmosis. Later, when these apricots are transferred to sugar solution, they will again shrink. This also occurs due to osmosis.
(b) When Rheo leaves are boiled in water first and then a drop of sugar syrup is put on it, osmosis does not occurs, due to the death of the cells of leaf. This shows that selective permeability is property of living plasma membrane.
(c) If there were no Golgi apparatus, the material synthesised by endoplasmic reticulum would not be carried to the various parts inside and outside of the cell. Also, as the Golgi apparatus performs the function of storage and modification of the material synthesised in the cell, these materials could not be stored and modified further.

3. (a) Chromatin is entangled mass of thread- like structure. Chromatin material gets organised into chromosome. The chromosome contains DNA and protein. Two arms of chromosome are called chromatids. Thus, chromosome is made of chromatid and chromatid is made of chromatin.
(b)

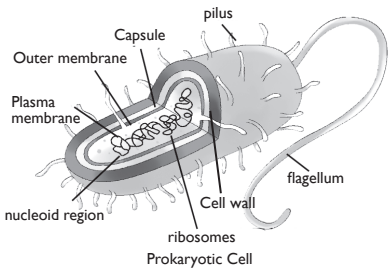


4. Amoeba obtains its food through a process called phagocytosis. The cell membrane of amoeba is projected into numerous finger-like outgrowths; called pseudopodia. Amoeba surrounds a food particle by pseudopodia and makes a food vacuole; after engulfing the food.

5. Animal cell- Centriole, lysosomes
Plant cell- Cell wall, vacuole,
Parts of both plant and animal cell-

6.

Q.12 1. (a)



(b) i) Our cells have proper well defined nucleus
ii) Our cells have membrane bound organelles.

2. (a) Robert Hooke in 1665.
(b) He discovered them while examining a thin slice of cork under primitive microscope.
(c) Cell looks like a brick of a building. Shreya can show her a brick used in making a building.
(d) i) All living organisms are component of one or more cells.
ii) Cell is the basic unit of structure of organisation in organisms.
iii) Cell arise from preventing cells.
(e) Cell Theory In 1838,was proposed by Jakob Matthias Schleiden (1804-1881) was a German botanist and Theodor Schwann (1810-1882) was German zoologist. Scheilden said that all plants consist of cell. Schwann said that all animals and plants are made up of cells. Cell Theory was refined by R.Virchow. He presented the idea that all cells are arise from pre existing cells only.
Thus, cell theory's postulates are:
1-All organisms are composed of cells and cell products.
2-All metabolic reactions takes place in cells. Thus,cell are structural and functional unit of life.
3-All cells are arise from pre existing cells only.
4-Every organism starts its life with single cell only. Viruses are exceptions.

3. (a) The cell wall is a protective layer around the plant cell. It mostly consists of cellulose, which provides rigidity and strength to the plant cell, helping it to stand upright.

(b) The cell walls of plant cells help maintain turgor pressure, which is pressure of the all membrane pressing the cell wall. The cell wall efficiently holds water so that the cell does not burst.

(c) Plant cell

(d) If animal cell is provided with cell wall, the animal would become stiff and rigid and would not able to do all the necessary things it needs to do like to survive, run, eat, etc.

4. (a) The chlorophyll present in chloroplast of leaf cell imparts green colour to leaf.

(b) This green coloured pigment helps in trapping solar energy required for the process of photosynthesis.

(c) Flowers are coloured differently due to different colourful pigments present in them. These pigments are called anthocyanins. The different colour pigments in flowers reflect different colours when exposed to sunlight.

(d) No, they are not present in animal cell.

5. (a) **Lysosome:** Lysosome are a kind of waste disposal system of the cell. Lysosomes help to keep the cell clean by digesting any foreign material as well as worn-out the cell organelles. Foreign materials entering the cell, such as bacteria or food,as well as old organelles end up in the lysosome, which break them up into small pieces. Lysosomes are able to do this because they contain powerful digestive enzymes capable of breaking down all organic material. When the cell gets damaged, lysosomes may burst and the enzymes digest their own cell. Therefore lysosomes are also known as the suicide bags of a cell.

(b) **Golgi bodies**: Modify proteins made by the cells. Package & export proteins. The materials synthesized in the ER are stored, sorted, modified, packaged and dispatched to various target cells only through the Golgi apparatus. Absence of Golgi complex leads to some problems in the transport of lipids in cells, formation of lysosomes or peroxisomes, formation of sugars etc. Without a Golgi apparatus the cell will not function.

(c) **Endoplasmic Reticulum** (ER): Endoplasmic Reticulum is a complex network of tubular membranes present within the cytoplasm of the eukaryotic cell, transpiring either with a smooth surface and therefore called as the smooth endoplasmic reticulum or studded with ribosomes and hence called the rough endoplasmic reticulum which is involved in the transportation of materials. These membranes are continuous, joining with the outer membrane of the nuclear membrane. They occur in almost every type of eukaryotic cell except red blood cells and sperm cells.

(d) **Ribosomes**: The ribosome is a complex molecular machine found inside the living cells that make proteins from amino acids together in the process called protein synthesis or translation. Protein synthesis is the major task performed by living cells.

(e) **Mitochondria:** Mitochondria are known as the power houses of the cell. They produce Adenosine Triphosphate (ATP). They are required for cellular respiration. They are present in both animal cell and plant cell. They are surrounded by two membranes. The inner membrane is folded into finger-like projections called cristae.

6. (a) A - Plant cell B - Animal cell

(b) It will gain water by the process of osmosis. The cell wall swell up because the concentration of water is high in the hypotonic solution.

(c) It will loose water by the process of osmosis. The cell wall shrink and gets plasmolysed because the concentration of water is low in the hypertonic solution.

WORKSHEET 2

Q.1 1. Multicellular 2. Prokaryotic 3. Protoplasm 4. Egg cell 5. Prokaryotic
6. DNA 7. Tonoplast 8. Cytology 9. Green parts like leaves, stems 10. Cell wall

Q.2 1. Endosmosis and exosmosis

Endosmosis	Exosmosis
a. The cell swells up.	a. The cell shrinks.
b. It occurs when cell is placed in hypertonic solution.	b. It occurs when cell is placed in hypotonic solution.
c. Concentration of water is high outside the cell.	c. Concentration of water is high inside the cell.

2. Cell membrane and nuclear membrane

Cell membrane	Nuclear membrane
a. It encloses the cytoplasm.	a. It encloses the nucleus.
b. It is a lipid bilayer.	b. It is a double lipid bilayer.

3. Nucleus and nucleolus

Nucleus	Nucleolus
a. Controls the structure and working of cells	a. It synthesises informal nutrients
b. Covered by a two membrane envelope	b. Does not have a covering membrane

Q.3 1. Shrink 2. Exosmosis 3. Electron 4. Karyoplasm
5. Viruses or Mesokaryotic (Dinoflagellates like Perienium) 6. Micrographia 7. Cell theory
8. Adenosine Triphosphate 9. Proteins 10. DNA

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

Q.5 1. Chloroplast 2. Endoplasmic Reticulum and golgi complex
3. Smooth endoplasmic reticulum and Rough endoplasmic reticulum 4. Nucleus 5. Ribosome

Q.6 1. Cell wall : Present only in plant cell 2. Blue green algae : prokaryotes 3. Chromosome : Other three are plastids

Q.7 1. diffusion 2. chloroplast, Colourless plastid 3. cell membrane 4. Leeuwenhoek

Q.8 1. True 2. True 3. True
4. False. Nucleus lies towards the periphery due to the presence of large central vacuole in plant cells.
5. False. Vacoules are large units in cells. 6. True

Q.9 1. Dead 2. Golgi apparatus 3. Membrane proteins
4. Cytoplasm 5. Deoxyribonucleic acid

Q.10 1. Viruses can be considered to be alive as they depend upon hosts to replicate their DNA from RNA. They are much smaller than the cells. But cell theory states that "all living cells are made of cells that are fundamental unit of life". So, a virus is not made up of cells. But, it is considered to be living. Therefore, it is an exception to the theory.

2. Genes are simply short regions of DNA which code for either a protein or RNA molecule. In eukaryotes, genes are mostly found in the nucleus of the cell.

3. Methylene blue or safranin can be used to stain the cells.

4. The folding of the inner membrane increases the surface area inside the organelle. Since, many of the chemical reaction happen on the inner membrane, the increased surface area creates more space for reactions to occur.

5. It is called selectively permeable membrane because it allows only certain/ selective materials to enter and exit the cell layer Molecules like oxygen and water move in and out of cell by the process of diffusion and osmosis respectively.

6. Cell is the basic unit of life. It is the smallest unit which has a definite structure and performs a specific function. Cell come together to form tissues, tissues come together to form organs, organs come together to form organ system and organ systems together form an organism.

Q.11 1. Lysosomes - They are also known as suicidal bags of the cell. They are responsible for the digestion of the cell with the help of digestive enzymes when the cell has grown old or is dead.
Peroxisomes - These are membrane bound organelles in eukaryotic cells. They are involved in lipid metabolism and conversion of reactive oxygen to safer molecules like water and oxygen.
Centrosome - It is an organelle in eukaryotic cell. It helps in formation of the microtubules essential for cell division.

2. (a) The cell will shrink as the water inside the cell will move out from higher potential to lower potential.
(b) The cell will swell up as the water from surrounding medium will move inside the cell from higher potential to lower potential.
(c) The cell shall remain as it is without any movement of water.

3. Nucleus - Contains genetic material, which controls the activities of the cell
Cytoplasm - Most of the chemical processes take place here, are controlled by enzymes
Cell membrane - Controls the movement of substances in and out of the cell

4. (a) Differences in the vacuoles found in plant cell and animal cell

Plant cell	Animal cell
a. Contains a single large vacuole.	a. Contains several small vacuole.
b. Generally occur in the centre of the plant cell.	b. Can be distributed all over the animal cell
c. Important in maintaining the turgor pressure.	c. Important in exocytosis and endocytosis.

(b) i) It is involved in synthesis of cell wall, plasma membrane and lysosome.
ii) It produces vacuoles or secretory vesicles which contain cellular nutrients.

5. Plasma membrane is defined as an outer membrane of the cell and it is composed of two layers of phospholipids and is embedded with proteins. Being a thin semi-permeable membrane layer, it surrounds cytoplasm and the other components of the cell. It is about 7nm thick. The membrane is 75% phospholipid. The membrane contains proteins, cholesterol and polysaccharides.
Function - Plasma membrane permits the entry and exit of some molecules in the cells. Therefore, plasma membrane is called selectively permeable membrane. It performs certain physical activities such as diffusion and osmosis for intake of molecules.
Certain biological and physiological activities such as active transport and endocytosis are performed by the plasma membrane.

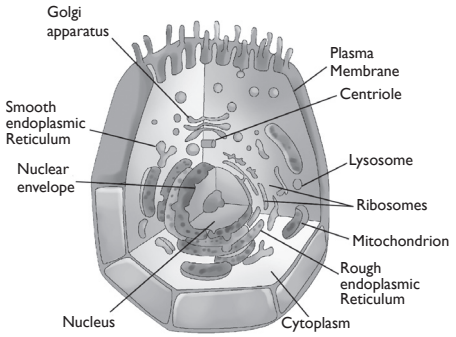
Q.12 1. Chlorophyll absorbs light in the red (long wavelength) and the blue (short wavelength) regions of the visible light spectrum. Greenlight is reflected by the plant. Chlorophyll absorbs all other colours of the electromagnetic spectrum, but it does not absorb green. Therefore, even if green light is blocked, there would be no harm to the photosynthetic process.

2. (a) i) Microtubules ii) Microfilaments iii) Intermediate filaments
(b) The cytoskeleton acts as a support for the cell.
It maintains the cell shape, holds and moves organelles.
Microtubules are heavily involved in meiosis and form the mitotic spindle.

3. (a) According to the hypothesis, their organelles originated from separate prokaryote organisms that were like in a primordial cell. Such symbolic relationships in which two species are dependent upon one another to varying extents served as several elements of the evolutionary progression.
(b) i) Mitochondra and chloroplasts contains DNA.
ii) The eukaryotic nucleus contains bilaterally denied genes.
iii) Mitochondria and chloroplast contain their own ribosomes.
(c) Chloroplasts (Plastids)

4. (a) Prokaryotic cell
(b) Evidence supports the idea that eukaryotic cells are actually the descendents of separate prokaryotic cells that joined together to form a symbiotic union. The hypothesis of endosymbosis theory supports that.
(c) i) The cell membrane - Its basic function is to separate the inside of cells from the outside.
ii) The cytoplasm - It is the interior portion filled with cytomel (the aqueous fluid enters the cell).
iii) The nucleus - It is the membrane bound internal region that contains genetic material.

5.



Animal Cell

Chapter

06 TISSUES

WORKSHEET 1

Q.1

1.	Intercalary meristem	(e)	Base of internode
2.	Thick - walled cells	(h)	Sclerenchyma
3.	Sieve tube	(a)	Phloem
4.	Vessels	(g)	Xylem
5.	Tendon	(b)	Areolar tissue
6.	Blood	(c)	Fluid tissue
7.	WBC	(i)	Leukocyte
8.	Neuron	(d)	Nervous tissue
9.	Thrombocyte	(j)	Platelet
10.	Erythrocyte	(f)	RBC

Q.2 1. Xylem tissue and Phloem tissue

Xylem tissue	Phloem tissue
a. Xylem mainly consist of dead cells(except xylem parenchyma)	a. Phloem consist of living cells (except phloem fibre)
b. It conducts water and minerals from to aerial parts of the plant.	b. It translocates prepared food from leaves to storage organs and growing parts of the body.

2. Tendon and Ligament

Tendon	Ligament
a. It connect muscles to bones.	a. It connect two bones.
b. They are fibrous tissue with great strength but limited flexibility	b. They are elastic and contain little matrix and have great strength

Q.3

1. **Division of Labour** - Division of labour is a term that describes the specialised functions of the cells which come together to ensure the organism is capable of surviving and performing different activities.
2. **Tissue** - These are a cluster of structurally and functionally similar cells arranged and designed, so as to give highest possible efficiency of the function they perform.
3. **Tracheids** - Tracheids are elongated cells in the xylem of vascular plant that serve in transport of water and minerals vertically.
4. **Voluntary muscles** - Muscles whose actions are normally controlled by an individual's will are called voluntary muscles.
5. **Involuntary muscles** - Muscles that contract without conscious control and found in the internal organs such as stomach are involuntary muscles.

Q.4 1. Apical meristem 2. Epithelial tissue 3. Plasma 4. Nervous 5. Bone

Q.5 1. (a) Striated 2. (c) Tendons 3. (b) Adipose tissue
4. (d) Phloem 5. (c) Connective tissue

Q.6 1. True 2. True 3. True 4. True 5. True
6. False. Sclerenchyma forms a protective covering over seeds
7. False. Lateral meristem is responsible for increasing the girth of the plant.
8. True

Q.7 1. Water, minerals 2. Simple squamous epithilium 3. scelerenchyma 4. sieve tube
5. heart 6. skeletal muscle, bone 7. cell body, axon, dendrites 8. collenchyma

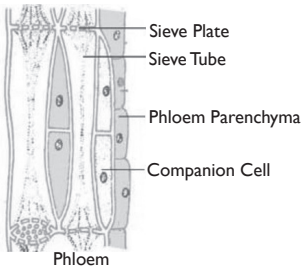
Q.8

1. Cork cambium and Vascular cambium
2. Neuron is one of the unit cell that constitutes nervous tissues that has the property of transmitting and receiving nervous impulses.
3. Meristematic tissue and epithelial tissue.
4. Calcium and phosphorus compounds are composition of bone matrix.
5. The dead elements present in the phloem is phloem fibre.
6. The different components of xylem tissue are tracheids, vessels, xylem parenchyma and xylem fibres.

Q.9

1. (a) Voluntary (b) Involuntary (c) Voluntary (d) Involuntary
2. The different cells present in blood are red blood cells, white blood cells and platelets.
3. Adipose tissue acts as an insulating layer, helping to reduce heat loss through the insulation.
   Adipose tissue is also a means of energy storage.
4. Animals or fishes in cold regions or water have thick layers of fat, because fats act as insulator and do not let their body heat escape.
5. (a) Squamous epithelium - It is located in the skin.
   (b) Cuboidal epithelium - It is located in kidney tubules and in salivary glands.
   (c) Columnar epithelium - It is found in inner lining of stomach and intestine.
   (d) Stratified epithelium - It is located in outer skin.

6. The elements of phloem tissues are:
Sieve tubes : These are tubular cells with perforated walls.
Companion cells : These are small elongated cells.
Phloem fibres - They provide mechanical strength to the tissue.
Phloem parenchyma : They help in storage and lateral conduction of food.

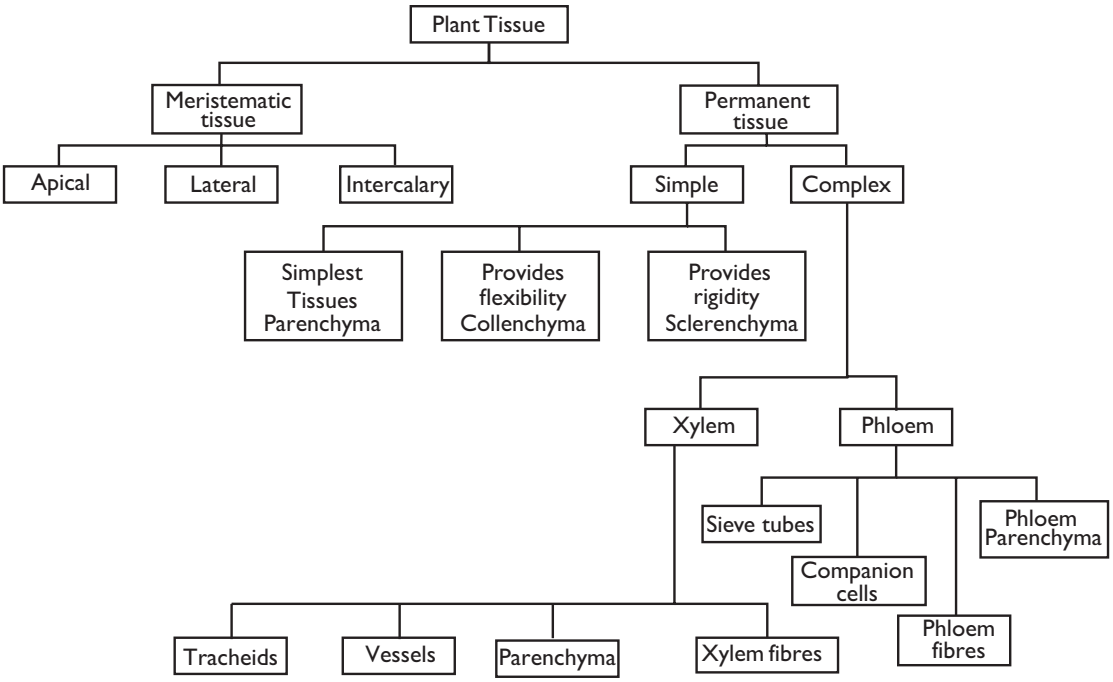


7. Two types of skeletal tissue are:
Bone - It is a very strong and non-flexible tissue.
Cartilage - It has widely spaced cells. We can fold it.
8. Sieve tubes are long tubular cells with perforated walls whereas companion cells are small elongated cells which are not perforated.

Q.10 1. (a) Neuron

(b) Cell body, axon and dendrites
(c) This cell belongs to nervous tissue.
(d) Neurons have the ability to receive stimuli from within or outside the body and conduct impulses to different part of the body. The impulses travel from one neuron to another neuron and finally to the brain or spinal cord.

2.



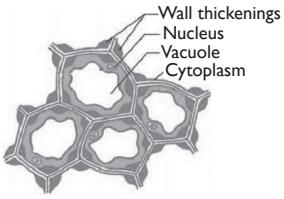
3. (a) Fluid or vascular connective tissues are motile connective tissues consisting of fluid matrix and free cells. Blood is the fluid connective tissue. It contains fluid matrix called plasma and blood cells such as Red Blood Cells, White Blood Cells and platelets are suspended in it.
(b) Cells present in the blood are:
(i) Red Blood Cells (RBCs) : They help in transport of respiratory gases such as O_2, CO_2 with the help of haemoglobin.
(ii) (WBCs) White Blood Cells: They fight with diseases by producing antibody
(iii) Blood Platelets : Help in clotting of blood

4.

Apical Meristem	Lateral Meristem	Intercalary Meristem
It is present at the growing tips of stems and roots.	It is present on lateral sides of roots and stems.	It is present at the base of leaves or internodes on tunings.

5. (a) Cells of cork are dead and compactly arranged without intercellular spaces. These cells have a chemical substance called suberin in their walls.
(b) It is formed by secondary lateral meristem called cork cambium. Cork cambium gives rise to new cells on it's both side, thus, forming cork on the outer side.
(c) Cork is protective in function. Cork cells prevent infection and mechanical injury.
6. (a) Epidermis (it's twin) protects the plant body against invasion of parasites.
(b) Epidermis is very important for plant. It is the outermost protecting layer of plant. It protectes against loss of water, mechanical injury and invasion of parasitic fungi.

7. (a)

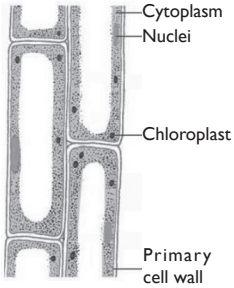


(b) (i) Sclerechyma is the tissue found in the husk of coconut.
(ii) Suberin is the chemical substance which makes cork cell impervious to gases and water.

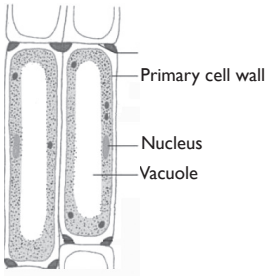
Q.11 1.

Character	Striated	Unstriated	Cardiac
Structure	Cells are long, cylindrical, non tapering and are unbranched.	Cells are long with tapering ends and are unbranched.	Cells are non-tapering, cylinderical and are branched.
Location	In hands, leg and skeletal muscles	The wall of stomach intestine, ureter	In the heart

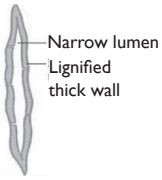
2. Complex permanent tissue is made up of more than one type of cells. The cells look different from each other unlike the simple permanent tissue. Regardless of different appearance of all the cells, they coordinate to perform the common function. They are of two types:
(a) Xylem (b) Phloem
3. Shape of epithelium tissue are:
(a) Squamous (b) Cuboidal (c) Columnar
They have central nucleus and are multinucleate connective tissue can be jelly fluid or solid. It is multinucleate and nucleus are usually basal.
Muscular tissues have elongated cells. They can be muti or uninucleate.
Nervous tissue are long. The cell has central nucleus they are uninucleated.
4. Areolar tissue is a loose connective tissue that consists of a mesh work of collagen, elastic tissue, and reticular tissue. Areolar tissue binds skin to the muscules beneath. It is mainly used for supporting and elasticity.
5. (a) Bone - Bone provide a framework and protect the internal organs of our body.
(b) Blood - Blood transports oxygen from lungs to all tissues. Nutrients are also taken up by it.
(c) Areolar tissue - It helps in supporting and elasticity.
6. (a) The homogeneous group of non-meristematic or permanent cells having similar structure, function and origin is collectively known as simple tissue.
It is of three major types i.e. parenchyma, collenchyma and sclerenchyma.
Parenchyma - A few layers of cell form the basic packing tissue. This tissue is parenchyma and is present in the cortex and pith of roots and stems and also in mesophyll of leaves.



Collenchyma - These tissues are generally found in leaves below epidermis and leaf midribs. They have very little intercellular spaces. It provides mechanical support and elasticity to the plant. It allows easy bending without breaking.



Sclerenchyma- This tissue is present in stems around vascular bundles, in the veins of leaves and in the hard coverings of seeds and nuts. These are dead cells.



WORKSHEET 2

Q.1

Column I	Column II	Column III
Types of tissues	**Position**	**Function**
1. Apical meristem	(iii) Root apex	(b) Growth in length of plant
2. Intercalary meristem	(i) Base of internode	(c) Growth in length of internode
3. Parenchyma	(ii) All soft parts of plant	(a) Store food

Q.2 1. False. Vacuoles are present in meristematic plant cells.
2. True 3. True 4. True 5. True
6. False. Sieve tube cells are found in phloem, while vessels are found in xylem.
7. False. Apical meristem helps in latitudinal growth, while lateral meristem helps in secondary growth.
8. False. Sclerenchyma cells are deposited with lignin, while collenchyma cells are deposited with pectin.

Q.3 1. Oxygen from the air to cells when we breathe in oxygen enters the small air sacs, called alveoli, in the lungs. These contain a red substance called heamoglobin, carries oxygen around the body in the blood, then lets it go when necessary.
2. Bone matrix is mostly made up of composite material incorporating the inorganic mineral calcium phosphate in the chemical arrangement formed calcium hydroxyapatite and collagen, an elastic protein which improves fracture resistance.
3. Contractile proteins of muscle are actin and myosin, the main components of the thin and thick filaments. The thin filaments extend from the z lines. They are formed by the actin molecules twisted in a helix.
4. Nerve cells as are usually long and thin because of the need to transmit information between various parts of the body. It is the key unit of the nervous tissue and also helps in carrying stimulus from the body.
5. Non-striated muscles are called so because these types of muscles do not show light and dark bands or striations when stained as shown by striated muscles. Non-striated muscles are also called involuntary muscles.

Q.4 1. Striated muscles and cardiac muscles

Striated muscles	Cardiac muscles
a. Cells are long cylindrical, non-tapering and unbranched.	a. Cells are non-tapering, cylindrical and unbranched.
b. Many nuclei which are situated towards the periphery of muscles fibres.	b. Each cell contains one or two nuclei situated in the center.
c. Hands, legs and other skeletal muscles	c. Present in heart

2. Unstriated muscles and skeletal muscle

Unstriated muscles	Skeletal muscle
a. Cells are long and uprising ends (spindle shaped) and unbranched.	a. Skeletal muscle is involved in voluntary movement. They are attached to bones by tendon and to produce all the movements of body parts in relation to each other
b. Stomach wall, intestine, bronchi, etc.	b. For e.g. - Biceps

3. Plant tissues and animal tissues

Plant tissues	Animal tissues
a. Tissues organisation is targeted towards stationary habit of plants.	a. Tissues organisation is targeted towards mobility of animals.
b. Organisation is simple.	b. Organisation is complex.
c. Most of the tissues are dead. e.g. - Cork.	c. Most of the tissues are living.
d. Growth is confined to certain areas.	d. Growth is not limited to areas.
e. Less maintenance energy required.	e. More maintenance energy required.

4. Parenchyma and collenchymas

Parenchyma	Collenchyma
a. Parenchyma cells are found in every soft part of the cell.	a. Collenchyma cells are found in petiole leaves and young stems.
b. Unspecialised cells.	b. Specialised cells.
c. Consist of thin cell wall.	c. Consist of an unequally thin cell wall.
d. Photosynthesis, storage of food are major function.	d. Provide mechanical support to plants.

Q.5 1. (a) Cilia 2. (b) Parenchyma 3. (a) Axon 4. (a) Epithelial tissue
5. (d) Tracheids 6. (d) Trachea 7. (a) Histology

Q.6 1. Food, leaves 2. Suberin 3. Stomata 4. divide
5. collenchyma 6. dead, without 7. Skeletal muscle 8. Differentiation

Q.7 1. **Lymph** - A colourless fluid containing white blood cells, which bathes the tissues and drains through the lymphatic system into the bloodstream
2. **Axon** - An axon is a thin fibre that conducts electrical impulses away from a neuron, or nerve cells
3. **Histology** - The study of tissue and their function
4. **Intercellular substance** - The body substance in which tissue cells are embedded
5. **Leukocytes** - A colourless cell which circulates in the blood and body fluids and is involved in contracting foreign substance and diseases

Q.8 1. Myology 2. Multinuclear 3. Striations
4. Neuron 5. Sensory/Efferent 6. Afferent

Q.9 1. The term tissue was coined by Marie Francois Xavier Bichat in the year 1792.
2. Cutin is that chemical substance.
3. A complex organic polymer deposited in the cell walls of many plants, making them rigid and woody.
4. Sclerenchyma
5. Bone
6. Suberin
7. (a) Skeletal muscle (b) Smooth muscle

Q.10 1. The tracheid is the basic cell in the xylem, that is all plants have tracheids, but not the more highly evolved vessel elements. Tracheids are generally spindle shaped, very elongate, and have tapered ends
2. A strand of conducting vessels in the stem or leaves of a plant, typically with phloem on the outside and xylem on the inside.
3. Blood, the fluid connective tissue helps in transportation of oxygen to various parts of the tissue. It is composed of fluid called plasma, and cells called corpuscles.
4. In multicellular organisms, several cells are grouped to form tissues. These tissues perform particular function at a definite place in the body. for e.g. - nerve cells.
5. The specific function of the cardiac muscle is to control the contraction and relaxation of the heart.
6. Simple tissues and Complex tissues

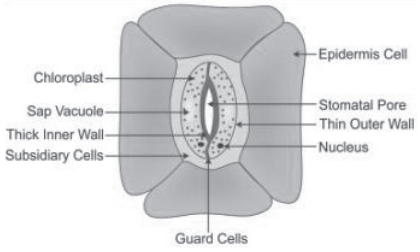
Simple tissue	Complex tissues
a. Simple tissue consists of one same type of cells.	a. Complex tissue has different type of cells.
b. Simple tissue consists of parenchyma, collenchyma and scerenchyma.	b. Complex tissue consists of xylem and phloem.
c. Simple tissue occurs in all parts of plants.	c. Complex tissue only occurs in vascular region.

6. (a) Animals are motile organisms whereas plants are non-motile. Being motile requires more energy.
(b) Plants have many dead tissues whereas this is not in the case of animals. Hence, again animals need more energy.
7. Plants does not move here and there in search of their food. They remain at one place thought the life and their most of the cell are dead. On the other hand animals needs more energy for a number of life process. Animals have to search for their food which requires a lot of energy and they have complex organs which need energy to operates, hence animals need more energy.
8.

Xylem	Tracheids	Mostly dead cells	Transports water and minerals vertically
Phloem	Companion cells	Sieve tubes	Transport food from leaves to other parts of the plant

Q.11 1. Nervous Tissue 2. Parenchyma 3. Collenchyma 4. Cambium
5. Phloem 6. Xylem 7. Cardiac tissue 8. Sclernchyma

Q.12 1. (a) Striated muscle tissue is a muscle tissue that features repeating functional units called sarcomeres, in contrast with smooth muscle tissues which does not.
(b) Cardiac muscle is specialized tissue that is found only in the heart. It has characteristics similar to both smooth and skeletal muscles tissue, as well as specialized properties, that allow it to function fast.
(c) Nervous tissue contains two categories of cells-neurons and neuroglia. Neurons are highly specialized nerve cells that generate and conduct nerve impulses. Neuroglia are supporting cells that support physical support.
2. (a)



(b) The gas exchange that occurs when stomata are open facilitates photosynthesis. Photosynthesis is the process by which plants convert sunlight into usable energy. During photosynthesis, carbon dioxide is taken in from the atmosphere through the stomata and oxygen is released as a waste product.
3. Tracheids are found in all vascular plants, but vessel elements are unique to angiosperms. Both kinds of cells die at maturity, but their lignified cell walls remain as the conduits through which water is carried in the xylem.
4. (a) Blood is considered a connective tissue for two basic reasons:
(i) embryologically, it has the same origin as do the other connective tissue.
(ii) blood connects the body systems together bringing the needed oxygen, nutrients, hormones and other signaling molecules, and removing the wastes
(b) Most skeletal muscles are attached to bones by bundles of collagen fibres known as tendons. A skeletal muscles refers to multiple bundles of cells called muscle fibres. The fibres and muscles are surrounded by connective tissue layers called fasciae.
5. (a) A layer of sclerenchyma or thickened parenchyma cells at the tip of a vascular bundle
(b) Medullary ray is radial strip of parenchyma cells present between adjacent vascular bundles. These connect the pith with pericycle and cortex. The presence of pits allows them to make intimate contact with the conducting cells of both phloem and xylem.
(c) Starch sheath is a layer of barrel shaped cells of endodermis formed due to accumulation of starch in them.
6. There are three types of cells. They are commonly known as red blood cells, white blood cells and platelets-and formerly named erythrocytes, leukocytes and thrombocytes. These cells move throughout your body in your blood to carry oxygen, fight injections and stop bleeding if a blood vessel is damaged.

7. Collenchyma and Sclerenchyma

Collenchyma	Sclerenchyma
a. The cells of collenchyma are living and have the cytoplasm and the nucleus.	a. The cells are dead. They do not have the cytoplasm and the nucleus.
b. They provide mechanical support and elasticity to the plant organ.	b. They mainly provide mechanical support to plant and rigidity to the plant.
c. Collenchyma cells may contain chlorophyll and can also help in the manufacture of starch.	c. They do not contain chlorophyll in any condition as they are dead cells.

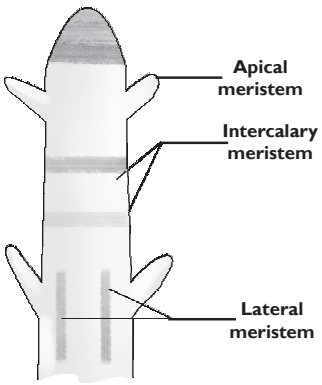
Q.13 1. (a) **Meristematic Tissue**:
(i) These tissues have the capacity to divide.
(ii) They have thin cellulose wall.
(iii) They produce permanent tissues.
(iv) They contain many small vacuoles in their cytoplasm.
(v) They do not have intercellular spaces.
(vi) They contain dense cytoplasm with prominent nucleus.
(vii) They are responsible for primary and secondary growth of plants.

Permanent Tissue:
(i) These tissues have lost the capacity of division.
(ii) They have thick cellulose wall.
(iii) They are produced by meristematic tissue.
(iv) They contain only a single large vacuole in their cytoplasm.
(v) They have large intercellular spaces.
(vi) They contain thin cytoplasm with normal nucleus.
(vii) These tissues and to various growth.

(b) Metabolism rate is faster in meristematic tissues.

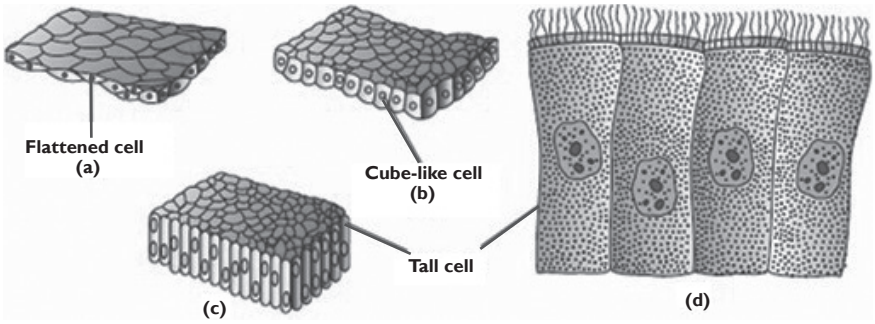
2. (a) Meristematic tissues are simple tisssues composed of a group of similar and immature cells that can divide and form new cells.
(b) The main characteristics of meristematic cells are:
(i) Isodiametric, rounded polygonal cells
(ii) Absence of intercellular spaces,
(iii) Dense cytoplasm and conspicuous nucleus
(iv) Absence of intercellular spaces
(v) Ability to divide and grow

(c)



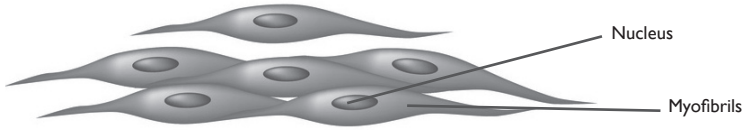
(d) The function of meristematic cells are mainly the increase in length and girth of plant. It is also responsible for secondary growth and thickness of plant. Due to presence of meristems the plant growth continues throughout the life of a plant.

3. **Epithelial tissue**: Epithelial tissues are widespread throughout the body. They form the covering of all body surfaces, line body cavities and hollow organs, and are the major tissue in glands.
(a) Skin protection.
(b) Cell lining digestive tract absorption.
(c) Kidney tubule cells. Filtration and secretion.
(d) Glandular cells or kidney cells secretion.
(e) Free ending of sensory neurons sensory reception.



Simple epithelium : (a) Squamous (b) Cuboidal (c) Columnar (d) Columnar cells bearing cilia

4. **Muscular Tissue**: Muscular tissue is composed of muscle cells. Muscle cells are specialized cells which have the capability to contract and expand. Due to contraction and expansion, muscles facilitate various kinds of movements in the body. Muscular tissues are of three types:
   (a) **Striated Muscles**: The cells of striated muscles are in the form of long, unbranched fibres. Cells are multinucleate. Light and dark bands (striations) are present on muscle fibres; which gives the name striated muscles. Striated muscles are found in those organs where voluntary movement is possible, e.g. hands, legs, back, neck,etc.
   (b) **Smooth Muscles:** The cells of smooth muscles are spindle shaped and each has one nucleus. Smooth muscle is found in those organs where involuntary movement is possible, e.g. alimentary canal.



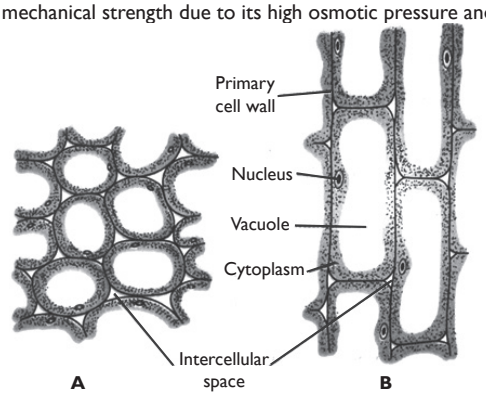
Smooth Muscle

   (c) **Cardiac muscle**: The cells of cardiac muscles are in the form of branched fibres. Striations are present and cells are uninucleate. These are found in the heart. Cardiac muscles are capable continuous contraction and relaxation throughout the life.

5. **Parenchyma**: The cells parenchyma have thin cell wall. They are loosely packed; with lot of intercellular spaces between them. Parenchyma makes the largest portion of a plant body. Parenchyma mainly works are packing material in plant parts. The main function of parenchyma is to provide support and store food. In some plant parts, parenchyma has chlorophyll as well. In that case, parenchyma carries out photosynthesis and is then termed as chlorenchyma. In aquatic plants, large air cavities are present in parenchyma. This provides buoyancy to the plant ,and then the parenchyma is known as aerenchyma.

Functions :

(i) The main function of parenchymatous tissue is assimilation and storage of reserve food materials (i.e. starch, fats, proteins, etc.)
(ii) They also store waste products such as tannin, gum, crystals,resins and inorganic wastes, etc.
(iii) Parenchymatous cells provide rigidity to plant body due to turgidity and help to maintain shape and firmness of the body.
(iv) In succulents (plants having fleshy parts), they act as water storage tissues and in water plants they help in buoyancy (floating) and gaseous exchange.
(v) Some parenchymatous cells contain chloroplasts and perform photosynthesis. Such a tissue is called chlorenchyma.
(vi) Parenchymatous cells perform all vital (or metabolic) activities of plants.
(vii) They serve as packing tissues inbetween the other tissues (such as xylem and phloem) constituting the vegetative ground tissue.
(viii) Parenchyma tissue provides mechanical strength due to its high osmotic pressure and compact arrangement.



Parenchyma : A transverse section ; B longitudinal section

Chapter 07 DIVERSITY IN LIVING ORGANISMS

WORKSHEET 1

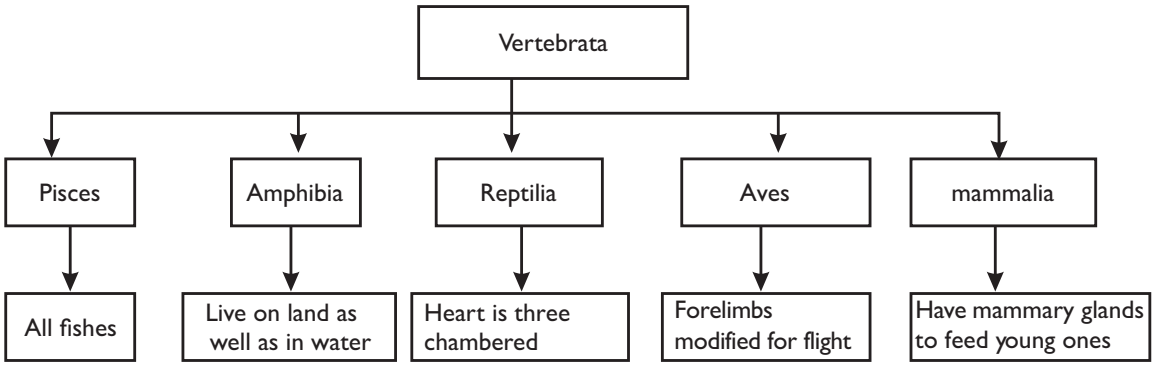
Q.1

1.	scales	2.	mycelium	3.	radial	4.	Eukaryotic unicellular
5.	chordata	6.	species	7.	mammalia	8.	mammals

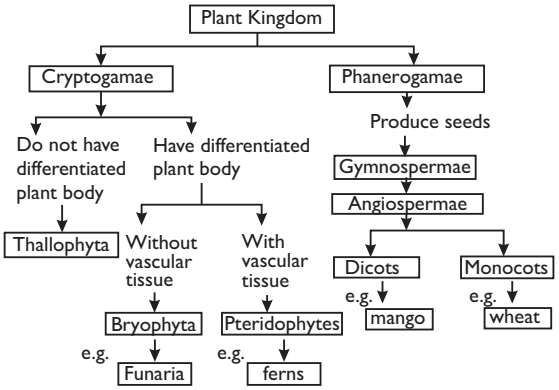
Q.2

1. True
2. True
3. False. Whale shark is the largest known fish, while blue whale is the largest mammal.
4. True
5. True
6. True
7. True
8. False. Conducting tissues are absent in bryophytes.

Q.3 (i)



(ii)



Q.4 (1)

Cryptogamae	Phanerogamae
a. Reproductive organs are hidden.	a. Reproductive organs are visible.
b. Non-flowering and non-seed bearing	b. Flowering and seed bearing.
e.g. fern, moss. etc	e.g. daisy, hibiscus. etc.

(2)

Gymnosperms	Angiosperms
a. Plants bear naked seeds.	a. Plants bear covered seeds.
b. Reproductive organs are present in cones.	b. Reproductive organs are flowers.
e.g. Pinus, cycas etc.	e.g. beans, wheat etc.

(3)

Poriferans	Coelenterates
a. Porifera have small pores called ostial all over the body and a large at the top.	a. Coelenterates lack ostia and have only one opening.
b. They have canal system for circulating water throughout the body.	b. They don't have water canal system in the body.

c. External skeleton is present.	c. Skeleton is absent.
d. Tentacles are absent.	d. Tentacles are present.

(4)

Annelids	Arthropods
a. Exoskeleton present.	a. No skeleton.
b. Body is segmented into head, thorax and abdomen.	b. Body is segmented into rings.
c. Sexes are usually separate.	c. Sexes may be united or separate.

(5)

Bony Fishes	Cartilaginous Fishes
a. Also known as Osteichthyes.	a. Also known as chondrichthyes.
b. Presence of bone tissue.	b. Presence of cartilage tissue.
c. Found in both marine and fresh water.	c. Found in marine, salt water.

Q.5

	A		B
1.	Naked seed	b)	Gymnosperms
2.	Covered seed	a)	Angiosperms
3.	Flagella	d)	Euglena
4.	Marchantia	c)	Bryophytes
5.	Marsilea	f)	Pteridophyta
6.	Cladophora	e)	Thallophyta
7.	Penicillium	g)	Fungi

Q.6

1.	Silver fish	-	Arthropoda
2.	Sea horse	-	Chordata
3.	Devil fish	-	Chordata
4.	Sea cucumber	-	Echinodermata
5.	Jelly fish	-	Coelenterata
6.	Gay fish	-	
7.	Star fish	-	Echinodermata

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

Q.8

1.	Rohu	-	cold blooded
2.	Scoliodon	-	cold blooded
3.	Flying Lizard	-	cold blooded
4.	King Cobra	-	cold blooded
5.	Frog	-	cold blooded
6.	Salamander	-	cold blooded
7.	Ostrich	-	warm blooded
8.	Pigeon	-	warm blooded
9.	Bat	-	warm blooded
10.	Crocodile	-	cold blooded
11.	Whale	-	warm blooded

Q.9 1. (a) Mushrooms (b) Green mold
2. Robert Whittaker 3. Panthera tigris 4. Carolus Linnaeus 5. Leech
6. Two chambers 7. Siliceous spicules 8. muscular foot

Q.10 1. Four characteristics of pisces are:
(a) Fishes can live only in water.
(b) The skin of fish is covered with scale/plates.
(c) Body of fishes is streamlined.
(d) Fishes are cold-blooded.

2. The class of flying warm-blooded animals in which teeth are absent is 'Aves'.
The some adaptations of Aves are:
(a) The bodies of birds are adapted for flying.
(b) They have a beak which serves some important functions - to build their home and feed and eat, etc.
(c) The respiratory system is highly developed. They breathe through lungs.
(d) Eyes are well developed having binocular vision because good sight is necessary for safe flight.

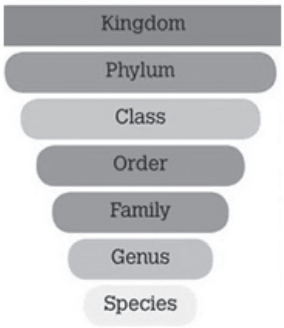
3. Organisms with simple cellular structure and no division of labour are called Primitive. Advanced organisms like mammals have millions of cells and there are different organ system for different biological functions.

4. Whales are not grouped into fishes because whales are warm-blooded, which means they keep a high body temperature that does not change in the cold water. So whales are indeed mammals not fishes.

5. We keep both snakes and turtles in the same class because both are cold-blooded and lay eggs with tough coverings. So both snakes and turtles are kept in the same class (reptilia).

6. Bats are not placed in birds kingdom. The reasons are:
(a) Bats produce young ones while birds kingdom lay eggs.
(b) Bats have mammary glands for to their young ones.

7. Hierarchical classification was proposed by 'Carolus Linnaeus'. It is a classification system of arranging organisms into various taxonomic group at different levels according to the characteristics they have. The levels from top to bottom are:



8. Haemocoel: In some invertebrate groups of animals the body cavity is reduced and filled with blood, which is called haemocoel. The groups of animals having haemocoel are Arthropoda and Mollusca'.

Q.11 1. (a) Two features possessed by all chordates are:
(i) Presence of dorsal supportive notochord.
(ii) The hollow nerve chord runs dorsal to the notochord.
(b) A system of grouping things according to their levels and orders. Like 'boss' at the top and 'entry level' employees at the bottom.
(c) A scaly exoskeleton and bony endoskeleton- class pisces.
(d) Class Reptilia

2.

Bilateral Symmetry	Radial Symmetry
a. An animal with bilateral symmetry can be divided into mirror halves through a single plane.	a. An animal with radial symmetry could be divided into equal portions from the center.
b. Bilateral symmetry is associated with having a head or leading end of a body	b. It has no right and left side or head and rear end.
e.g - Spiders, birds and mammals etc.	e.g. - Starfish, Sea anemones etc.

3. (a) 'Aves'
(b) Few flight adaptations in birds are:
(i) Many of a bird's bones are hollow which means bodies of birds is light weight.
(ii) Flying birds have large chest muscles that move the wings.
(iii) They have feathers that allows passage of air and reduces friction while flying.
(iv) Forelimbs are modified into wings that helps in flight.

4. (a) Euglena is called plant animal because it is unicellular eukaryotic organisms that can be either autotrophs or heterotrophs.
(b) Protozoa are regarded as 'one-celled animals' because they often possess animal-like behaviour, such as motility and predation and lack cell wall as found in plants and many algae.

5. Differences between Plants and Animals.

Plants	Animals
a. Plants generally are rooted in one place and don't move on their own.	a. Most animals have the ability to move fairly freely.
b. Plants contain chlorophyll and are autotrophs.	b. Animals don't contain chlorophyll and are heterotrophs.
c. Plants give off (O_2) and take in (CO_2).	c. Animals give off CO_2 and take in O_2.

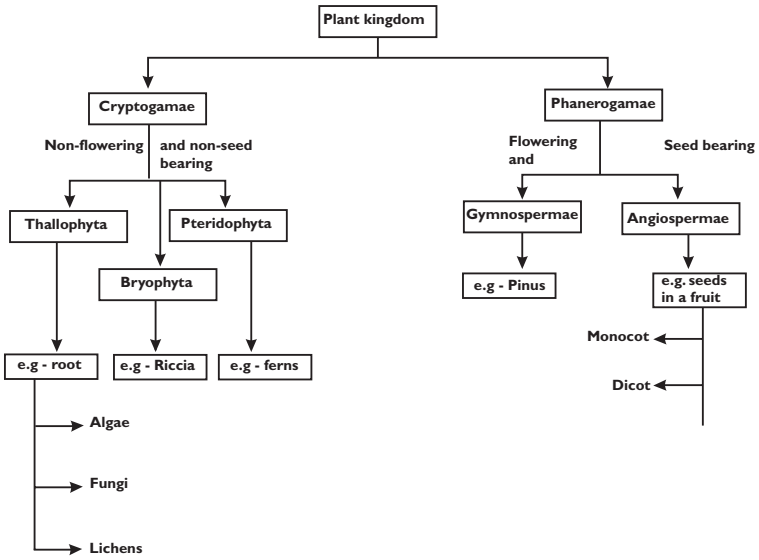
6. (a) Local names are not sufficient to recognize the organisms because they are not understood elsewhere. They are misleading as they fail to indicate the exact position in taxonomy. They are completely unscientific and unrelated.
(b) The advantages of keeping scientific names are:
(i) Organise and classify.
(ii) Clarity and precision.
(iii) Universal recognition.
(iv) Stability

7. (a) For easier and convenient study of variety of life forms we classify organisms.
(b) The major characteristics required for classification are:
i. nature of cell whether it is prokaryotic or eukaryotic or unicellular or multicellular
ii. they occur singly or grouped together
iii. mode of nutrition either autotrophic, heterotrophic, saprotrophic
iv. level of body organisation
(c) 'Arthropoda' is the largest phylum which is probably the largest group of animals.

Q.12 1. (a) Gymnosperms : The plants which bear naked seeds and are usually perennial, evergreen and woody.
(b) Two examples of gymnosperms are:
(i) Pinus (ii) Cycas

(c) General characteristics of gymnosperm are:
(i) All gymnosperms are perennial and woody.
(ii) Flowers are absent.
(iii) Some of gymnosperms are very large and live for thousands of years.
Economic importance of gymnosperms are:
(i) Edible seeds: Seeds of Pinus are eaten after roasting.
(ii) It possess softwood, which is used in preparation of light furniture.
(iii) Drug ephedrine is obtained from 'Ephedra' a gymnosperm.

2.



(a) Thallophyta has the simplest plants.
(b) Pinus and Cycas belong to gymnosperms.
(c) Flowering plants are also called "Phanerogamia".

3. Pisces - Pisces are fish. They are exclusively aquatic animals.
Some important features of pisces are:
(a) Their skin is covered with scales/plates. They obtain oxygen dissolved in water by using gills.
(b) The body is stream lined, and a muscular tail is used for movement.
(c) They are cold-blooded and their hearts have only two chambers.
(d) They lay eggs. Some fish's skeleton is made of cartilage, such as sharks. But some with a skeleton made of both bone and cartilage, such as 'Rohu'.

e.g - Mandarian fish, Angular fish, Lion fish, Torpedo, Dog fish etc.

4. (a) A - Nereis/Centipede
B - Hydra
C - Liver fluke
D - Earthworm
(b) (i) Platyheminthes - Liver fluke
(ii) Arthropoda - Cantipede
(iii) Annelida - Nereis, Earthworm
(c) (i) Tissue level organisation- Hydra, Liver fluke
(ii) Organ level organisation - Nereis, Earthworm
(d) Earthworms

5.

Bryophytes	Pteridophytes
1. Plant body is either leafy or thalloid.	1. Plant body is differentiated into roots, stem and leaves.
2. The cells in plant body are haploid.	2. The cells in body are diploid.
3. Vascular tissue like xylem and phloem absent	3. Vascular tissue like xylem and phloem present.
4. In life cycle the gametophytes phase is dominant.	4. In life cycle the sporophytic phase is dominant.
5. Sporophytic phase completely depends upon gametophytic phase.	5. Sporophytic phase is independent and autotrophic.
e.g. - moss	e.g. - ferns

Two advancements of pteridophytes on bryophytes:
(a) Pteridophytes have complex leaves (megaphyll) that contain more than one vein.
(b) These are seedless plants that possess a well developed vascular system.

WORKSHEET 2

Q.1
1. Liver fluke - *Fasciola hepatica*
2. Cattle Leech - *Hirudo medicinaolis*
3. Housefly - *Musca domestica*
4. Indian shark - *Scoliodon laticaudces*
5. Frog - *Anura*
6. Tapeworm - *Cestoda*
7. Cockroach - *Neostylopyga rhombifolia*
8. Starfish - *Asteroidea*
9. Climbing Perch - *Anabas testudineus*
10. Flying Lizard - *Draco*

Q.2 1. Locomotory 2. yeast 3. Lichen 4. basidiocarp
5. red 6. birds 7. binomial nomenclature

Q.3 1. Ostrich 2. Whale 3. Birds 4. Snail
5. Thallophyta, Bryophyta and Pteridophyta 5. Bryophytes 6. Grass 7. Osculum

Q.4
1. False. The gills of sharks are covered by an air ventilation.
2. False. They have local contractions in their body.
3. False. Either sexual or asexual.
4. True
5. False. Starting from class, species comes after genus.
6. False. Chameleon is a Reptilia.
7. False. Platypus and echidna are the only egg - laying mammals.
8. False. Prokaryotes does not have a membrane bound nucleus and menbrane bound organelles in its cytoplasm.

Q.5 1. Amphibians and reptiles:

Amphibians	Reptiles
a. Adapted to live in water and land, can breathe by skin in water.	a. Can live in water but need to come to surface to breath in oxygen.
b. Skin is moist and soft.	b. Skin is hardened.
c. Respiration is either through gills or lungs.	c. Respiration is through lungs

2. Aves and mammals

Aves	Mammals
a. Aves have beak.	a. Mammals do not have beak.
b. Their body is covered with feathers.	b. Their body is covered with hair.
c. They lay eggs	c. Produce young ones.
d. They don't have mammary glands to feed young ones.	d. They have mammary glands to feed young ones.

3. Monocotyledons and Dicotyledons

Monocotyledons	Dicotyledons
a. Seeds have a single cotyledon	a. Seeds have two cotyledons.
e.g. Rice and wheat	e.g. Pea and mango

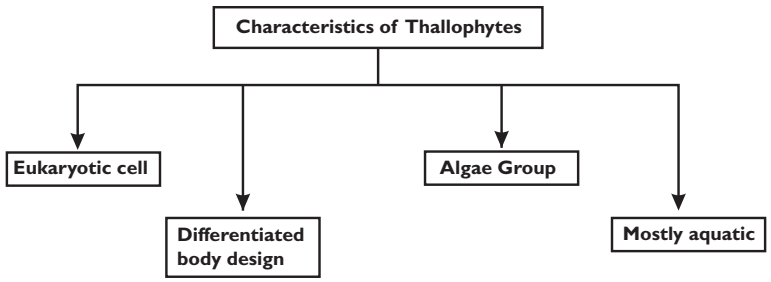
4. Algae and Fungi

Algae	Fungi
a. Contain chlorophyll.	a. Do not contain chlorophyll.
b. Autotropic nutrition.	b. Heterotropic nutrition.
c. Food is stored in the form of starch.	c. Food is stored in the form of glycogen.
d. The cell wall is made up of cellulose.	d. The cell wall is made up of chitin.
e.g. *Spirogyra*	e.g. *Rhizopus*

Q.6
1. Biodiversity: Different forms of living organisms found in a particular region is known as biodiversity.
2. Classification: Arranging the things or organisms on the basis of similarities and differences in various group is known as classification.
3. Species: All organisms that are similar to breed and perpetuate.
4. Prokaryotes: Organisms which have cells without well defined nucleus are called prokaryotes.
5. Eukaryotes: Those organisms which have cells with well defined nucleus are called eukaryotes.

Q.7 1. (d) Genus 2. (a) Mammals 3. (c) are plants which bear naked seeds. 4. (b) species
5. (a) Starfish - Phylum Chordata 6. (d) Flying fish 7. (b) Fungus 8. (b) Mammalian

Q.8 1.



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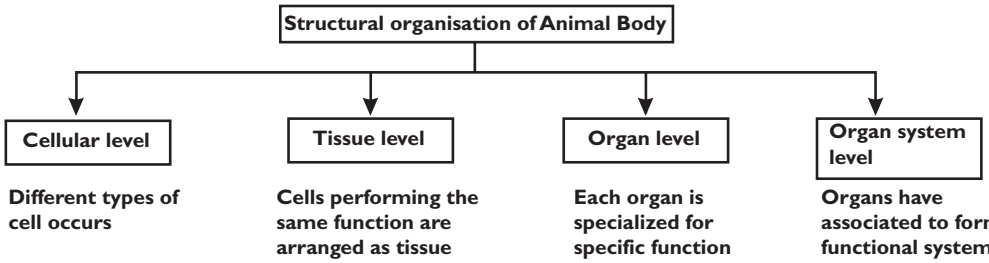
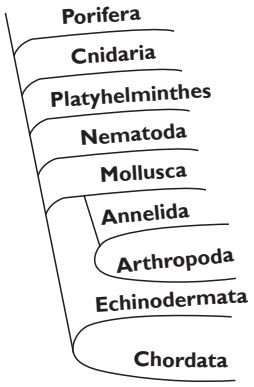


Q.9 1. Kingdom or Phylum is the highest taxonomic category.
2. Lichens are dual organisms or entities comprising a permanent association of a fungus and an alga.
3. Sea squirts
4. Reptilia
5. Pseudopodia
6. No, different organisma have different type of body organisation, cells and tissues. Also the life span of different organisms is also quite varied.
7. Pseudocoelom is the body cavity in animals that is derived from the blastocoel of the embryo. This is a fasle coelom.
8. (a) *Spongia officinalis* (b) *Leucosolenia*

Q.10 1. Yes. Because the group of organisms have acquired their particular body designs relatively recently.
2. Three examples of the range of variations that we see in life form around us:
   (i) Life span - Mosquitoes live for a few days whereas cows, dogs, etc. live for many days.
   (ii) Colour - Some organisms , and certain cows, horses, dogs are white but some birds and flowers are brightly coloured.
   (iii) Size - Some organisms are so small and some are several metre tall.
3. Thallophyta
4. Triploblastic organisms are an animal having a body composed of three embryonic cell layers: the ectoderm, mesoderm, and endoderm.
5. The general characteristics of class Reptilia are:
   (a) They have body covered with scales made of keratin.
   (b) Fertilize eggs internally.
   (c) Produce eggs with shell.
   (d) They are cold - blooded.
6. Because blue-green algae are prokaryotic unicellular organisms. Monera are prokaryotic and unicellular whereas plantae are autotrophic multicellular.
7. Protista. Because it cannot be classified as a plant, animal or fungus. They are aquatic.

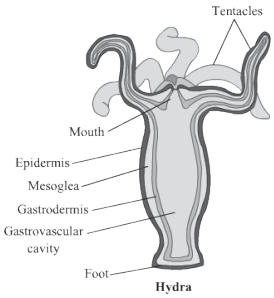
Q.11 1. (a) Bryophytes : Plant body may be thalloid or leafy. True roots are absent instead rhizoids develop.
   Pteridophytes : The main plant body is the saprophyte, which is differentiated into true roots, stems and leaves.
   Gymnosperms : Reproductive organs are present in cones. The plants bear naked seeds.
   (b) Gametophyte is a haploid multicellular adult stage in a bryophyte's life cycle. In this phase multicellular haploid gametophyte develops from a spore and produces haploid gametes, hence is the dominant phase.
2. (a) Characteristics of vertebrate group of animals:
   (i) As chordates, vertebrates have the same common features: a notochord, a dorsal hollow nerve cord, pharyngeal slits, and a post anal tail.
   (ii) Vertebrates are further differentiated from chordates by their vertebral column, which forms when their notochord develops into the column of bony vertebrate separated by discs.
   Characteristics of invertebrate group of animals:
   (i) The main chracteristics that separates invertebrates from other organism is the absence of the spinal column and backbone.
   (ii) They are multicellular organisms, they completely lack cell walls.
   (iii) They are devoid of hard bony endoskeleton.
   (b) 97% of the total animals on earth are invertebrates. They are the cause of diseases in us but without them there would be no soil formation, nutrient cycling, pollination in crops, ecological balance in nature. Therefore, the survey on invertebrates indicates the health and biodiversity of an ecosystem.
3. (a) Population growth and resource consumption, climate change and global warning, habitat conversion and urbanisation, invasive alien species, over exploitation of natural resources and environmental degradation are the threats to biodiversity.
   (b) To conserve biodiversity:
   (i) Attract good insects by planting pollen and nectar plants.
   (ii) Maintain wetlands by conserving water and reducing irrigation.
   (iii) Avoid draining water bodies on your property.
4. Some adaptations of reptiles towards terrestrial mode of life are:
   (a) Reptiles have dry skin covered with scales or bony plates to minimise water loss
   (b) Their eggs have shell for protection and to survive on terrestrial places.
   (c) They have strong limbs and tail to catch their prey.

5.



According to the tree, Annelids are more closely associated with arthropods while chordates are more closely related to echinoderms.

Q.12 1. (a)



(b) Cnidaria(Coelenterates)
(c) Corals

2. (a) Homo sapiens
(b) Phylum chordata, Class Mammalia
(c) Five characteristic features of vertebrate group:
(i) Vertebrates have spinal cord, vertebrae and notochords
(ii) The have a very well developed nervous system.
(iii) They have muscles and skeletons.
(iv) Most vertebrates possess guts with a non-terminal anus.
(v) Repeoduction is sexual.
(d) An Yes, there are exceptions in class Mammalia of vertebrates. For e.g., Bats are the only mammals that have wings and can fly.

3. General characteristics of platyhelmenthis and Nemathelminthes:

Platyhelmenthis	Nemathelminthes
a. Their body is dorsoventrally flat and leaf like or ribbon like	a. They are commonly called thread worm or round worm.
b. Body is bilaterally symmetrical that is left and right half have the same design.	b. It is a phylum of unsegmented triploblastic, pseudocoelomic, cylindrical or thread like worms which are covered by a body wall having cuticle and epidermis.
c. They are mostly hermaphorodite.	c. Organ system level of organisation.
d. Body cavity or true coelom is absent.	d. Respiratory and circulatory organs are absent.
e. They are either free living or parasitic.	
e.g. *Planaria, Fasciola*	e.g. *filariform and microfilariae*

4. (a) A - *fern (Dryopteris)* B - Moss C - *Spirogyra* D - *Euglena* E - *Rhizopus*
(b) Euglena
(c) (i) Bread Mould - *Rhizopus*
(ii) Male shieldfern - *Dryopteris*
(d) Moss

5. (a) No
(b) Leech and Nereis are classified into same group 'Annelid'
- Both have bilaterally symmetrical and triploblastic.
- True body cavity present and extensive organ differentiation.

Scolopendra is a species-rich of often very large centripedes of the family scolopendridae.
Scorpion : They are predatory arachnids of the order scorpiones. They have eight legs.
Prawns : These are classified into group or phylum Arthropoda showing common features as:
- Open circulatory system
- Bilateral, triploblastic

Chapter

08 Motion

WORKSHEET 1

Q.1 Initial velocity, $u = 80 \text{ km h}^{-1} = 80 \times \frac{5}{18} \text{ ms}^{-1} = 22.22 \text{ ms}^{-1}$

Final velocity, $v = 60 \text{ km h}^{-1} = 60 \times \frac{5}{18} \text{ ms}^{-1} = 16.67 \text{ ms}^{-1}$

Time, $t = 5\text{s}$

Acceleration, a=?

using, $a = \frac{v - u}{t}$

$= \frac{(16.67 - 22.22) \text{ ms}^{-1}}{5\text{s}}$

$= \frac{-5.55 \text{ ms}^{-1}}{5\text{s}}$

$= -1.1 \text{ ms}^{-2}$

Q.2 (a) Speedometer in a car measure its instantaneous speed

(b) Odometer in a car measure its actual distance travelled by it.

Q.3 When an object moves along a straight line on the same direction.

Q.4 Initial velocity, $u = 20$ m/s

acceleration, $a = 0.5 \text{ m/s}^2$

or, $\frac{1}{2} \text{ m/s}^2$

time, t= 30s

distance, s = ?

using, $s = ut + \frac{1}{2}(at)\, t$

$= 20 \text{ m/s} \times 30 \text{ s} + \frac{1}{2}(0.5 \text{ m/s}^{-2} \times 30 \text{ s})30\text{s}$

$= 600\text{m} + \frac{1}{2}(450\text{m})$

$= 600\text{m} + 225\text{m}$

$= 825\text{m}$

Q.5 (a) m/s = velocity of an object

(b) m/s^2 = acceleration of an object

Q.6 **Conclusion**: *v-t* graph is not a straight line. Slope of curve at *P* is less than the slope of curve at *Q*. Therefore, acceleration of body at *P* is < the acceleration of the body at *Q*.

Q.7 It means the object is moving with uniform motion.

Q.8 If the direction component of the objects velocity is constant.

Q.9 The direction of velocity of an object moving along a circular path is along the tangent to the circle at every point.

Q.10 Magnitude of average velocity = Average speed.

So, numerical ratio of average velocity to average speed is 'One'.

Q.11 Uniform circular motion:- The circular motion of a body having uniform or constant speed is known as uniform circular motion

Two examples are:

(a) An artificial satellite orbiting the earth at a constant height.

(b) An electron moving perpendicular to a uniform magnetic field.

Q.12 Speeds in increasing order are:

(b) A bicycle moving with a speed of 200 m/min. i.e. $\frac{200 \text{ m}}{60 \text{ s}} = 3.3 \text{ ms}^{-1}$

(c) A scooter moving with a speed of 30 km/h. i.e. $\frac{30 \times 1000 \text{ m}}{60 \times 60 \text{ s}} = 8.3 \text{ ms}^{-1}$

(a) An athlete running with a speed of 10 m/s. i.e. 10 ms^{-1}

Q.13 Radius of orbit, $r = 42{,}250$ km

Distance travelled by satellite to complete one orbit = circumference of orbit

$= 2\pi r$

$= 2 \times \frac{22}{7} \times 42{,}500 \text{ km}$

$= 267142.84 \text{ km}$

Time, $t = 24$ hr

Speed of satellite = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{267142.84 \text{ km}}{24 \text{ h}}$

$= 11130.95 \text{ km h}^{-1}$

$= \frac{11130.95 \text{ km}}{3600 \text{ s}}$

$= 3.09 \text{ kms}^{-1}$

Q.14 (a) Constant (b) Zero

Q.15 Initial velocity , u = 8 m/s
acceleration, a = 1 m/s^2
Distance, s = 18m
Final velocity, v = ?
using, $v^2 - u^2 = 2as$

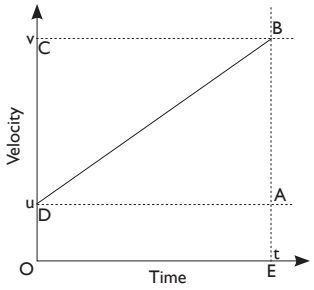
$v^2 = \sqrt{2as + u^2}$
$v^2 = 2 \times 1 m/s^2 \times 18 m \times (8)^2 m/s^2$
$v^2 = (36 + 64)\ m^2/s^2$
$v = 100\ m^2/s^2$
$v = 10$ m/s

Q.16 Initial velocity of motor cycle, u = 0m/s
Final velocity of motor cycle, v = 28m/s
Time, t = 4s

(a) Its average acceleration, a =?
using, $v = u + at$
$28m/s = 0 + (4s)a$
$(4s)\ a = 28m/s$
$a = 7m/s^2$

(b) Displacement, s
using, $v^2 = u^2 + 2as$
$(28m/s)^2 = (0\ m/s)^2 + 2 \times (7\ m/s^2)(S)$
$784 = 14 \times s$
$s = \frac{784}{14}$
s = 56 m

Q.17 Initial velocity of the object = u
Object moving with uniform acceleration, a.
Object reaches at point B in time, t
final velocity becomes, v
Draw line parallel to axis DA from D where object starts moving.
Draw another line BA from B parallel to y-axis meets at E at y-axis
Let OE = time, t
Now, as we had seen the graph,



$BE = AB + AE$
$v = DC + OD$ (Since, $AB = DC$ & $AE = OD$)
$v = DC + u$ (Since, $OD = u$)
$v = DC + u$ _____(i)

Now,
Acceleration (a) = change in velocity/ time taken
$a = (v - u)/t$
$a = (OC - OD)/t = DC/t$
$at = DC$ _____(ii)

By substituting the value of DC from (ii) in (i)
we get, $v = at + u = at + u$
$v = u + at$

Q.18 (a) Acceleration of a body is defined as the rate of change of velocity of the body with time. Thus, acceleration of a body is a measure of change in velocity of the body per unit time.
The SI unit of acceleration = m/s^2

(b) Uniform acceleration: When velocity of the body moving along a straight line changes by equal amounts in equal intervals of time, i.e., when velocity of a body changes at a uniform rate, it is known as uniform acceleration.
Example: Motion of a body falling freely under the action of gravity.

Q.19 In the first case:
Initial velocity, u = 0m/s
final velocity, v = 10m/s
time velocity, t = 25s
acceleration, $a = \frac{v - u}{t}$
$= \frac{(10-0)m/s}{25s}$
$= 0.4m/s^2$

In the second case:
Initial velocity, u = 10m/s
final velocity, v = 0m/s
time velocity, t = 25s (50s - 25s = 25s)
acceleration, $a = \frac{v - u}{t}$
$= \frac{(0-10)m/s}{25s}$
$= -0.4m/s^2$

Thus, the acceleration of the bicycle in the first case is 0.4ms^{-2} and in the second case is -0.4ms^{-2}
Total distance travelled:
speed = $\frac{\text{Distance}}{\text{time}}$

$10\text{m/s} = \frac{\text{Distance}}{50\text{s}}$

Distance = 50s × 10m/s

Distance = 500m

Q.20 a. The velocity of an object is its speed in a particular direction. The slope of a velocity/ speed -time graph represents the acceleration of an object. The distance travelled is equal to the object. The distance travelled is equal to the area under a speed-time graph.

b. 'Displacement' is the quantity which is measured by the area occupied under the velocity-time graph.

c. In the circular motion body has a constant speed but not constant velocity.

Q.21 Distance and Displacement

Distance	Displacement
1. Distance travelled by an object is the length of actual path.	1. Displacement travelled by an object is the shortest distance between the initial to final position.
2. It is scalar quantity	2. It is vector quantity
3. Its value can never be zero or negative.	3. Its value can be zero or negative.

Q.22 (a) Initial velocity, $u = 0$

final velocity, v =72km/h = $72 \times \frac{5}{18}$ m/s = 20m/s

Time, t = 10s

Acceleration, a =?

using, $v = u + at$

$20\text{m/s} = 0\text{m/s} + (10\text{s})a$

$a = \frac{20}{10}\ \text{m/s}^2$

$= 2\text{m/s}^2$

(b) Average velocity, $v_{av} = \frac{u + v}{2}$

$= \frac{0\text{m/s} + 20\text{m/s}}{2}$

$= \frac{20\text{m/s}}{2}$

$= 10\text{m/s}$

(c) Distance travelled =?

Displacement = distance travelled = s

So using, $v^2 - u^2 = 2as$

$(20)^2 - (0)^2 = 2 \times 2 \times s$

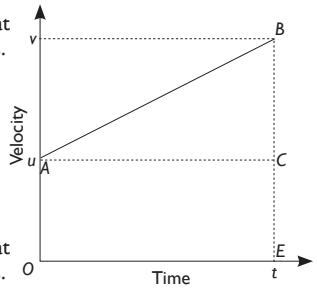
$400\text{m/s} = 4s$

$s = \frac{400\text{m/s}}{4}$

$s = 100\text{m}$

Q.23 An object starts linear motion with a velocity 'u' and under uniform acceleration 'a'.

The velocity-time graph is:



(a) Let u be the initial velocity of an object and 'a' is the acceleration produced in the body. As we know that the distance travelled s in time t is given by the area enclosed by the velocity-time graph and the time axis.

Therefore, distance travelled, s = area of trapezium($ABEO$)

= area of rectangle $ACEO$ + area of ΔABC

$\Rightarrow \quad ut + \frac{1}{2} \times A \times BC = ut + \frac{1}{2} \times t \times (v\text{-}u)$

$s = ut + \frac{1}{2} \times t \times at$

because, $(v\text{-}u) = at$ $\qquad s = ut + \frac{1}{2}\ at^2$

(b) Let u be the initial velocity of an object and 'a' is the acceleration produced in the body. As we know that the distance travelled s in time t is given by the area enclosed by the velocity-time graph and the time axis.

Therefore, distance travelled s = area of the trapezium (ABEO)

$= \frac{u + v}{2} \times t$ _____ (i)

As, $(v\text{-}u) = at$

$t = \frac{v - u}{a}$

Substituting the value of t in equation (i)

$s = \frac{u + v}{2} \times \frac{v - u}{a}$

$2as = (v+u)\ (v\text{-}u)$

$v^2 - u^2 = 2as$

$v^2 = u^2 + 2as$

Q.24 (a) Initial velocity of an aeroplane, u = 0m/s

Final velocity of an aeroplane, v=?

Acceleration of an aeroplane, $a = 3\text{m/s}^2$

Time of an aeroplane, t = 35s

Displacement of an aeroplane, s=?

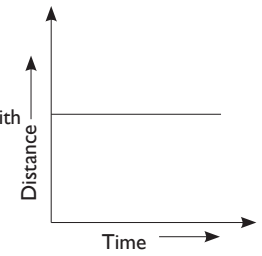
For Displacement using, $s = ut + \frac{1}{2}\ at^2$

$s = [0 + \frac{1}{2} \times 3 \times (35)^2]\text{m}$

s = 1837.5m

For Velocity using, $v = u + at$
$= (0+3\times35)$m/s
$= 105$m/s

(b) The figure (graph) is possible.
This distance-time graph shows 'when the body is at rest'.The position of the body does not change with time. Its distance from the origin continues to be same at the instants of time.



Q.25 (a) The initial speed of the car = 10km/h
(b) The maximum speed attained by the car = 35km/h
(c) Part of the graph shows zero acceleration $\Rightarrow t = 3h$ to $t = 8h$.
(d) The part of the graph shows varying retardation $t = 8h$ to $t = 10h$.
(e) Distance travelled in first 8 hours.
= area of trapezium + Area of rectangle
$= [\frac{1}{2}\times$ Sum of perpendicular lines $\times h] + (l\times b)$
$= \frac{1}{2}\times (10+35)$km/h $\times 3h + (5\times35)h$
$= \frac{1}{2}(45)\times 3 + 175$
$= 242.5$ km

WORKSHEET 2

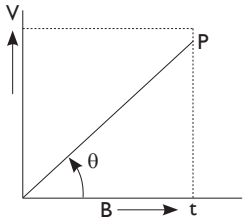
Q.1 The path may be a straight line or curved or zig-zag.

Q.2 The object is stationary and is not moving.

Q.3 (a) The total distance travelled = $h+h=2h$
(b) The displacement is zero, because the initial and final position coincide.

Q.4 Yes, when another train in the track beside moves.

Q.5 The distance is measured by the area occupied below the velocity-time graph.



Q.6 The average velocity of that body will zero.

Q.7 The tangent of the graph gives us velocity of the object in motion.
Tan $\theta = P/B$
Tan θ = Displacement/time.

Q.8 When the velocity of an object is constant.

Q.9 Always acting towards center of the circular path.

Q.10 It will move in a straight line tangential to the circular path.

Q.11 Yes, it have zero displacement.
Example: If an object travels from point *A* and reaches to the same point *A*, then its displacement is zero.

Q.12 (a) Yes, a particle can be accelerated when it is moving with constant speed.
(b) No.

Q.13 Speed and Velocity:

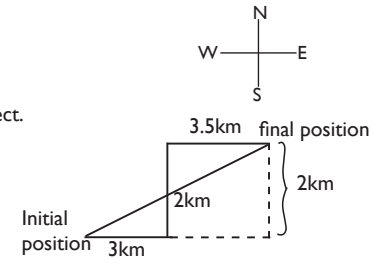
Speed	Velocity
a. It is how fast an object is moving.	a. It is the rate at which an object changes position in a certain direction.
b. Speed doesn't deals with the direction.	b. It does.
c. Speed is a scalar quantity.	c. Velocity is a vector quantity.

Q.14 $\text{Speed}_1, s_1 = 10\text{kmh}^{-1}$, $\text{speed}_2, s_2 = 15\text{kmh}^{-1}$
$\text{time}_1, t_1 = 2$h , $\text{time}_2, t_2 = 3$h
$\text{Distance}_1\ d_1 = s_1 \times t_1$, $\text{Distance}_2, d_2 = s_2 \times t_2$
$= (10\times2)$km $= (15\times3)$km
$= 20$km $= 45$km
$\therefore$ Total distance moved by her $D = D_1+D_2$
$D = (20+45)$km $= 65$km

Hence, Average speed $= \frac{\text{Total distance}}{\text{Total time}}$
$= \frac{65\text{km}}{(2+3)\text{h}}$
$= \frac{65\text{km}}{5\text{h}}$
$= 13\text{kmh}^{-1}$

Q.15 As average velocity depends on displacement and displacement can be zero if the object returns to initial position. Where as displacements is zero as source and destination is same. Hence a body can have zero average velocity but not average speed.
v = displacement/time
s = distance/time

Q.16 (a) Distance covered = total length of the path covered
It is a scalar quantity (scalar quantities are the ones which only have magnitude like time)
So, the distance covered by the person = 3km + 2km + 3.5km
= 8.5km



(b) Displacement is the length of the shortest path between the initial and the final position object.
It is a vector quantity.
So, Displacement of this motion

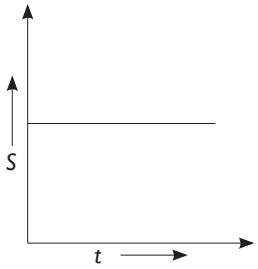
$(D)^2 = 2^2 + 6.5^2$

$= \sqrt{4 + 42.25}$

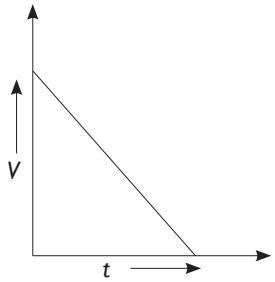
$= 46.25$

Displacement = 6.8km (approx)

Q.17 (a) When the object is in uniform motion.



(b) When the object is thrown vertically upwards.



Q.18 Initial velocity of car, u = 10m/s
acceleration, a = 5m/s^2
distance, s = 30m
Final velocity of car, v=?

using, $v^2-u^2 = 2as$

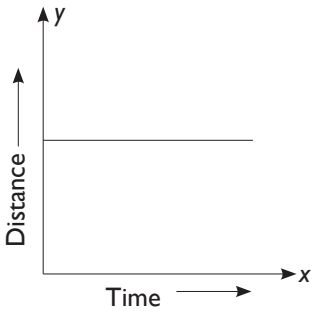
$v^2 - (10)^2 = 2(5)(30)$

$v^2 - 100 = 300$

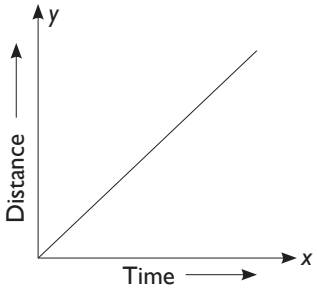
$v^2 = 400$

$v = 20$m/s

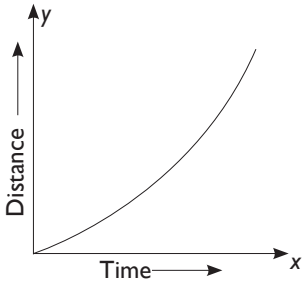
Q.19 (a)



(b)



(c)



Q.20 Initial velocity of shatabdi, $u = 0$
final velocity of shatabdi, $v = 108$ km/h $= 108 \times \frac{5}{18}$ m/s $= 30$m/s
Time, t=2min=120sec

(a) acceleration, a=?

using, $v = u+at$

$30\text{m/s} = 0\text{m/s} + a(120\text{s})$

$a = \frac{30\text{m/s}}{120\text{s}}$

$a = 0.2\text{m/s}^2$

(b) Distance travelled by the train, s=?

using, $s = ut+0.5at^2$

$s = 0+(0.5)(120)^2$

$s = 7{,}200$m

Q.21 Velocity decides the direction of motion of an object.
Example: If a ball is thrown up, the direction of motion of the body is the same as the direction of its velocity whereas the acceleration due to gravity acts on it in the downward direction. Thus, the direction in which an object moves is given by the direction of velocity and not by the direction of acceleration.

Q.22 (a) (i) When a body has no acceleration.
(ii) Also has no acceleration.

(b) Average velocity: When an object moves along a straight line in the same direction, its total path length is the magnitude of displacement. Hence its average speed is equal to the magnitude of average velocity.

Q.23 initial velocity, $u = 36$km/h $= 36 \times \frac{5}{18}$ m/s $= 10$m/s

Final velocity, $v = 72$km/h $= 72 \times \frac{5}{18}$ m/s $= 20$m/s
time, $t = 20$s
Distance travelled = ?

using, $v = u+at$

$20m/s = 10m/s + a(20s)$

$a = \frac{1}{2}\ m/s^2$

Now using, $s = ut + \frac{1}{2}at^2$

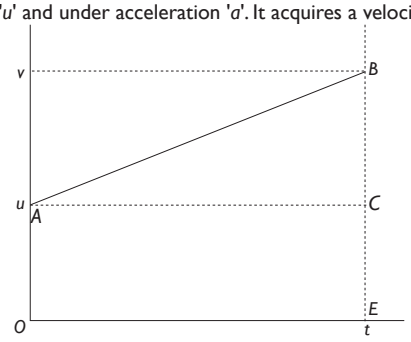
$s = [10 \times 20 + \frac{1}{2} + \frac{1}{2}(20)^2]m$

$s = (200+100)m$

$s = 300m$

So distance travelled = 300m or 0.3km

Q.24 An object starts linear motion with a velocity '*u*' and under acceleration '*a*'. It acquires a velocity '*v*' in time '*t*'.



velocity-time graph

(a) acceleration to this acceleration is in its uniform motion. As a result of the acceleration, its velocity from u to v (final velocity) in time t. Since the slope of the *v-t* graph gives the acceleration of the moving object.

acceleration = Slope of $AB = \frac{BC}{CA}$

$a = \frac{v - u}{t}$

$v-u = at$

$v = u+at$

it is velocity time equation.

(b) Third equation of motion.

As we know that the distance travelled '*s*' in time '*t*' is given by the area enclosed by the velocity-time graph and the time axis.

Therefore, distance travelled *s* = area of the trapezium *ABEO*

$= \frac{u + v}{2} \times t$ _____ (i)

we know, $(v - u) = at$

$t = \frac{v - u}{a}$

Substituting the value of t in equation (i)

$s = \frac{u + v}{2} \times \frac{v - u}{a}$

$2as = (v + u)(v - u)$

$2as = v^2 - u^2$

$v^2 = u^2 + 2as$

It is position-velocity relation.

Q.25 (a) (i) The speed of car is constant but the direction of motion of the car is changing continuously.

(ii) The length of each side of a circular path tends to be zero. So, the athlete has to change his direction of motion at each point.

(b) Radius of the circular track = 21m

Circumference of circular track = 2×22/ 7×21

= 132m

Distance covered in 1 round = 132m

Distance covered in 5 round = 5×132m = 660m

Time taken to complete 5 rounds = 12min. = 12×60s = 720sec

Speed of cyclist = $\frac{\text{distance}}{\text{time}}$

$= \frac{660m}{720s}$

=0.91m/s

(c) It actually moves in straight line but due to gravity its path is curved and it appears to be moving around the earth. So, because the satellite is falling freely under the influence of gravity, hence the motion is accelerated.

Chapter 09 FORCE AND LAWS OF MOTION

WORKSHEET 1

Q.1 Tendency of a body to resist changes in position of rest, motion or direction.

Q.2 Product of mass and velocity of an object. It's SI unit is kg ms^{-1}

Q.3 Loaded one will require larger force to stop because it has more mass; ($F \propto P$) more momentum.

Q.4 For every action, there is an equal and opposite reaction. (3^{rd} law of motion)

Q.5 External unbalanced force

Q.6 For every action, there is an equal and opposite reaction.

Q.7 The crater is initially at rest so P_i=0. After bursting, according to law of conservation of momentum final momentum should be zero so splinter fly off symmetrically in all directions such that overall momentum is zero.

Q.8 He might injure his hand because of greater momentum imparted by the fast moving ball, because effect of force will be larger for short time.

Q.9 Gun exerts force on bullet when fired then bullet exerts equal and opposite force on the gun according to 3^{rd} law of motion.

Q.10 F = ma;
IN = 1kg x $1ms^{-2}$. The force when acting on an object of mass1kg access acceleration of $1ms^{-2}$ in the object.

Q.11 It enables the entire momentum of person to be reduced to zero in a long time interval i.e. rate of change of momentum is small. So, the impact of force is small, hence it prevents injury.

Q.12 A 3kg mass at 4 m/s^2 as; $F = ma$
So, $F_1 = m_1 \times a_1 = 3 \times 4 = 12$ N
where as $F_2 = m_2a_2$, = 5 x 20 = 10N
so, $F_1 > F_2$.

Q.13 By doing this he/she increases the rate of change of momentum by decreasing time ie. rate of change of momentum is large, according to 2^{nd} law of motion, the resultant force delivered on pile is large enough to break in a single blow.

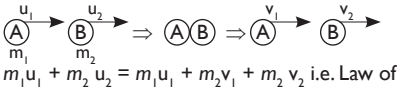
Q.14 Given, m_B = 20 g = 0.02kg; v_B = 150 m/s and m_p = 2kg; v_p =?

As $m_B \times v_B = m_P \times v_P \Rightarrow v_P = \frac{m_B \times v_B}{m_p} = \frac{0.02 \times 150}{2}$ = 1.5 m/s

Q.15 Given, m_B = 10 g = 0.01kg; v_B = 400 m/s and m_{CB}= 400g = 0.4kg; v_{CB} = 90km/h = 25m/s

moment of bullet = $m_B \times v_B$ = 0.01 x 400 = 9kg m/s; Moment of ball = $m_{CB} \times v_{CB}$ = 0.4 x 25 = 25 = 10kg m/s

$\therefore$ Cricket ball has more momentum i.e. 10 kg m/s.

Q.16 

$m_1u_1 + m_2 u_2 = m_1u_1 + m_2v_1 + m_2 v_2$ i.e. Law of conservation of Momentum. Total momentum of A & B before collision remains same after collision $\rightarrow p_1 = p_2$

Q.17 (a) Unbalanced external retarding force (air resistance, force gravity).
(b) Unbalanced external force air resistance, (with more magnitude).
(c) Balanced force (object has same/uniform velocity at each external of time.

Q.18 (a) Change of magnitude of speed of a moving object e.g. cricket ball hit by batsman
(b) It causes motion in a stationary body e.g. - a book on table moves when pushed.
(c) It can stop a moving body. e.g. a moving ball stopped by force on our hand.

Q.19 Sandy surface increases the time external for change of momentum i.e. rate of change of momentum is small and reducing the impact force and injury on a sandy surface than a hard concrete floor.

Q.20 m_1 = 20g = 0.02kg
m_2 = (980 + 20) = 1000g = 1kg
v_1 = 200 m/s, v_2 = ?
but know, $m_1v_1 = m_2 v_2$
0.02kg x $200ms_1$ = 1kg x v_2
$v_2 = 0.02 \times 200$
$v_2 = 4\ ms^{-1}$
Velocity acquired by block is 4 ms^{-1}

Q.21 In the absence of an external force, the total momentum of all bodies of a system remains constant.
e.g. (a) Recoiling of gun
(b) Motion of rocket

Q22. a) kg m/s. Velocity needs to be varied if momentum of given mass to be changed.
b) m = 2kg; t =10s; u = 5 m/s; v = 10m/s

we know, $\frac{v-u}{t} = a \Rightarrow a = \frac{(10-5)}{10} = \frac{1}{2}$ m/s^2

Now, $F = ma = 2 \times \frac{1}{2} = 1$

Now, F = 1N; if applied force 15s

then, $F = \frac{mv}{t} \Rightarrow v = \frac{1N \times 15s}{2kg} \Rightarrow v = 7.5$ m/s

Q23. a) Rate of change of momentum of an object is directly proportional to the applied force in the direction of force.
i.e. Consider an object of mass m having initial and final velocity applying four F for some time 't'. Initial momentum Pi = mu and $P_f = mv$
change of momentum $p_f - p_i = m(v-u)$
Now A/c 2nd law, F $\propto$ rate of change of momentum,

$\Rightarrow F \propto \frac{m(v-u)}{t} \Rightarrow F \propto ma \Rightarrow F = ma$, If R = 1.

b) m = 500g = 0.5kg; v = 0 m/s; u = 50 m/s ; t = 0.01;

$F = \frac{m(v-u)}{t}$

$\Rightarrow F = \frac{0.5(50-0)}{0.01} = 0.5 \times 50 \times 100 = 2500$ N

F = 2500 N

Q24. (a) Coin falls down to the glass due to inertia of rest to resist the change of position.
(b) Inertia defined in 1st law of motion i.e. when no unbalanced external force acts on an object it continues to be in its state of rest or motion in a straight line path.
(c) It will be same even heavier coin will have more inertia hence tendency of being at rest will be more to stay at rest.

Q25. (a) Object will fall towards (pull) ground.
(b) Object will fall towards ground.
(c) Bike will move in direction of applied mechanical pull.
(d) Object move in direction of push if more than frictional force.
(e) Object remains at rest.

WORKSHEET 2

Q.1 Zero; all are balanced by each other.

Q.2 Force of friction.

Q.3 Steel block; As inertia is measure of mass and steel has more mass.

Q.4 Object thrown by shubham is an action that has an equal and opposite reaction (3rd Law of motion).

Q.5 A car has more mass and hence $P = mv \Rightarrow P \propto m$ (v is constant)

Q.6 F = ma

Q.7 Zero; as at the highest point v = 0 $\Rightarrow$ p = m x v $\Rightarrow$ p = m x 0 $\Rightarrow$ p = 0

Q.8 They act on different objects not the same.

Q.9 force

Q.10 Due to conservation of momentum and to 3rd law of motion (action/reaction).

Q.11 The practices of dust remain at rest due to inertia of rest while the carpet when beaten comes in motion. Hence dust tends to fall down easily.

Q.12 a) Given: $m_A = m_B = M$; $v_A = v$; $v_B = 3v$; $p_A = m_A \times v_A = Mv$; $p_B = m_B \times v_B = M3v$; $p_B = 3Mv$; $p_B > p_A$; $3mv > mv$

b) B has 3 times more momentum than A.

Q.13 $F = ma$; Given F = 50N; m = 20kg; u = 15m/s
so, a = F/m = 2.5 ms^{-2}
Now, $v = u + at$

$0 = 15 - 2.5t$

$\Rightarrow t = 15/25$

t = 6 s

Q.14 The entire momentum of ball is reduced to zero in a long time interval.
i.e. rate of change of momentum is decreased and hence less force will be applied by fielder on ball in creation ball also applies less force on lapin of player and is not juiced.

Q.15 The quantity momentum of a moving object is product of mass and velocity. It depends upon mass and velocity i.e. $\Rightarrow p = mv$

Q.16 Common velocity means both trolley and boy moves with same velocity.
Initial momentum = 60 x 3 + 170 x 1.5m/s = 180+210 = 390kg m/s.
Final momentum = (60 + 140) v = 200v
so, on equating 200v = 390

v = 390/200

v = 1.9 m/s

Q.17 Rate of change of momentum of an object is directly proportional to the applied force in the direction of force.

Q.18

Balanced farce	UnBalanced farce
1) forces equal in magnitude and opposite in direction.	1) Force unequal in magnitude, can be in same or opposite direction.
2) If does not produce acceleration in an object it acts upon	2) If produces acceleration in the object it acts upon.

Q.19 (a) Inertia of rest. Examples:
(i) A book lying on floor remains at rest unless compelled by external force.
(ii) A moving ball remains in motion unless a force of friction and air resistance causes it to stop.
(iii) When a bus starts passengers are jerked backwards, because of inertia of rest upper body remains stationary and hence resists the motion.

Q.20 (a) Change of shape till the time the force is applied.
(b) Change of speed and direction of ball.
(c) Change of (shape and size) configuration of spring.

Q.21 v_i = 36 km/m = 10m/s^{-1}

v_f = 54 km/n = 15ms^{-2}

$$\therefore a = \frac{v_f - v_i}{t} = \frac{15 - 10}{25} = 0.2 \text{ ms}^{-1}$$

$\therefore p_i = v_i m = 10 \times 20 = 20$kg m/s

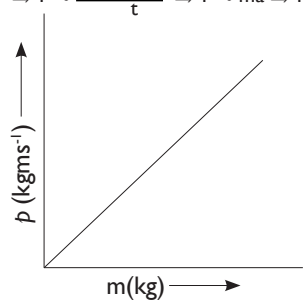
$\therefore p_f = v_f m = 15 \times 20 = 300$kg ms^{-1}

$\therefore F = m \times a = 20 \times 0.2 = 4$ N

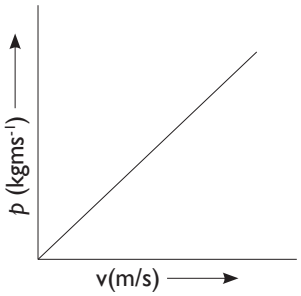
Q.22 Rate of change of momentum of an object is directly proportional to the applied force in the direction of force.
i.e. Consider an object of mass m having initial and final velocity applying four F for some time 't'. Initial momentum pi = mu and pf = mv change of momentum $p_f - p_i = m(v - u)$
Now according to 2nd law, F $\propto$ rate of change of momentum,

$$\Rightarrow F \propto \frac{m(v - u)}{t} \Rightarrow F \propto ma \Rightarrow F = Rma \Rightarrow F = ma, \text{ (If R = 1)}$$

(a)



(b)



Q.23 a) First law of motion: The body continue in its state of rest or motion untill unless any external force is applied to it.
b) To every action there is an equal and opposite reaction.
c) Rate of change of momentum of an object is directly proportional to the applied force in the direction of force.
i.e. Consider an object of mass m having initial and final velocity applying four F for some time 't'. Initial momentum pi = mu and pf = mv change of momentum $p_f - p_i = m(v - u)$
Now according to 2nd law, F $\propto$ rate of change of momentum,

$$\Rightarrow F \propto \frac{m(v - u)}{t} \Rightarrow F \propto ma \Rightarrow F = Rma \Rightarrow F = ma, \text{ (If R = 1)}$$

d) Initial momentum = mv = 30 x 48 = 1440kg m/s
After exploding in 2 parts, 18kg has zero velocity (rest) and other part (30 + 8 = 12 kg) has velocity v.
Final momentum = 18 x 0 + 12v
momentum before = momentum after

$\Rightarrow$ 1440 = 12 v

$\Rightarrow$ v = 120m/s

Q.24 If two bodies moving with same direction with different velocities u_1 and v_2 with mass m_1 and m_2. total momentum before collision,

$p_1 = m_1 v_1 + m_2 u_2$

After collision, velocity changes to v_1 and v_2 so total momentum after Collision,

$p_2 = m_1 v_1 + m_2 u_2$

Let force F_1 is exerted by A on B and in term if - F_2 is exerted on A f on time t.

So, Acceleration of B $(a_2) = \frac{(v_2 - u_1)}{t}$

But F = m x a

so, $F_1 = m_2 (v_2 - u_2)/t$ .....(i)

When F_2 reacts on A by B for time t

acceleration of A $a_1 = (v_1 - u_1)/t$

But, $F_2 = m_1 \times a = \frac{m_1 (v_1 - u_1)}{t}$ .....(ii)

$\because F_1 = -F_2$

$\Rightarrow$ from (i) and (ii)

$$\frac{m_1 (v_2 - u_1)}{t} = \frac{m_1 (v_1 - u_1)}{t}$$

$\Rightarrow (m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2) \Rightarrow (p_1 = p_2)$

Chapter

10 GRAVITATION

MULTIPLE CHOICE QUESTIONS

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

WORKSHEET 1

Q.1 Everybody into the universe attracts every other body with a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

Q.2 The falling of a body from a height towards the earth under the gravitational force of earth.

Q.3 Relative Density $= \frac{\text{Density of substance}}{\text{Density of water}}$

$$7.8 = \frac{\text{Density of substance}}{1}$$

Density of substance = $7.8 g/cm^3$

Q.4 When mass of object = 50kg, $g = 10 m/s^2$

So, weight = $m \times g = 50 \times 10 = 500N$

Weight of object on moon is $1/6^{th}$ of that on earth

$$\Rightarrow \quad \text{weight of moon} = \frac{1}{6} \times \text{weight of earth}$$

$$= \frac{500}{6}$$

$$= 83.33$$

$$\frac{w_e}{w_m} = \frac{500}{83.33}$$

Q.5 It is decreased on appears less than actual.

Q.6 To determine purify of milk.

Q.7 Due to buoyant force acting on it.

Q.8 No unit, it is dimensionless because it is given by same quantities division i.e

$$\text{Relative Density} = \frac{\text{Density of substance}}{\text{Density of water}};$$ which cancels out each other.

Q.9 Mercury is less denser than water while steel block has more density than water.

Q.10 It works on the application of Archimedes principle to determine density of liquids.

Q.11 As, $F = \frac{Gm_1m_2}{r^2}$; r is distance between objects

Since, $F \propto \frac{1}{r^2}$

If $r = \frac{r}{2} \Rightarrow F = \frac{1}{4r^2}$ F becomes four times force increases by a factor of 4.

Q.12 Density is defined as mass of substance per unit volume i.e. $D = \frac{M}{V}$

Relative density is the ratio of density of a substance to that of water.

i.e. $\text{Relative Density of substance} = \frac{\text{Density of substance}}{\text{Density of water}}$

Given

Density of water = $1000 kg/m^3$

Relative Density of substance = 1.9.3

Density of gold = Density of water × Relative Density of gold

$= 1000 \times 19.3$

$= 19300 kg/m^3$

Q.13 $\text{Pressure} = \frac{\text{Force}}{\text{Area}}$

Sharp tip has less area i.e if we apply force then larger pressure is exerted on it and it gets easily while a blunt tip has more area, hence with equal force applied less pressure will be exerted on it. and it will not go well inside.

Q.14 Given, m=30kg on earth

weight = $m \times g = m \times \frac{GM}{R^2}$

G= Universal gravitational constant

M= Mass of earth

R= radius of earth

Mass of the body remains same on surface of other planets.

Gravity on a planet $g' = \frac{GM'}{R'^2}$

and given $M' = \frac{M}{g}$ and $R' = \frac{R}{2}$

$\Rightarrow g' = \frac{GM}{R \times 9} \times 4$

$g' = \frac{4}{9}\frac{GM}{R}$

$= \frac{4}{9} \times g$

weight on plant = $m \times g' = \frac{4}{9} \times 30 = \frac{40}{3} = 13.33N$

Q.15 $F = \frac{Gm_1m_2}{r^2} = \frac{6.67\times10^{-11}\times50\times120}{(10)^2} = 4\times10^{-9}N$

Q.16 An iron nail has more density than of water, hence it sinks down while a cork piece is less denser than water and hence it floats over the water surface.

Q.17

Mass	Weight
1. Mass of an object is the quantity of matter contained unit	1. Weight is the force with which it is attracted towards the centre of earth.
2. SI unit is kg	2. SI unit is Newton (N).
3. The mass can never be zero and remains constant	3. It can be zero and is variable (with change of acceleration due to gravity.)

Q.18 Buoyancy is a tendency of water to exert an upward force on an object immersed in it.
Buoyancy depends upon density of fluid i.e. higher the density of fluid in which object is immersed, higher the object floats over it. As buoyant force is upward force, so greater the upward force, so greater the upward force higher the object float.

Q.19 Given, height of tower =100m ; $g=10m/s^2$
velocity of stone projected from ground=25m/s
velocity of stone projected from tower=0
Let the particles meet at time 't' and at height 'h'

(from ground) So, $h=25t - \frac{1}{2}gt^2 \Rightarrow h=25t - \frac{1}{2}\times10\times t^2$

$\Rightarrow h=25t-5t^2$ ——————— (i)

Distance converted by projectile thrown down in time t will start from rest u=0

$100-h = \frac{1}{2}gt^2 \Rightarrow 100-(25t-5t^2) = 5t^2$ ——————— from (i)

$\Rightarrow 25t=100$

$t=4s$

Thus, (particles) stone meets at 4s
Height at which the stone meets is 'h'

$h = 25t - 5t^2$

$\rightarrow h = 25(4) - 5(4)^2$

$h = 100-80$

$h = 20m$

Q.20 1 pascal is the pressure exerted or experienced by a body or object when a thrust of 1N acts on an area of 1metre square.
mass of boy = 40kg
weight of boy = $40\times g = 40\times10 = 400N$
Area = $0.04\ m^2$

$Pressure = \frac{Force}{Area}$

$= \frac{400}{0.04}$

$P = 10000\ Pa$

Q.21 When an object is wholly (or partially) immersed in a liquid it experience a buoyant force which is equal to the weight of liquid displayed by the object.
Applications:
1) In determining relative density of a substance.
2) The lactometers used to determine purity of milk.

Q.22 Given, $v=0$ (at highest point)
time of reach highest point = $\frac{6}{2} = 3s$
$a=-9.8ms^{-2}$

(a) $V=u+at$
$0=u-9.8\times3$
$u=29.4ms^{-1}$

(b) $2as = v^2-u^2$
$s = \frac{v^2-u^2}{2a}$
$= \frac{0-29.4\times29.4}{2\times9.8}$
$= 44.1$

(c) $t=4s$. In 3s ball reaches top 2 in 1s if fall down so, $u=0$
Distance covered in 1s from top

$s=ut+\frac{1}{2}at^2$

$\Rightarrow s=0+\frac{1}{2}9.8\times1$

$s=4.9m$

$\therefore$ The ball will be 4.9m below the top of tower after 4s.

Q.23 The object will float in a liquid if the
(a) Weight of object is equal to the weight of liquid displaced by it.
(b) Life jackets do not absorb water neither add to weight and are far less denser than water so it floats easily and when we wear, it reduces our relative density to water. The buoyancy life jacket provides, from being less denser than us and keeps us floating in any circumstance.
(c) The volume of a 500g sealed packet is $350cm^3$.
The volume of sealed packet is greater than density of water so it will sink.
Now, density of water is $1g/cm^3$.

Using Archimedes Principle.

The volume of water = $\frac{\text{Mass of water}}{\text{Density of water}}$

$= \frac{350}{1}$

$= 350 cm^3$

$\therefore$ Weight of water displaced is $350 cm^3$

Q.24 (a) Universal law: If we drop a stone of mass m from a distance R from centre of earth of Man M, then force entered by earth on stone is

$$F = \frac{GmM}{R^2} \quad \text{(i)}$$

Second law: Now, gravitational force acting on stone

$$F = m \times g \quad \text{(ii)}$$

from (i) and (ii)

$$\frac{GmM}{R^2} = m \times g$$

$$g = \frac{GM}{R^2}$$

(b) u=10m/s

v=0(top)

s=120m

g=10m/s^2

$$s = ut + \frac{1}{2}gt^2$$

$$120 = 10 \times t + \frac{1}{2} 10 t^2$$

$\Rightarrow 5t^2 + 10t - 120 = 0$

$\Rightarrow t^2 + 2t - 24 = 0$

solve using quadratic equation

we get, t=4sec

Time taken to reach the ground

= 2×time taken to reach top

=2×4=8s

$\therefore$ time taken to reach ground is 8s.

WORKSHEET 2

Q.1 $F = \frac{Gm_1m_2}{r^2}$; m_1= mass of object

m_2= mass of earth

r = distance between object and earth.

Q.2 The uniform acceleration produced in a freely falling body due to gravitational force of earth is called acceleration due to gravity.

Q.3 Thrust is the force acting on an object perpendicular to its surface.
SI unit is Newton (N).

Q.4 weight on earth = 100N

weight on moon = $\frac{1}{6}$ weight on earth

$= \frac{1}{6} \times 100 = 16.66$ N

Q.5 It is dependent upon mass of both objects and inversely dependent upon distance between both the objects.

Q.6 The weight of a body at centre of earth is zero.

Q.7

Mass	Weight
1. Mass of an object is the quantity of matter contained unit	1. Weight is the force with which it is attracted towards the centre of earth.
2. SI unit is kg	2. SI unit is Newton (N).
3. The mass can never be zero and remains constant	3. It can be zero and is variable (with change of acceleration due to gravity.)

Q.8 $m_1 = m_2 = 50$kg, e=0.5m

$$F = \frac{Gm_1m_2}{r^2}$$

$$= \frac{6.67 \times 10^{-11} \times 50 \times 50}{0.5 \times 0.5}$$

$F = 6.67 \times 10^{-7}$ N

Q.9 Applications:

1) In determining relative density of a substance.
2) The lactometers used to determine purity of milk.

Q.10 SI unit of $g = ms^{-2}$

SI unit of $G = Nm^2kg^{-2}$

Q.11 (a) w = 600N , g = 10m/s^2

$w = mg \Rightarrow m = \frac{600}{10} = 60$ kg

(b) w_{moon} = 100N

we know that, $w_{earth} = 6 \times w_{moon}$

So, $m \times g_e = 6 \times m \times g_m$

$$\frac{g_e}{6} = gm$$
$$g_m = \frac{9.8}{6}$$
$$g_m = 1.63 m/s^2$$

Q.12 (a) Density is defined as mass of substance for unit volume i.e. $D = \frac{M}{V}$
Relative density is the ratio of density of a substance to that of water.
i.e Relative Density of substance = $\frac{\text{Density of substance}}{\text{Density of water}}$
and it is a dimensionless quantity and has no unit.

(b) $D_{silver} = 108103 kg/m^3$
$D_{water} = 1000 kg/m^3$
R.D of silver = $\frac{\text{Density of substance}}{\text{Density of water}}$
$= \frac{10.8\times10^3}{10^3}$
R.D of silver = 10.8

Q.13 We have, $F = \frac{G\times M_e \times M_{object}}{\text{Radius of earth}}$
$= \frac{6.67\times10^{-11}\times6\times10^{24}\times1}{6.4\times10^6}$
$= 1.04\times6\times10^{24}\times10^{-17}$
$F = 6.25\times10^7 N$

Q.14 Area of force = $4\times2 = 8m^2$
Pressure = $\frac{force}{area}$
force = $m\times g = m\times10$

Q.15 Mass of an object is a constant quantity while weight is given by
$w = m\times g$
where g is the gravitational acceleration which varies from place to place.
∴ The weight can change.

Q.16 The camel's feet are broad and flat, so area covered is larger by their foot and it decreases the amount pressure and hence it can walk easily on sand.
But our feet sink as we have smaller feet so area is less and hence more pressure is applied and we tend to sink in the sand.

Q.17 (a) Given $m' = \frac{m_e}{2}$
and $r' = \frac{r_e}{2}$,
for earth, $g = \frac{Gm_e}{r_e^2}$
for new planet,
$g' = \frac{Gm'}{r'^2}$
$g' = G\frac{m_e\times(2)^2}{2\times r_e^2}$
$= \frac{4\,G\,m_e}{2\times r_e^2}$
$g' = \frac{4}{2}g$
$g' = 2g$
$=2\times9.8$
$g' = 19.6 m/s^2$

(b) When an object is dropped freely under gravitational force of earth is called free fall. And its velocity changes at a constant rate causing a uniform acceleration of 9.8 m/s^2

Q.18 (a) A thin strap will have less or small area of contact which will exert more pressure on the shoulder of a person carrying it. Hence, it will be difficult to hold a bag with thin and strong string.

(b) Mass of substance $m = 50g$
Volume of substance $v = 20cm^3$
Density of substance = $\frac{m}{v}$
$= \frac{50}{20}$
$= 2.5 gcm^{-3}$
As density of water is $1 g/cm^3$ and Density of substance is more than it.
Hence it will sink.

Q.19 As we know, $F \propto \frac{m_1 m_2}{r^2}$
(a) If $m_1 = 2m_1$
then $F \propto 2m_1 m_2$
force will be twice.

(b) $F \propto \frac{1}{r^2}$
if $r = 3r$
$F \propto \frac{1}{(3r)^2}$
$F \propto \frac{1}{9r^2}$
F will decreases by a factor of 9.

(c) both masses are doubled
i.e $m_1=2m_1$ and $m_2=2m_2$
$F \propto m_1 m_2$
$F \propto 2m_1 2m_2$
$F \propto 4m_1 m_2$
Force will be 4 times.

Q.20 (a) The gravitational attraction between the planet and sum is the source of centripetal force.

(b) This force depends upon mass of two objects between which it acts and the distance between them i.e.

$F \propto \frac{m_1 m_2}{r^2}$; m_1 = mass of one object
m_2 = mass of second object
r = distance between them

(c) If this force will be zero then the planet will be moving into tangential path from the point on its rotational orbit.

Q.21 (a) Pressure is thrust per unit area.

$P = \frac{F}{A}$

SI unit = Nm^2

(b) Higher the density of fluid, higher the object floats over it. As buoyant force is the upward force, so greater the upthrust, higher it will float. If the density of object is more than that of fluid it will sink.

Q.22 u=49m/s

v=0 (at highest point)

g=-9.8m/s^2

Using, $v^2-u^2=2as$

$$s = \frac{v^2-u^2}{2g}$$
$$= \frac{0-49\times49}{2\times9.8}$$
$$s = \frac{-2401}{19.6}$$
$$= 122.5\text{m}$$

(b) time taken to reach at top 't'

$$v = u+gt$$
$$-gt = v-u$$
$$t = \frac{v-u}{-g}$$
$$= \frac{0-49}{9.8}$$
$$t = 5\text{s}$$

$\therefore$ Total time taken to return = 2×time taken to reach top
= 25
=105

Q.23 (a) The weight depends upon acceleration due to gravity for any certain place.
i.e. $w= mg$
g is found to be maximum at poles and minimum at equation.
Weight on equation will also be less than that at poles.
Mass is constant everywhere in the universe.

(b) The weight will be more at poles than at equator.

(c) at the centre.

(d) If there is no acceleration due to gravity then object may be falling but not under free fall and would not be attracted to the earth and everything will be floating in the air.

Q.24 (a) (i) Life jackets do not absorb water neither add to weight and are far less denser than water so it floats easily and when we wear, it reduces our relative density to water. The buoyancy life jacket provides, from being less denser than us and keeps us floating in any circumstance.

(ii) Sea water is more denser than river water, hence he tend to float higher because of much higher buoyant force acting on an body making it easier to swim.

(iii) The young babies when uses four area of contact i.e. two palms and two knees. The area of contact is increased and hence their weight is distributed on ground which exert less pressure on them and making it-easier to crawl on floor.

(b) A steel needle has more density than water and hence it sinks. While a ship made up of steel has a definite structure in which inner part is hollow and contain air in it which makes it less denser than density of water and hence it floats over.

OR

Ship displaces more water than needle as volume of ship is more than that of needle. Since upthrust depends upon volume of object. So, more the volume, more upthrust acts on it and object floats.

Chapter

11 WORK AND ENERGY

WORKSHEET 1

Q.1 When the force is acting on the object is opposite the force of gravity.

Q.2 Power of electric over, P = 2500W, time t = 4 hours
Total energy consumed = $p \times t$
= 2500 x 4
= 1KWL
= 1 unit

Q.3 Potential energy of body $A = mgh_1 = mgh_2$
Potential energy of body $A = mgh_2 = 2mgh_2$
Ratio = $\frac{mgh_1}{2\ mgh_1} = \frac{1}{2} = 1:2$

Q.4 Force , F = 10N
Distance, s = 5m
Work done = Force x Distance
= 10 x 5
= 50Nm = 50J

Q.5 Work is said to be done whenever a force acts on a body and the body moves in the direction of the force SI nit of work is joule (J)

Q.6 K. E. = $\frac{1}{2} mu^2$
Where v is the velocity of object
$\Rightarrow$ K. E. $\propto v^2$

Q.7 SI unit of power is watt (W)

Q.8 Electrical energy converts in to mechanical energy.

Q.9 Gravitational potential energy, PE = mgh

Q.10 Mass of horse, m_1 = 250kg
Mass of dog, m_2 = 25kg
$v_1 = v_2 = v$
Kinetic energy of horse = $\frac{1}{2} m_1 v_1^2 = \frac{1}{2} \times 250 \times v^2$
Kinetic energy of dog = $\frac{1}{2} m_2 v_2^2 = \frac{1}{2} \times 250 \times v^2$
$\therefore$ Horse possesses more kinetic energy

Q.11 Mass of object, m = 1kg
Kinetic energy, K. E = 4 J
$\frac{1}{2} m v^2 = 4$
$\frac{1}{2} \times 1 \times v^2 = 4$
$v^2 = 8$
$v = 2\sqrt{2}$ m/s
If velocity is increased by 50% new velocity, $v' = 3\sqrt{2}$
New kinetic energy
$= \frac{1}{2} m \times v'^2$
$= \frac{1}{2} \times 1 \times (3\sqrt{2})^2$
$= \frac{1}{2} \times 9 \times 2$
= 9 J

Q.12 (a) The rate doing work is called power. SI unit of power is watt (W).
(b) Mass of boy, m_1 = 40kg
Mass of box, m_2 = 20kg
Height of building, h = 15m
Time, t = 25s
work done = mgh
$= (m_1 + m_2) \times 10 \times 15$
= 60 x 10 x 25
= 15000 J
Power = $\frac{w}{t} = \frac{15000\ J}{25s}$ = 600 watt (W)

Q.13 Mass, $m = \frac{1}{2}$ kg

Height, h = 20ms = 0.2m

$g = 10ms^{-2}$

work done = mgh

$= \frac{1}{2} \times 10 \times 0.2$

= 1 J.

Q.14 An object possesses gravitational potential energy if it is positioned of a height above the zero height. An object possesses elastic potential energy if it is of a position on energy medium other then the equilibrium position.

Q.15 Force, F = 10N

$\theta = 30^0$

Distance traveled, s = 10m

Work done = $F.s \cos \theta$

$= 10 \times 10 \times \cos 30^0$

$= 100 \times \frac{\sqrt{3}}{2}$

$= 20 \sqrt{2}$ m

Q.16 Kinetic energy can never be negative

As, K. E = $\frac{1}{2} mv^2$

and mass and velocity can not negative.

Q.17 (a) When we push a table and the table is moves form it's original position in the direction of force, then work done is positive.

(b) When we push the table and the work done by the kinetic friction is negative.

(c) When we hold a bucket a water perpendicular to the ground, work done is zero.

Q.18 Kilowatt - hour (kwh) is the commercial unit of energy

SI unit of energy is joule

If 1000 joule of energy is used to do some work for 1 hour, then the power generated is

= 1000 J 1 hour

= 1 k J 1 hour

= 1kWh

Power, P = 500 W = $\frac{1}{2}$ k W

Time, t = 10 hours

Energy consumed in one day

$= p \times t$

$= \frac{1}{2} \times 10$

= 5 k W h

Energy consumed in month of April

= 5 kWh x 30

= 150 kWh

= 150 units

Q.19 (a) Here, $\theta = 90^0$

Work done = $F.S \cos \theta = F.S \times \cos 90^0 = 0$

Hence, the work done is zero

(b) Force, F = 50 N

Distance, and = 4m

$\theta = 60^0$

Work done = $F.S \cos \theta$

$= 50 \times 4 \times \cos 60^0$

= 100 J

Q.20 Mass of body, m = 10kg

Initial velocity, v = 0 m/s

Final velocity , v = 25 m/s

Distance covered, s = 20m

g = 10m/s

$s = ut + \frac{1}{2} g + 2$

$20 = 0 \times t + \frac{1}{2} \times 20 \times t^2$

$2 = t^2$

$t = \sqrt{25}$

Q.21 Mass of lady, m = 60kg

Time, t = 50s

Total steps = 70

Height of each step = 15cm

Total height of 4 steps = 70 x 15 cm

= 1050 cm

= 10.5 m

Work done = mgh = 60 x 10.5 = 63 J

Power = $\frac{w}{t} = \frac{63}{30}$ = 2.15

$\frac{v^2 - u^2}{2a}$

Q.22 Total power = 40 W + 75 W + 150 W
= 265 W
Time, t = 8 hours
Energy consumed per day
= $p \times t$
= 265 x 8
= 2120 Wh
= 2.12 kWh
= 2.12 units

Q.23 Let an object of mass m, starts from rest and attains a uniform velocity v, after a force F is applied on it.
Let during this period the object be displaced by distance s.
thus, work done on object, $W = F \times S$
Let the acceleration produced after applying force on object be a.
So, using third equation of motion, we have:

$$v^2 - u^2 = 2as$$

$$s = \frac{v^2 - u^2}{2a}$$

Also, force, $F = ma$

$$\rightarrow W = ma \times \frac{v^2 - u^2}{2a}$$

$$\rightarrow W = \frac{1}{2} m (v^2 - u^2)$$

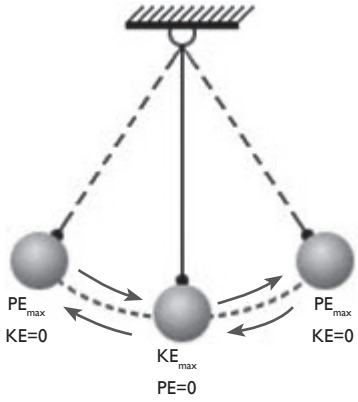
$$\rightarrow w = \frac{1}{2} mu^2 \qquad \text{(As, u = 0)}$$

$$\rightarrow (E_k = \frac{1}{2} mv^2)$$

Mass, m = 70kg
Height, h = 10m
PE = mgh = 70 x 10 x 10
= 7000 J
= 7 KJ
At half way down, the potential energy of the object will be $\frac{1960}{2}$ = 980 J.
At this point, the object has on equal amount of potential energy and elastic energy.
Hence, elastic energy = 580 J.

Q.24 (a) Law of conservation of energy states that energy can neither be created nor destroyed, but it can be transformed from one form to another. The total energy before and after the transformation reaming the constant.

(b) In case of swinging pendulum, the bob moves in to and from motion and at mean position if has maximum KE. This KE transforms into PE while going from mean to extreme position and this process repeats.



WORKSHEET 2

Q.1 As, work done is F.S cos θ, so where the box is not displaced, from its position, karan has not done any work.

Q.2 When the direction of force acting on an object is opposite to the direction of displacement, the work done by force is negative.

Q.3 Object A loses energy.

Q.4 Object B gaining energy

Q.5 kinetic energy, K. E = $\frac{1}{2} mv^2$, Where v is the velocity.
$\rightarrow$ K. E. $\propto v^2$

Q.6 Law of conservation of energy states that the energy can never be created nor be destroyed but can be transformed from one form to another.

Q.7 Power = $\frac{\text{Work done}}{\text{Time}}$ so, the worker who completes the work in less time has more power.

Q.8 So that can store the potential energy and the flow converts that energy in to kinetic energy. more the height greater the potential energy.

Q.9 When the object is displaced per perpendicular to the force spliced, the work done is zero.

Q.10 During photosynthesis, light energy converts into chemical energy.

Q.11 Power, P = 40 w
Time, t = 6 h
Energy consumed by the tube in one day. = Power x time
= 40 W x 6 h
= 240 Wh
= 0.24 kWh = 0.24 units

Q.12 Mass of bucket, m = 5kg.
Depth of well, h = 10m
Time, t = 10s
Energy consumed, P_E = mgh = 50 x 10 x 10 = 500 J
Power used by her, $P = \frac{\text{Energy}}{\text{Time}}$

$$= \frac{500\ J}{10s}$$

= 50 J/S
= 50 watt

Q.13 Mass of object, m = 50kg
Height, h = 600 = 6 m
g = 100 ms^{-2}
Potential energy = mgh
= 50 x 10 x 6
= 3000 J = 3 k J.

Q.14 Work done is zero because in one complete revolution, earth returns to its initial position and displacement is zero.

Q.15 The team which is slowly giving way to the other is doing negative work because their displacement is in opposite direction to that of applied force. The other team is doing positive work.

Q.16 Mass, $m = \frac{1}{2}$ kg
Height, h = 20cm = 0.2m
g = 10 ms^{-2}
Work done = P. E = mgh
$= \frac{1}{2} \times 10 \times 0.2$
= 1 J

Q.17 (a) Law of conservation of energy states that the energy can next be created nor be destroyed but only can be transformed from one form to another total energy always reaming constant.
(b) (i) Steam engine (ii) Generator.
(c) Since the displacement of the pitcher is zero from the last 20 minutes, hence the work done by person is zero.

Q.18 Kinetic energy is the energy possessed by its motion while potential energy is the energy possessed by its position
Mass of ball, m = 0.5 kg
Initial speed, u = 5 m/s
Final speed, v = 3 m/s
Change in K. E. = Final K. E. - Initial K. E.

$$= \frac{1}{2} mv^2 \frac{-1}{2} mu^2$$
$$= \frac{1}{2} m(v^2 - u^2)$$
$$= \frac{1}{2} \times 0.5 (9 - 25)$$
$$= 4 \text{ J}.$$

Q.19 Initial velocity of car, u = 30 km/h
Final velocity of car, v = 60 km/h
mass of car = 1500 kg
Work done = change in kinetic energy

$$= \frac{1}{2} m(v^2 - u^2)$$
$$= \frac{1}{2} \times 1500 (60^2 - 30^2)$$
$$= \frac{1}{2} \times 1500 \times 2700$$
$$= 150 \times 2200$$
$$= 2025000 \text{J} = 2025 \text{ k J}.$$

Q.20 a) Power of electric heater, P = 2000 W
Time, t = 5 hours
Energy consumed = Power x time
= 2000 x 5
= 1000 W h
= 10 units
b) Commercial unit of energy = 1 unit = 1 k W h = 3.6 x 106 J

Q.21 Consider a body with mass m, raised throng a height h, from the ground.
Force required to raised the object = Weight of object mg
Object grins energy equal to the work done on it.
work done on the object against gravity is W.
W = Force x displacement
= $mg \times h$
$W = mg\ h$
PE = $mg\ h$

Q.22 Kinetic energy of the object, K. E. = 25 J
Velocity, v = 5 m/s
As we know that,

$$\text{K. E.} = \frac{1}{2} mv^2$$
$$25 = \frac{1}{2} \times m \times 5^2$$
$$m = 2 \text{ kg}.$$

(a) When velocity is mode two times, k. E. becomes four times
As, v' = 2v

$$(K.E)' = \frac{1}{2} m v'^2$$
$$= 4\left(\frac{1}{2} mv^2\right) = 4 \text{ K. E.}$$

(b) When velocity is made two times, K. E. becomes 9 times.

$$v' = 3v$$
$$(K.E)' = \frac{1}{2} m v'^2$$
$$= \frac{1}{2} m (3v)^2$$
$$= 9\left(\frac{1}{2} mv^2\right)$$
$$= 9 \text{ K. E.}$$

Q.23 (a) Let v be the velocity of dog and horse.

Mass of dog $m_1 = m$

Mass of horse, $m_2 = 10m$

$$\text{K. E of horse} = \frac{1}{2} \times m_2 \times v^2$$
$$= \frac{1}{2} \times 10m \times v^2$$
$$= \frac{mv^2}{2}$$

$$\text{Ratio of their K. E's} = \frac{m v^2}{5 m v^2} = \frac{10}{2} = 1:10$$

(b) mass of object, m = 40 kg

Height, h = 5m

Potential energy, PE = mgh

= 40 x 10 x 5

= 2000J

= 2 KJ

When half-way down, potential energy of object is $\frac{2}{1}$ = 1 K J.

At that point kinetic energy will be equal to that of potential energy.

∴ Kinetic energy of the object at half-way down = 1 K J.

Q.24 Let us consider a body of mass placed at A

Let,

h = AB = height of body diagram above the ground.

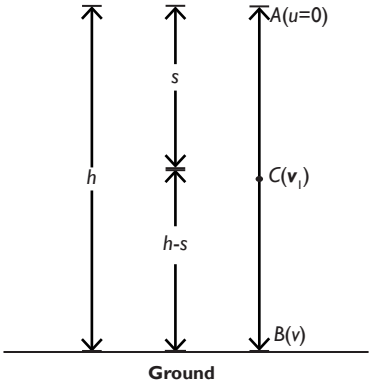
s = distance of any point c from A.

g = acceleration due to gravity at the place.

v_1 = velocity of the body at C.

v = velocity f the body at B, a point just above the ground.

The velocity at the at the point A is zero, i. e, u = 0.



(i) At the point A,

P. E = mgh

K. E = 0

Total mechanical energy at A,

= P. E + K. E.

= $mg\,h + 0 = mg\,h$

(ii) At the point C:

When the body moves form A to C, It covers a distance s. If $v1$ is the velocity at C.

Then from, $v^2 - u^2 = 2as$ we get

$$v_1^2 - 0 = 2gs$$
$$v_1^2 = 2gs$$

$$\text{K. E at C} = \frac{1}{2} mv_1^2 = \frac{1}{2} m (2gs)$$
$$= mg\,s$$

P. E. at C = mg (h-s)

Total mechanical energy at C = K. E. + P. C.

$$= mg\,s + mg\,(h\text{-}s)$$
$$= mg\,h$$

(iii) At the point B :

From, $v^2 - u^2 = 2as$

$v^2 - 0 = 2gh$

$v^2 = 2gh$

K. E. at B = 0

Total mechanical energy at B = K. E. + P. E.

$$= mg\,h + 0 = mg\,h$$

Clearly, the total mechanical energy of the body at A, B and C is the same. Hence, the total mechanical energy of the body throughout the free fall is conserved and is equal to the sum of kinetic energy and potential energy.

Chapter

12 SOUND

WORKSHEET 1

Q.1 Amplitude determines loudness ϑ

Q.2 Frequency υ = 220 Hz
speed, v = 440 m/s
wavelength, $\lambda = \frac{\text{speed}}{\text{frequency}} = \frac{v}{\upsilon} = \frac{440\text{m/s}}{220\text{Hz}} = 2\text{m}$

Q.3 Iron

Q.4 20Hz - 20000 Hz

Q.5 Wavelength, $\lambda = \frac{\text{speed}}{\text{frequency}}$

Q.6 Ultrasound waves have frequencies above 20,000 Hz.

Q.7 Frequency, υ = 100 Hz
Vibrations per minute = 100 × 60 = 6000

Q.8 Speed of sound in air increases with increase in temperature.

Q.9 Speed, v = 330 m/s
Frequency, υ = 550 Hz
wavelength, $\lambda = \frac{\text{speed}}{\text{frequency}} = \frac{v}{\upsilon} = \frac{330\text{m/s}}{550\text{Hz}} = \frac{3}{5} = 0.6\text{m}$

Q.10 Time-period, T = 0.02 seconds
frequency , $v = \frac{1}{T} = \frac{1}{0.02} = 50$ Hz

Q.11 Sound waves need material medium to propagate therefore, they are called mechanical waves. Sound waves propagate through a medium of the interaction of the particles present in that medium.

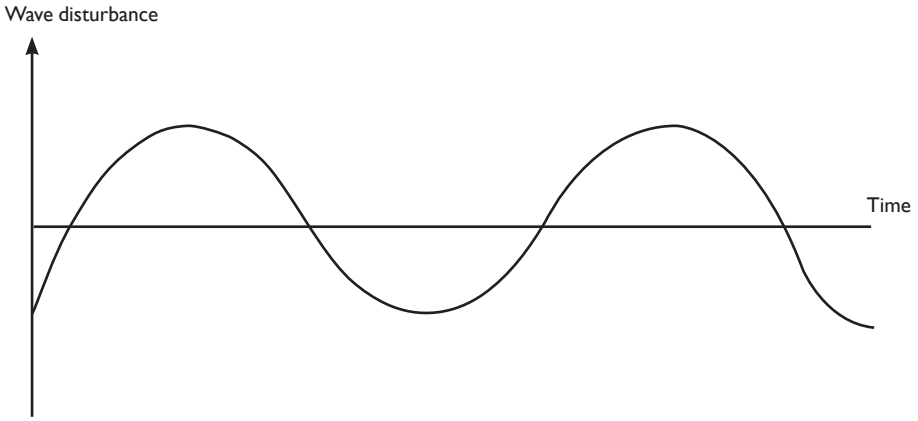
Q.12 The soldier heard the sound produced by firing of bullet from a gun afterwards because speed of light is greater than speed of sound.

Q.13 (a) Parallel to the direction of waves propagation.
(b) perpendicular to the direction of wave motion.

Q.14 Time, t = 1.02 s
Speed of sound in water, υ =1531m/s
Distance = Speed × Time
= 1531×1.02
= 1561.62 m
So, the distance of the cliff from the substance = $\frac{1561.62\text{ m}}{2} = 780.81\text{m}$

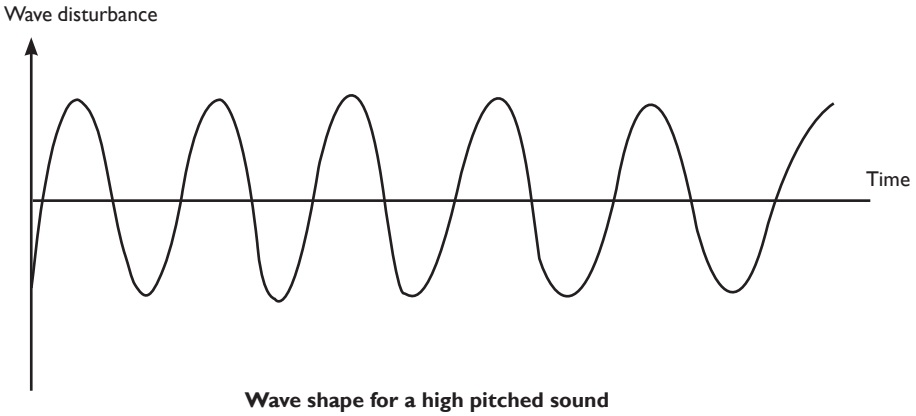
Q.15 Number of vibrations = 32
Frequency tuning fork = 256 Hz
Time to complete one vibration = $\frac{1}{256}$ s
Time to complete 32 vibrations = $\frac{32}{256}$ s = $\frac{1}{8}$ s = 0.125 s

Q.16 (a)



Wave shape for a low pitched sound

(b)



Wave shape for a high pitched sound

Q.17 Sitar, Tabla, Drum, Guitar, Violin, Veena.

Q.18 Frequency, wavelength and speed of sound are related as follows:
Wavelength is the distance travelled by the wave during the time and particle of the medium completes one vibration.
Wave velocity = $\frac{\text{Distance}}{\text{Time}}$

$v = \frac{\lambda}{T}$

Wave velocity = Frequency × Wavelength

Q.19

Q.20 Ultrasonography uses high-frequency sound pulses that are emitted from a hand-held ultrasound transducer.
This technique is used in x-ray, medical treatment etc.

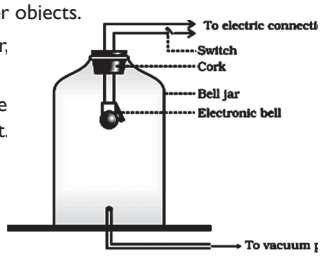
Q.21 Longitudinal waves are the waves in which the particles of the medium vibrate along the direction of propagation of the wave.
e.g.- Sound wave.
In transverse waves, particles of the medium vibrate in a direction perpendicular to the direction of propagation of the wave.
e.g. - Waves produced in a stretched string.

Q.22 (a) This is because the speed of light is greater than the speed of sound.
(b) The ceilings of the concert halls are curved so that it can reject the sound waves and give minimum amplitude.
(c) Those animals have audible range of ultrasonic sound so they can sense earthquakes before its effect.

Q.23 (a) Frequency: Number of oscillations of sound waves per unit times is called its frequency. Number of peak or troughs per unit time will give frequency.
Wavelength: Distance between two consecutive peaks (crest) or and troughs is called wavelength.
Echo: The reflections of sound heard after producing the sound is called echo.
(b) Ultrasound is used to clean objects like electronic components, used to detect cracks in metal blocks.
SONAR: It is a device which uses ultrasonic waves to measure distance, direction and speed of underwater objects.

Q.24 Take an electrical bell and an air tight glass bell jar connected to a vacuum pump. Suspend the bell inside the jar, and press the switch of the bell.

You will be able to hear the bell ring. Now pump out the air from the glass jar. The sound of the bell will become jointer and after some time, the sound will not be heard. This so because almost all air has been pumped out. This shows that sound needs a material medium to travel.



WORKSHEET 2

Q.1 Speed = wavelength x Frequency

Q.2 Frequency.

Q.3 Range < 20Hz.

Q.4 Frequency, υ = 100Hz.
Number of vibrations in one minute = 100 x 60 = 6000

Q.5 In this type of wave the particles of the medium vibrate in a direction perpendicular to the direction of propagation of the wave.

Q.6 A loud sound.

Q.7 Speed of sound increases with increases in temperature.

Q.8 Electrocardiography (ECG) is the process of recording the electrical activity of the heart over period of time.

Q.9 Stethoscope works on the principle of multiple reflection of sound waves.

Q.10 Sound Navigation And Ranging

Q.11 Sound is called a longitudinal wave because it is produced by compression and refractions in the air. The air particle vibrates parallel to the direction of propagation.

Q.12 Speed of sound wave, v = 339 m/s
Wavelength, λ = 1.5 cm = 0.015 m/s
Frequency, $\upsilon = \frac{v}{\lambda} = \frac{33900}{0{,}015}$ = 2260 Hz
Yes, it will be audible.

Q.13 No, they cannot talk on the surface of moon because there is no atmosphere and no air to act as medium of propagation of sound.

Q.14 Thunder is heard after the flash is seen because speed of light is greater than speed of sound.

Q.15 Speed of sound wave = $\frac{\text{Distance travelled by wave}}{\text{Time period}}$

$$v = \frac{\text{Wavelength}}{T}$$

$$v = \frac{\lambda}{T}$$

$$v = \lambda v \qquad \left[\text{Frequency, } \upsilon = \frac{1}{T}\right]$$

Q.16 Time, t = 70s

Speed of sound in water = 1550 m/s

Distance of enemy submarine = $\frac{1}{2}$ x Speed x Time = $\frac{1}{2}$ x 1550 x 70 = 54250 m

Q.17 Height of tower, h = 500m

g = 10 m/s^2

Speed of sound, v = 340 m/s

Initial velocity of the stone, u = 0

According to the second equation of motion: $h = ut + \frac{1}{2} gt^2$

$$500 = 0 \times t + \frac{1}{2} \times 10 \times t^2$$

$$\Rightarrow 100 = t^2$$

$$\Rightarrow t = 10 \text{ s}$$

Now time taken by the sound to reach the top from the base of the tower = 500/340 = 1.475.

Therefore, the splash is heard at the top after time = 10 + 1.475 = 11.475

Q.18 (a) The persistence of sound in an auditorium is the result of repeated reflections of sound and it is called reverberation.

(b) The reverberation can be reduced by covering the ceiling and walls of the enclosed space with sound absorbing materials, such as fiber board, loose woolens, etc.

Q.19 (a) The quality or timbre of sound.

(b) Audible range of frequencies is 20 Hz - 20000 Hz

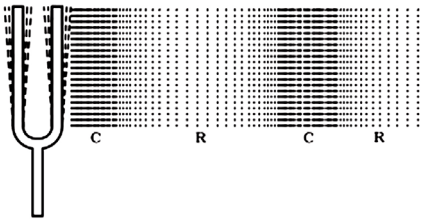
(c) Frequency of sound, υ = 100 Hz

$\Rightarrow$ No of vibrations in one second = 100

No of vibrations in the minute = 100 x 60 = 6000

Q.20 The sound is produced through the vibration of parties of medium and it is transmitted through vibrations and passes through the ear canal to a thin membrane called eardrum. The eardrum vibrates.

Q.21 When a vibrating body moves forward it creates a region of high pressure in its vicinity region of high pressure is known as compressions. When it moves backwards, it creates a region of low pressure in its vicinity. This region is known as rarefaction. As the body continues to move forward and backwards, it produces a series of compressions and rarefactions. This is shown in figure below.



Q.22 (a) Wavelength: The distance between two consecutive compression or two consecutive compression or two consecutive rarefaction is known as the wavelength. Its SI unit is meter (m).

(b) Time period: The time taken to complete one vibration is called time period. Its SI unit is seconds (s).

(c) Amplitude: The maximum height reached by the crest or trough of sound wave is called its amplitude. Its SI unit is meter (m).

Q.23 (a) SONAR is a device which uses ultrasonic waves to measure distance, direction and speed of underwater objects. The distance of the object can be calculated by knowing the speed of the sound of water and the time taken between the transmission and reception of ultrasound.

(b) Distance of the object from the submarine = 3625 m

Total distance travelled by the signal, s = 2 x 3625 = 7250 m

Echo returns in time, t = 5s

Speed of sound, $v = \frac{s}{t} = \frac{7250}{5}$ = 1450 m/s

Q.24 The sound waves passes through the ear canal to a thin membrane called eardrum. The eardrum vibrates. The vibrations are amplified by the three bones of the middle ear called hammer, anvil and stirrup. Middle ear transmits the sound waves to the inner ear. The brain then interprets the signals as sound.

Chapter

13 WHY DO WE FALL ILL?

WORKSHEET 1

Q.2
1. **Health** : Health is a state of complete physical, mental and social well being.
2. **Pathogens** : Pathogens are disease- causing microbes.
3. **Immunisation** : It is a method of preparing memory cells in immune system.
4. **Vaccine** : A vaccine is a biological preparation that improves immunity to a particular disease.
5. **Pulse Polio Programme** : It is programme which is run for creating awareness against the Polio disease. Under this programme, children under the age of 5 years are given Polio vaccines to provide them immunity against the disease.

Q.3
1. The disease spread from person to another, they are 'catching' disease and can be spread through the air, water, etc. are called communicable disease.
   The disease which does not spread from one person to another through any mode is called non-communicable disease.
2. Such disease which occurs suddenly and last for a short period is called as acute disease.
   Such disease which shows it's prolonged effects on human health. The condition is said to be chronic when the disease lasts for more than three months. Such disease can be life-threatening and majorly affect the immune system of the body and thus declines the health.
3. Though signs and symptoms describe the same conditions, these two are different in many characteristics. While signs are what a doctor sees, symptoms are what a patient experiences.
   A symptom can be defined as one of the characters of a disease. Meanwhile, sign is the definite indication of a specific disease.

Q.4
1. A balanced diet is important because your organs and tissues need proper nutrition to work effectively. Without good nutrition, your body is more prone to disease, infection, fatigue, and poor performance. Children with a poor diet run the risk of growth and developmental problems and poor academic performance, and bad eating habits can persist for the rest of their lives
2. Health is a state of being well enough to function physically, mentally and socially well and these conditions in turn depend upon the surrounding environmental conditions. e.g., if there are unhygienic conditions in surrounding area, it is likely that we might get infected or diseased.
3. Stagnant water is a breeding place of mosquitoes. If there will be stagnant water then the mosquito will take birth which can cause several diseases. So the area must be free from stagnant water.
4. Health is a state of social, mental and physical well being. If all the people will help each other, will share their sorrow then a social harmony will be made and a person will be mentally healthy. Good economic condition is necessary for getting good opportunities of employment. Health also depends on economy. If one will get proper earning then one will be able to get balanced food which will make one's family healthy. So good economy is important.

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

Q.6
1. Immunisation 2. Jaundice 3. Typhoid, diarrhoea and cholera 4. Pneumonia, emphysema, tuberculosis
5. circulatory 6. mental 7. *Salmonella typhi*

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

Q.8
1. WHO - WORLD HEALTH ORGANIZATION
2. BCG- Bacillus Calmette-Guerin
3. AIDS - Acquired Immune Deficiency Syndrome
4. DPT -Diphtheria, Pertussis, Tetanus

Q.9
1. Use of contaminated needles and syringes and organ transplant.
2. (a) Number of microbes attached to the body
   (b) Immune system of the individual
3. Infection occurs when viruses, bacteria or other microbes enter your body and begin to multiply. Disease occurs when the cells in your body are damaged as a result of infection and symptoms appear.
4. Rabies is transmitted by bite of dog or cat.
5. Staphylococcus
6. Liver
7. Diarrhoea
8. Polio and Hepatitis

Q.10
1. (i) Once someone has disease, his body functions are altered and may never recover completely.
   (ii) The treatment will take time, which means that someone suffering from a disease is likely to be bedridden even if proper treatment is given.
2. In case of AIDS, the virus affects the body's immune system and damage its function, and immune system gets weakened making the person prone to even minor infections.
3. Influenza spreads easily with rapid transmission in crowded areas including schools and nursing homes. When an infected person coughs or sneezes then the proximity person gets infected.

4. Malaria parasites, enter the blood after an infective mosquito bite infect the red blood cells. At the end of that infection cycle, red blood cells rupture. This cause lowering of RBC's and leads to anemia.
5. Microorganism causing malaria is a protozoan named plasmodium and that of kala azar disease is Leishmania.
6. The causative organism of malaria is a parasite called Plasmodium and the vector or carrier of malaria is female mosquito Anopheles.
7. Antibiotics are medications used to fight infections caused by bacteria. They're also called antibacterials. They treat infections by killing or decreasing the growth of bacteria
8. Infectious diseases are generally spread through air, water, sexual contact, vectors, physical contact with affected person and through articles of use of affected person.

Q.11 1. (a) The garbage thrown in open places, overflowing drains or sewer water, stagnant water, etc., are the places where disease-causing microbes multiply and mosquitoes and flies breed. These mosquitoes and flies act as carriers of disease-causing microbes. As a result, diseases may spread in the community and affect individual health. Thus, public cleanliness is important for individual health

(b) Personal health and community health are inter-related. The health of the community depends on the health and personal hygiene of the individuals of the community. If the individuals of the community stay healthy and behave responsibly towards the environment and surroundings, create a lively, healthy and hygienic environment, then the community on the whole would be healthy.

2. (a) Chronic disease is more harmful, as these last for long period of time, therefore, have enough time to cause major effects on our general health.

(b) In case of illness, the normal functions of the body get disturbed. So, a nourishing food is required which is easily digestable and contains all the nutrients. Therefore, bland and nourishing food is advised to take during sickness.

3. (a) Diarrhoea diseases are a intestinal infection including food poisoning. The causative organism of diarrhoea is Staphylococcus.

(b) (i) Diminished appetite
(ii) Dehydration symptoms are sucker eyes and hollow cheeks.

(c) Clean water : 1 litre (5 cups), add six spoons of sugar and half teaspoon of salt to it. Stir the mixture till the sugar dissolves.

4. (a) A vaccine is a biological preparation that imparts immunity to a particular disease.

(b) It is a technique in which a preparation of antigenic proteins of pathogens or weakened or dead pathogens are injected into a person to develop immunity in him without infection.

5. (a) The Local Authority gives the following provisions for the supply of clean drinking water 1. A large filter plant is placed near the Locality. 2. Chlorine is used to process water as it cleanses the water. 3. The Boilers are present in the filter plant where the water is first boiled then it is ready for drinking.

(b) Local authority has a dedicated team of skilled & trained workers & fleet of waste collection trucks. Men on duty moves with each truck for waste &garbage collections from every street of each ward. They segregate on spot as much possible like dry waste or wet garbage. They separate the plastic & edible/ food item in different large bins. However most of times residents only manage at their end & dump in respective Bins at the end corner of each street. After collecting from all over area they finally dump whole waste at main dump yard outside the city

6. (a) Different species of microbes seem to have evolved to home in on different parts of the body. In part, this selection is connected to their point of entry. If they enter from the air via the nose, they are likely to go to the lungs. This is seen in the bacteria causing tuberculosis. If they enter through the mouth, they can stay in the gut lining like typhoid causing bacteria. Or they can go to the liver,like the viruses that cause jaundice. But this needn't always be the case. An infection like HIV, that comes into the body via the sexual organs, will spread to lymph nodes all over the body. Malaria-causing microbes, entering through a mosquito bite, will go to the liver, and then to the red blood cells. The virus causing Japanese encephalitis, or brain fever, will similarly enter through a mosquito bite. But it goes on to infect the brain. The signs and symptoms of a disease will thus depend on the tissue or organ which the microbe target.

(b) Infection with a pathogen does not necessarily lead to disease. Infection occurs when viruses, bacteria, or other microbes enter your body and begin to multiply. Disease occurs when the cells in your body are damaged as a result of infection and signs and symptoms of an illness appear. The incidence of disease among those infected varies greatly depending on the particular pathogen and individual susceptibility.

7. A congenital disorder is a medical condition that is present at birth. A congenital disorder can be recognized before birth (prenatally), at birth, or many years later. Congenital disorders can be a result of genetic abnormalities, the intrauterine environment, or unknown factors. A congenital condition can arise from the genetic make-up of the fertilized egg or be acquired at any time during fetal development. The causes of many congenital disorders are not known.
Acquired diseases are acquired during the lifetime of an individual and are not present from birth. They are usually caused by disease causing agents or due to the lifestyle of an individual.

8. Infectious diseases are generally spread through air, through water, sexual contact, vectors, physical contact with affected person and through articles of use of affected person.

Q.12 1. (a) This is because our immune system is always active and when foreign bodies enter our body, the immune system instantly attacks it trying to kill it. So in case where our immune system is successful in killing the infectious microbe we do not develop the disease, it was supposed to cause.

(b) (i) Living in hygienic environment.
(ii) Getting vaccinated against common infectious diseases.
(iii) Availability of adequate and nutritious food.
(iv) Drinking clean water.

2. (a) Childhood immunisation under the Public Health Programme if available to all children is important for prevention of infectious diseases.

(b)

Age (completed weeks/ monthly years)	Vaccines	Comments
12 months	Hep-A1	**Hepatitis A:** Single dose for live attenuated H2-strain Hep-A vaccine Two doses for all killed Hep-A vaccines are recommended now
15 months	MMR 2 Varicella 1 PCV booster	**MMR:** The 2nd dose must follow in 2nd year of life However, it can be given at anytime 4-8 weeks after the 1st dose **Varicella:** The risk of breakthrough varicella is lower if given 15 months onward;

16 to 18 months	DTwP B1/DtaP B1 IPV B1Hib B1	The first booster (4th dose) may be administered as early as age 12 months, provided at least 6 months have have elapsed since the third dose. **DTP:** First nad second boosters should preferably be of DTwP Considering a higher reactogenicity of DTwP, DTaP can be considered for the boosters
18 months	Hep-A 2	**Hepatitis A**: 2nd dose for killed vaccines; only single dose for live attenuated H2-strain vaccine
2 years	Typhoid booster	Either Typbar-TCV® or Vi-polysaccharide (Vi-PS) can be employed as booster; Typhoid revaccination every 3 years, if Vi-polysaccharide vaccine is used Need of revaccination following a booster of Typbar-TCV® not yet determined
4 to 6 years	DTwP B2/DTaP B2 OPV 3 Varicella 2 Typhoid booster	Varicella: the 2nd dose given at anytime 3 months after the 1st dose.
10 to 12 years	Tdap/Td HPV	**Tdap:** is preferred to Td followed by Td every 10 years. **HPV:** Only 2 doses of either of the two HPV vaccines for adolescent/preadolescent girls aged 9-14 years; For girls 15 years and older and immunocompromised individuals 3 doses are recommended For two-dose schedule, the minimum interval between doses should be 6 months. For 3 dose schedule, the doses can be administered at 0, 1-2 (depending on brands) and 6 months

3. (a) Community issues like child marriage can affect the health of a girl. Lack of education of the community to sex related issues can also cause sexually transmitted diseases. Bad treatment with the underprivileged sections of the society can also cause mental problems.
   (b) (i) Wash your hands often.
   (ii) Get vaccinated.
   (iii) Stay at home if you have signs and symptoms of an infection.
   (iv) Don't share personal items.
   (v) Cover Your Mouth When You Cough or Sneeze.
   (vi) Exercise Caution With Animals
4. (a) A state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.
   In other words, WHO recognizes three dimensions of health :
   (i) Physical dimension (ii) Mental dimension (iii) Social dimension
   (b) (i) Physical dimension : It implies perfect functioning of all the body parts.
   (ii) Mental dimension : It implies harmony between the individual and its environment.
   (iii) Social dimension : It implies social interaction and behaviour.
5. (a) If a person having above symptoms, then he is suffering from the disease called Tuberculosis. It is especially among poor people living in dirty; ill- ventilated, congested localities of big cities. It is caused by bacterium. Mycobacterium tuberculosis is responsible for TB . It affects lungs.
   (b) (i) Infection spreads by tiny droplets of sputum sprayed by the infected person by sneezing, coughing.
   (ii) One can also get infected indirectly by taking contaminated milk of cow having bovine T.B.
   (c) The patient can be immunised with the BCG vaccine.
   (d) Edward Jenner discovered this vaccine. He tested his vaccination theory in May, 1976. He deliberately gave cowpox to people and found they were now resistant to smallpox.
6. (a) Hepatitis is caused by a virus that infects liver cells and causes inflammation.
   (b) The inflammation can affect how your liver works and cause other signs and symptoms of hepatitis.
   (c) The most common symptoms - mild fever, loss of appetite, nausea, vomiting, jaundice.
   (d) Prevention and control : Avoid tap water, Don't share personal case and getting immunised with test and vaccination.
7. The disease is AIDS, the causative agent of disease is retrovirus - HIV.
   (a) (i) Unprotected sexual inter course with an infected partner. It is a sexually transmitted disease.
   (ii) Use of contaminated needles, razors, syringes etc.
   (iii) Organ transplant, artificial insemination.
   (b) (i) Use of disposable needles and syringes.
   (ii) Avoidance of sharing of razor for shaving.
   (iii) Refraining high-risk groups from donating blood.
   (iv) Educating people about AIDS, particularly those in high risk group.

WORKSHEET 2

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

Q.2 1. Syphilis, AIDS 2. Streptomyces and Bacillus 3. Down Syndrome and cerebral palsy
4. Tuberculosis chicken pox 5. Trypanosoma 6. Sanitation , Proper immunisation against disease
7. (i) If one hasn't been vaccinated, it an increase the risk of polio.
(ii) Live with someone infected with polio.
8. Malaria , kala-azar

Q.3 1. **Disease** : Malfunctioning of the body or some part of it with specific symptoms.
2. **Entry point** : A portal of entry is the site through which micro-organisms enter the susceptible host and cause disease/infection. Infectious agents enter the body through various portals, including the mucous membranes, the skin, the respiratory and the gastrointestinal tracts.

3. **Target site** : The tissue or organ on which the microbe attacks is called target site.
4. **Vector** : Animals who carry the infecting agents from infected person to other potential host.

Q.4 1. unwashed 2. bacteria 3. leishmaniasis 4. malaria 5. immune response
6. immune system cell / T helper cells 7. Hydrophobia 8. major

Q.5 1. False. Wounds should be washed and flushed immediately with soap and water for 10–15 minutes. If soap is not available, flush with water alone. This is the most effective first-aid treatment against rabies.
2. True 3. True
4. False
5. False
6. True 7. True 8. True

Q.6

Q.7 1. This is because in India majority of children get exposed to hepatitis A virus in their early childhood. . As a result, these children develop immunity against it.
2. Because these disease last for long time period, even as much as a little time.
3. Since these diseases are spread from infected person to other through physical contact, air, water food, etc.
4. This is because anti bacterial medicines block the formation of cell wall of the bacteria. When, bacterias dont have cell wall, they dont divide and hence they die. While, viruses dont have their machinery of own. When they enter into our body, they use our cells as their machinery. So, to kill viruses we've to kill some of our cells as well.
Hence, making anti-viral drugs is more difficult than making anti-bacterial drugs.
5. Because after that disease is caused , his body has produced antibodies . So if the germs of small pox enters his body again then they would be killed.

Q.8 1. Tuberculosis - Infectious disease
2. Cholera - Infectious disease
3. Diabetes - Chronic disease
4. Influenza - Infectious disease
5. Hypertension - Non-infectious disease
6. Diarrhoea - Acute disease

Q.9 1. Scurvy and diabetes 2. Small intestine.
3. Penicillin 4. Bubonic Plague
5. Edward Jenner 6.
7. Rabies(Hydrophobia) 8. HIV - HUMAN IMMUNODEFICIENCY VIRUS
9. Viruses 10. 1.5 to 6 months

Q.10 1. A disease in which the function or structure of the affected tissue or organs changes for the worse over time.
Example : Osteoarthritis, Osteoporosis and Alzheimer's. etc
2. In the particular country to which you will be going to their may be wide spreading deadly diseases that may have health concerns and thus you must get vaccinated.
3. It is the disease caused by the virus called as Herpes simplex virus, which cause cold sores and genital herpes.
4. vaccines help develop immunity by imitating an infection by a disease, causing the immune system to develop the same response as it does to a real disease. This allows the body to recognize and fight the vaccine-preventable disease in the future if a person comes into contact with it.
5. When a microbe infects the tissue of the body of an individual in a particular type of disease.
6. AIDS : retrovirus - HIV, Typhoid - Salmonella typhi
Tuberculosis - Mycobacterium tuberculosis
Malaria : Plasmodium, kala-azar - leishmania
7.

Healthy	Disease free
a. It is a state of physical, mental and social well being.	a. It is a state of absence of any discomfort or derangement of the functioning of the body.
b. It refers not only to the individual but also its social and community environment.	b. It refers to the individual.
c. A healthy individual is one who is able to perform normal under given situation.	c. A disease - free individual may have good health or poor health.

Q.11 1. (a) Symptoms of swine flu are body aches, cough, headache, sore throat, fever, tiredness etc.
(b) (i) Best way to prevent swine flu is to get flu vaccination.
(ii) Wash your hands properly using soap and sanitiser.
(iii) Avoid contact with people suffering from swine flu, wear mask on mouth.
2. (a) The chances of mother having chicken pox is nil because she became immune to this disease. When the immune system first encounters an infectious microbes. It responds against it and then remembers it specifically. So when next time particular microbe enters into the body, the immune system responds the greater vigour and eliminates the infection more quickly.
(b) It is a infectious disease can be spread by air, water, food, physical contact, etc.
3. (a) Do yourself
(b) Do yourself
(c) Do yourself
4. (a) Influenza virus causes influenza while Mycobacterium tuberculosis causes TB.
(b) It is difficult to make vaccines for influenza or flu. Because the virus itself changes rapidly. So, it is difficult to develop the perfect vaccine.
(c) Influenza also known as acute respiratory infection (ARI) so it is a acute disease not chronic.
5. (a) (i) By taking proper vaccines and medicines
(ii) By doing regular exercise
(iii) By taking healthy nutritious meal
(b) Because they wear a mask to cover mouth and nose to avoid infection, use gloves to avoid direct contact with wounds and maintain personal hygiene.

Q.12 1. (a) **Immediate causes** : It is the real or primary cause of the disease. For infectious disease - the pathogens as virus, bacteria etc are immediate causes.
Contributory causes : These are causes or factors that do not cause the disease themselves but provide conditions for the disease to occur. It makes a person prone for catching a disease - second level causes.
For example - contaminated food or water induces disease in healthy persons.

(b)

Vector	Infection Agent
a. A vector is an organism that does not cause disease itself but which spreads infection by conveying pathogens from one infected host to a healthy host	a. An agent which is capable of producing infection by a chemical, physical or biological effect such as a disease.
b. These organisms act as an intermediaries.	b. The infection agent lives inside the vector and reproduce itself.
c. A vector that is essential in the life cycle of a pathogenic organisms.	c. It never harm the vector or carrier through which it is entered to the target host.
d. Female Anopheles mosquito is the carrier of a parasite called Plasmodium, which is responsible for the malaria disease.	d. These are commonly known as pathogens-include-bacteria, viruses, fungi etc.

2. (a) Causes of Jaundice:
(i) Jaundice is caused by a buildup of bilirubin, a waste material, in the blood.
(ii) An inflamed liver or obstructed bile duct can lead to jaundice, as well as other underlying conditions.
(iii) This leads a yellow tinge to the skin and whites of the eyes, dark urine and itchiness.
Causes of Tuberculosis:
(i) It is caused by a bacterium known as "Mycobacterium tuberculosis".
(ii) It is especially common among poor people living in dirty, ill-ventilated, congested localities of big cities.
(iii) The bacterium commonly affects the lungs, where small tubercles are formed.
(iv) It may also attack brain, intestine, eyes etc.
(v) The bacterium damages tissues and releases a toxin called tuberculin which produce the disease.

(b) **Long term effect of Jaundice**:
Jaundice usually goes away on its own after mild treatment. However, if a severe case of jaundice is left untreated for too long, the baby can get kernicterus, a form of brain damage. As result, other complications can occur, including cerebral palsy.
Long term effect of Tuberculosis:
(i) This disease affects the lungs very seriously.
(ii) The healing process is the lung leaves long term effects.
(iii) These affect the lungs function then of course there is the impact of decreased lung capacity on physical activity.
(iv) The long term complications of TB drugs can also affect the liver as sum of these medicines can damage it when taken in high doses.

3. (a) It is a viral disease, which is spread by mosquitoes. The target organ of this disease is brain. It is also called brain fever.
(b) The causative agent of this disease is a virus named Japanese encephalitis virus (JEV). It happens because of a mosquito bite, carrier or vector of the JEV
(c) This disease causes the symptoms of headache, vomiting, fever, confusion and seizures.
(d) As the vaccination against Japanese encephalitis is not 100% effective, one should protect himself against mosquito bites while travelling or staying in at risk areas.
(e) (i) Eat antioxidant foods, including fruits, such as blueberries, cherries and tomatoes and vegetables. (guards-pumpkin, cucumber etc) It can help your immune system tight off illness.
(ii) Drink enough fluids generally 6-8 glasses day.
(iii) Eat whole grain breads and cereals, provide essential fibers.
(iv) Eat at least 5 servings of fruits and vegetables a day, eating things of varying colors can provide a range of nutrients.

4. (a) It is the common name of rabies disease. The meaning of hydrophobia is that the infected person is afraid of water and therefore, rabies is commonly called hydrophobia.
(b) (i) Severe headache and high fever
(ii) Painful contraction of muscles of throat and chest, restlessness and inability to swallow.
(iii) Infected person is afraid of water called hydrophobia.
(iv) Alternating periods of excitement and depression.
(c) (i) Cleaning the bite wound with soap and clean running water, immediately after the bite is also an important preventive measure.
(ii) Pet dogs and cats should be vaccinated with anti rabies vaccine.
(iii) Animal should be watched for 10 days.
(iv) The bitten person should also be administered vaccination.

5. (a) Diarrhoea diseases are a group of intestinal infections, including food poisoning. The causative agents are mainly bacteria such as Staphylococcus, Clostridium, Escherichia coli etc.
(b) Abdominal cramps, nausea and vomiting lead to dehydration. For this ORS (oral rehydration solution) may be given to the patient. Periodically isabgol should be given with curd to the patient.
(c) (i) Undergound sewers for disposal of human excreta.
(ii) Proper covering of eatables to avoid contamination.
(iii) Use of only disinfected water or boiled water for drinking.

6. (a) Pulse polio programme was launched in 1995-1996 with an aim to eradicate polio disease from the world. In this programme, 2 dose of vaccine are given 4-6 weeks apart. In 1996-1997, the target age group was increased to all children under 5 years of age.
(b) (i) To reduce the effects of the disease : It can be done by providing symptomatic treatment.
(ii) To kill the cause of the disease : i.e. pathogens
(c) Malaria is a disease caused by a protozoan Plasmodium. This parasite is carried by anopheles mosquito from a infected person to a healthy person.
(d) (i) Once a person suffers from a disease, his body functions are impaired and may never recover completely.
(ii) As treatment takes time, the patient is confined to bed for some time.
(iii) The infected person serves as a potential source of spread of his infectious disease to others.

Chapter

14 NATURAL RESOURCES

WORKSHEET 1

Q.1 (i) Natural erosion (ii) Heterotrophic (iii) UV radiations (iv) respiration (v) diamond
(vi) 69% (vii) earth's crust (viii) cyanobacteria (ix) sunlight (x) 78

Q.2 (i) False. Soil erosion is reduced by intensive cropping and building bunds.
(ii) True (ii) True (iii) True (iv) True (v) True (vi) True

Q.3 (i) **Global warming** : A gradual increase in the overall temperature of the earth's atmosphere by increased levels of CO_2, CFCs, etc.
(ii) **Biogeochemical cycles** : A biogeochemical cycle is a pathway by which a chemical substance moves through biotic and abiotic.
(iii) **Air pollution** : It refers to the release of pollutants into the air, by smoke, harmful gases, carbon, etc.
(iv) **Ozone layer** : The ozone layer is a region of faith's stratosphere that absorbs most of the sun's ultraviolet radiation.
(v) **Biosphere** : Biosphere is the global ecological system integrating all living beings and their relationships.

Q.4 1.

Exhaustible resources	Inexhaustible resources
a. These resources cannot be renewed after exhaustion.	a. These resources have an ability to renew themselves in a given period of time
b. These are non-renewable or non-replenishable resources.	b. These are renewable or replenishable resources.
c. They require conservation steps to be taken, so that they can be used in future also.	c. They don't require conservation step to be taken can be, renewed.
e.g. iron, coal, etc.	e.g. sunlight, water etc.

2.

Renewable resources	Non-Renewable resources
a. They are present in the atmosphere of the earth.	a. They are typically found in the underground layers of the earth.
b. They are replaced by nature itself in a very short period.	b. They cannot be replaced by nature during time of human life span.
c. They are obtained free of cost.	c. Very costly and not easily available.
d. They don't cause pollution in the environment.	d. Pollute the earth by releasing various types of pollutants.

Q.5 (i) Carbon dioxide - Green-house gas
(ii) Ground water - renewable resources
(iii) Petroleum - Exhaustible resources
(vi) Oxygen - 21%
(v) CFC - Gas causing hoke in ozone layer
(vi) Terracing, afforestation - Prevents soil erosion
(vii) Plant, trees, microbes - Biotic components
(viii) Carbon monoxide - cause of air pollution

Q.6 1. Renewable resources - sunlight , water
2. Natural resources - water , oil
3. Exhaustible resources - coal , petroleum
4. Elements of weather - clouds , humidity
5. Soil pollutants - chemicals , tars
6. Air pollutants - Carbon dixoide , Smog
7. Kinds of soil - clay , loamy

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

Q.8 1. Carbon dioxide 2. Oxygen 3. Renewable energy 4. Nucleic acids
5. CFCs (Chlorofluorocarbon) 6. Cyanobacteria 7. Photosynthesis

Q.9 1. Abiotic factors 2. Smog : Dirty, poisonous air that cover a whole city 3. Plant, fungi
4. Ultraviolet 5. Renewable resources 6 78% of NO_2, 21% of O_2 7. Earth

Q.10 1. (a) **Water cycle** : The movement of water on, in and above the earth. (Circulation of water)
(b) Clouds form when the invisible water vapours in air condenses into visible water droplets or ice crystals.
2. Effect of air pollution on our health: watery eyes, coughing and difficulty breathing are acute and common reactions.
3. Eutrophication means excessive growth of algae plants on the surface of water due to over use of nitrogen fertilizers.
4. Fecal contamination of water can introduce a variety of pathogens into waterways, including bacteria, viruses etc. that are transmitted to people when they consume untreated water.
5. 'Atmosphere acts as a blanket' because:
(a) It keeps the average temperature of the earth.
(b) It prevents a sudden increase in the temperature during the day.

(c) It slows down the escape heat from the surface of the earth into outer space during night time.

6. Oxygen is present in free form like O_2 (oxygen molecule). Ozone (O_3) and combined from like oxides of metals and non - metals e.g. - CO_2, NO_2.
7. Water is essential for life because:
   (a) All life process that take place in the cells require water medium.
   (b) Water is needed for transportation of substances.
   (c) To get rid of high amounts of wastes.
8. Nitrogen fixation is a process by which nitrogen in the Earth's atmosphere is converted into ammonia (NH_3) or other molecules available to living organisms. It s relatively inert. It does not easily react with other chemicals with new compounds.
9. Widening of ozone hole has consequences on humans, animals and plants. This typically results from higher UV levels reaching us on earth and, UV rays causes non-melanoma skin cancer etc.
10. When fossil fuels such as coal and petroleum products are burnt, produce oxides of nitrogen and sulphur. On dissolving in rain, these oxides of nitrogen and sulphur form nitric acid and sulphuric acid respectively. This causes acid rain

Q.11 1. (a) Soil is the thin layer of material covering the earth's surface and is formed from the weathering of rocks.
   (b) The methods of preventing or reducing of soil erosion are:
   (i) Afforestation (ii) Contour plaughing (iii) Vegetation (iv) Mulch
2. (a) An atmosphere is a layer of or a set of layers of gases surrounding a planet or other material body, that is held in place by the gravity of that body.
   (b) The atmosphere is essential for life because it block some of the sun's dangerous rays from reaching Earth. It traps heat, making earth a comfortable temperature.
3. Forests influence the quality the air, soil of water resources in various ways. Some of them are:
   (a) Forests balance the percentage of CO_2 and O_2 in the atmosphere. The increasing amount of CO_2 caused by human activities is balanced by a larger intake of CO_2 by plants during the process of photosynthesis and, released large amount of O_2.
   (b) Forests prevent soil erosion. Roots of plants bind the soil tightly in a way that the surface to the soil cannot be eroded away by wind, water, etc.
   (c) They help in the environment resources.
4. Water harvesting can provide 50% of a family's water needs. This is not only saves water, but saves money and reduces our impact on the environment. Water harvesting is carried out through catchment areas and conduits.
   Catchment : By this the surface which receives rainfall directly.
   Conduits : Through pipelines the harvested water collects from the rooftop etc.
5. 1. Photosynthesis
   2. Respiration
   (a) Oxygen cycle
   (b) The importance of oxygen for living organisms are:
   (i) Living things respire to get the oxygen for living cells to function.
   (ii) Plants use CO_2 to produce energy and give out O_2 as a by product.
   (iii) Oxygen is what almost all animals need to survive.
   (iv) Oxygen is the most important constituent of water body health.
6. (a) "Water of Yamuna river resembles a drain".
   It stated that Delhi doesn't have a proper drainage system. Yamuna is movely a drain. It doesn't have fresh water after wazirabad. Out of 30 Sewage Treatment Plants (STPs), It is noted, that they are underutilised up to 37% so, the court told the bench that the yamuna turns into a drain after wazirabad since industrial and domestic effluents are indiscriminately dumped into it.
   (b) Yes, The solubility of oxygen and other gases will decrease as temperature increases. This means that colder lakes and streams can hold more dissolved oxygen than warmer water. If water is too warm, it will not hold enough oxygen for aquatic organisms to survive.

Q.12 1. (a) Nitrogen exists as free nitrogen in the atmosphere.
   Atmospheric invert nitrogen gas is converted into usable nitrogenous form for the various lip form by:
   (i) Blue green algae and bacteria.
   (ii) This bacteria found in the nodules of roots of legumes. such as, gram, bean, etc.
   Plants take compounds containing nitrogen from the soil. From plants nitrogen passes into food web. Decay of dead plants, animals and excreta like urine, faeces, causes veteran of nitrogen compounds to the soil.
   (b) nitrogen cycle

2. (a) Biodegradable and non-biodegradable.

Biodegradable	Non-biodegradable.
a. They are non pollutants.	a. They are pollutants.
b. Ones are degraded by living organisms.	b. Have no part with living organisms.
c. It gets decomposed within very short period.	c. It takes longer time.
d. They are organic.	d. They are artificial mostly polymers.
e.g. Fruits, plants, animals, etc.	e.g. Plastics, glasses, etc

   (b) The air of this place contains serious levels of sulphur and nitrogen oxides. This is due to the large number of industries set up near by Taj Mahal and pollution of Yamuna River. So, acid rain reacted with the marble (calcium carbonate) of Taj Mahal and this causing damage to heritage structure.
   (c) Acid rain caused by a chemical reaction that begins when compounds like sulphur dioxide and nitrogen oxides are released into the air. These substances can rise very high into the atmosphere, where they mix and react with water, oxygen and other chemicals to form more acidic pollutants, known as acid rain.

3. (a) The carbon cycle is the biochemical cycle by which carbon is exchanged among the biosphere, pedosphere, geosphere, hydosphere, and atmosphere the earth.
   (b) Carbon cycle.
      (i) Carbon enters the atmosphere as carbon dioxide from respiration and combustion.
      (ii) CO_2 is absorbed by producers (that make their own food) to make carbohydrates in photosynthesis. These producers then put off oxygen.
      (iii) Animals feed on the plants. Thus, passing carbon compounds along the food chain.
      (iv) The dead organisms are eaten by decomposers in the ground. The carbon that was in their bodies is then returned to the atmosphere as CO_2.
4. (a) "Dust is a pollutant". It is concentrated with pollen grains which also are considered as dust. Dust is released by constructions, factories, industries, plants, mining activities etc. Dust mainly constitutes solid particles less then 500 micrometers in size.
   (b) (i) Yes. Carbon dioxide is necessary for plants.
      (ii) CO_2 is considered as a pollutants because CO_2 is a green house gas and its excessive amount in the atmosphere results in global warming.
      (iii) Photosynthesis.
5. (a) Ozone covers the earth's atmosphere. It is present in the 'stratosphere'.
   (b) The effects of UV rays on humans, plants and animals are:
      (i) It can cause significant damage to plants, as seen in crop yield reduction and leaf burn. It affects crop by affecting the photosynthesis process.
      (ii) It causes ionizing effect, can cause cancer and genetic disorder in any life form.
      (iii) It can damage animal's skin health.

WORKSHEET 2

Q.1
1. Because glass absorbs highly amount of heat from the sun.
2. The cycling process of all these gases maintains their percentage in the atmosphere at constant level.
3. Because moon has no atmosphere. Earth's atmosphere protects life on the earth by absorbing UV radiation coming from the sun and maintaining the average temperature.
4. During the day, the air above the land gets heated faster and starts rising. So, flying kites near seashore is easy as compared to anywhere else.
5. It releases chemicals like sulphur and nitrogen oxides which rise into the atmosphere mix with rain and oxygen and cause acid rain which corrods the marble of Taj Mahal. This causes yellowing of Taj Mahal.
6. By Domestic sewage and unavailability of food.
7. Water is needed to be conserved because less that 1% of the total water content is freshwater which can be consumed by humans. The rest of the large oceans water is too salty for human consumption.

Q.2
1. Westerns chats, Konkan region, Maharashtra
2. Rainy coastal area (water)
3.
4. Hydrogen and oxygen atom
5. 21
6. 20-30
7. Population growth.
(8) Sun's energy
9. Crude oil
10. Oil and gases

Q.3
1. Solar energy
2. Natural resources.
3. Coal and petroleum.
4. Hydropower
5. Fossil fuels
6. Non-renewable resources.

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

Q.5
1. False. Oxygen is harmful for nitrogen fixing bacteria.
2. True.
3. False. Lichens - Producing organic acids.
4. False. The scientific study of soil is called pedology.
5. False. 71% of the earth's surface covered water.
6. True. 7. True.

Q.6 1.

Venus	Mars
a. Its atmosphere is very thick	a. Its atmosphere is very thin.
b. Venus is hotter than Earth.	b. Mars is coldest than Earth.
c. Venus is the second planet from the sun.	c. Mars is the fourth planet from the sun.

2.

Nitrification	Denitrification
a. Nitrification is when the ammonia is converted back to nitrates.	a. Denitrification is when the nitrates are reduced back into the nitrogen gas atmosphere.
b. Done by soil living bacteria and other nitrifying bacteria.	b. It completes the nitrogen cycle.

3.

Soil erosion	Soil conservation
a. It is the displacement of the upper layer of soil, one form of soil. Soil become less fertile.	a. It is the preventing of soil loss from erosion or reduced fertility.
b. e.g. Wind, Water	b. e.g. Afforestation

Q.7
1. Skin cancer - UV rays
2. Green house effect - keeps the earth warm
3. Global warming - rise in temperature of earth
4. ODS - another name of CFCS
5. Blue green algae - Nitrogen fixer
6. Lichens and mosses - Biological agents of weathering.

Q.8
1. **Humification** : It is a process of formation of humic substances decomposed from plant remains.
2. **Mineralisation** : The Process through which an organic substance becomes impregnated by or turned into inorganic substances.
3. **Soil profile** : A soil horizon is a layer parallel to the soil surface, whose physical characteristics differ from the layers above and beneath.
4. **Soil pollutants** : It is defined as the presence of toxic chemical in soil, in high enough concentrations to pose a risk to human and/or the ecosystem.

Q.9
1. Desertification is the process by which fertile land becomes desert, typically as a result of drought.
2. 60% of humans body is made up of water.
3. SPM are finely divided solids or liquids that may be dispersed through the air from combustion process industrial activities or natural sources.
4. Wind is the perceptible natural movement of air, especially in the form of a current of air blowing form a particular direction.
5. Molecules of different gases (Like nitrogen, oxygen, argon, etc.)
6. Cycling process keeps the temperature on earth steady
7. Carbon cycle and nitrogen cycle
8. Burning of fossil fuels is the largest source of air pollution

Q.10
1. Federal statutory regulation of water pollution has been governed primarily by three pieces of legislation! the Refuse Act, the federal water Pollution Control Act, and the Clean Water Act.
2. Two human activities which lead to environmental pollution are:
   (a) Deforestation, which would increase the amount of CO_2
   (b) Uses of chemicals in the industries
3. Role of respiration in oxygen cycle is to release carbon dioxide which is then taken up by the plants to carry out photosynthesis, that release oxygen which is used up by human beings in respiration to produce CO_2 for plants again and this cycle goes on.
4. 'In water cycle', water can exist either as a solid (ice), a liquid (water), on a gas (water vapour). Water on the surface of earth is constantly changing between those three states. Ice can change to become water or water vapour.
5. The pesticides and insecticides sprayed in the fields are carried away by rain water. These chemicals are washed away with the rain or irrigation water into the nearby water bodies like ponds, lakes or rivers.

Q.11
1. The some different types of soil are below:
   (a) **Black soil** : This soil will be usually found in the volcanic regions as it is formed by lava rocks after they undergo a decomposition process. This black colour is due to the presence of iron in it.
   (b) **Red soil** : Red soils are found in regions with warm, moderate and moist climates. This soil mainly formed due to crumbling and weathering.
   (c) **Laterite soil** : The soil contains high amount of iron and Aluminum oxide. It is highly weathered red soil which is found in area with tropical to moderate climate.
2. "Direct sources include effluent outfalls from factories, refineries, waste treatment plants, etc. that emit fluids of varying quality directly into urban water supplies. The effects of water pollution are varies.
   "The main problem caused by water pollution is that it kills organisms that depend on these water bodies. Dead fish, crabs, birds and sea gulls, Dolphin, etc. Pollution disrupts that natural food chain as well.
3. The Layers of the atmosphere are:
   (a) **Troposphere** : It is the first layer above the surface and contains half of the Earth's atmosphere. Weather occurs in this layer.
   (b) **Stratosphere** : Many jet aircrafts fly in the stratosphere because it is very stable. Also, the ozone layer absorbs harmful rays from the sun.
   (c) **Mesosphere** : Meteors or rock fragments burn up in this layer.
   (d) **Thermosphere** : It is a layer with auroras. It is also where the space shuttle orbits.
   (e) **Exosphere**: This is the upper layer of our atmosphere. It merges into spaces in the extremely thin exosphere.
4. (a) **Fossil fuels :** A natural fuel such as coal or gas. Formed in the geological past from the remains of living organisms.
   (b) Fossil fuels release nitrogen into the atmosphere, which contributes to nutrient pollution in our air. Also, they release nitrogen oxides into the atmosphere, which contribute to the formation of smog and acid.
5. (a) Rhizobium
   (b) Root nodules have rhizobium bacteria. Rhizobium bacteria fix atmospheric nitrogen and convert them into nitrate and nitrite which the plants can easily absorb.
6. (a) The direction of air currents in coastal areas during 'day time' towards the land.
   (b) During Night towards the sea.
   This happens because during the daytime, land gets heated faster than water and radiated heat from land, heats the air above it. During the night, since the water cools down slower than the land and the air above water will be warmer than the air above land.
7. The mechanism of paedogenesis:
   (a) Sexually mature larvae, usually without fertilization
   (b) The young may be eggs, such as are produced by Miaster
   (c) This form of reproduction is distinct from neotenic reproduction in its parthenogenetic nature and the eventual maturation.
8. (a) **Wind in weathering** : The wind can blow ting grains of sand against a rock. These wear the rock away and weather it.
   (b) **Vegetation in controlling soil erosion** : Plants slow down water as it flows over the land and this allows much of the rain to soak into the ground.
   (c) Water can seep into cracks and crevices in rock. If temperatures drop low enough, the water will freeze. When water freeze, it expands.

Q.12
1. (a) (i) Ocean water - 97.2% (ii) Glaciers and other ice - 2.15% (iii) Ground water - 0.61%
   (iv) Fresh water lakes - 0.009% (v) Inland seas - 0.008% (vi) Soil moisture - 0.005%
   (vii) Atmosphere - 0.001% (viii) Rivers - 0.0001%
   (b) Seasons are a very important element in our lives. Effect of seasons on variety and abundance of life forms by:
   (i) A warmer climate is expected to increases the risk of illnesses and death from extreme heat and poor air quality.
   (ii) During long winter days - many animals can't survive due to their adaptations and dead, etc.
2. (a) Air is called breathe of life because it contains oxygen, which is required by all living organisms for respiration.

(b) When water evaporates from the earth's surface, it is carried into the atmosphere as invisible vapour mainly because the vapour laden air cools as it rises, a point is reached when the air is no longer able to hold water in the form of vapour.

3. (a) Interactions happens Biotic and Abiotic component and constant transfer of food and energy goes on which provides stability and makes the system dynamic

(b) Draw the oxygen cycle:

Oxygen cycle : Oxygen from the atmosphere is used up in three processes, namely combustion, respiration and in the formation of oxides of nitrogen.

(i) Animals take in O_2 through the process of respiration. And release CO_2 into the atmosphere.
(ii) CO_2, released by animals is used in plants in the process of photosynthesis.
(iii) Plant release O_2 into the atmosphere as a by-product of photosynthesis
(iv) Fuels need oxygen for combustion so they take oxygen and release CO_2 into the atmosphere as a by product along with other gases like N_2 etc.
(v) CO_2 is released into air in the process of decaying of dead animals and plants.
(vi) This CO_2 is taken by plants for the process of photosynthesis and O_2 is released, and this process continues.

4. (a) Ozone layer is found in atmosphere in the stratosphere layer.
(b) Ozone hole is an area of the ozone layer that is seasonally depleted of ozone. The depletion is caused by the destrution of ozone by CFCs and by other compounds.
(c) Ozone hole is located in the Ozone layer at the stratosphere of earth's atmosphere.
(d) Ozone $\rightarrow O_3$

5. (a) Gaseous nitrogen fixed by plants. There are certain nitrogen fixing bacteria present in the root nodules of the plants. Which changes nitrogen into nutrients.

Significance -

(i) Nitrogen is the element that helps make chlorophyll.
(ii) Proper amount of nitrogen helps in the plant growth.
(iii) Also improves the quality of the leaves.

(b) Excessively used of nitrogen in agriculture, they affect human life in various ways -

(i) Nitrogen fertilizers get dissolved in the soil and cause ground water contamination.
(ii) It results in the emissions of nitrous oxide gas in large quantities.
(iii) Due to this gas, the rain becomes acid rain these fertilizers can cause skin diseases when exposed to human body.

(6) (a) The wastewater which generates daily in our house is added to natural environment.
(b) Wastewater leaving our homes generally goes either into a septic tank in the back yard where it seeps back into the ground or is sent to a sewage-treatment plant through a sewer system.
(c) Yes, they discharged directly into the river and oceans without treatment.

Chapter 15 IMPROVEMENT IN FOOD RESOURCES

WORKSHEET 1

Q.1

1.	*Kharif*	(b)	Rice
2.	*Rabi*	(c)	Wheat
3.	Tilling	(f)	Ploughing
4.	Fertilizer	(e)	Urea
5.	Irrigation	(d)	Trickle
6.	Weed	(a)	Amaranthus

Q.2

1. True
2. False. Manure are rich in organic matter and nitrogen and stimulates beneficial soil bacteria and fungi.
3. True
4. False. It is called winnowing. Grain harvesting means cutting of grain or pulse.
5. True
6. False. Because operation flood is called white revolution.
7. False. Malathion is an insecticide.
8. False. It is called weeds.

Q.3

1.	Mixed cropping	2.	Weeds	3.	Pathogen	4.	Intercropping
5.	Organic farming	6.	Mixed farming	7.	Fungicides	8.	Irrigation

Q.4

1.	*Kharif* crops	-	Green gram	,	Rice
2.	*Rabi* crops	-	Peas	,	Mustard
3.	Indian breeds of cows	-	Sahiwal	,	Gir
4.	Pests	-	Rodents	,	Weeds
5.	Fertilizers	-	Nitrogen	,	Phosphorus
6.	Weeds	-	Bull thistle	,	Garlic
7.	Macronutrients	-	Lipids	,	Proteins
8.	Micronutrients	-	Calcium	,	Iron

Q.5 2 → 3 → 1 → 4

Q.6

1.	*Fungus Puccinia Triticina*	2.	rich, organic matter	3.	herbicides	4.	Mycorrhiza
5	rope	6.	minerals	7.	nutrients	8.	17

Q.7

1. Composting and Vermicomposting

Composting	Vermicomposting
The compost is obtained by decomposition of organic waste like animal excreta, plant waste, etc. naturally due to decomposition by bacteria.	To hasten the process of decomposition earthworms are added to this organic matter to obtain compost.

2. Layer and broiler

Layer	Broiler
a. The egg-laying poultry bird is called layer. The ration for broilers is protein-rich with adequate fat.	a. The poultry bird groomed for obtaining meat is called broiler.
b. The levels of vitamins A and K is kept high in the poultry feeds.	b. While broilers require protein rich diet or ration with adequate fat.

3. Apiculture and Sericulture

Apiculture	Sericulture
It is technique of growing or keeping bess in hives on large scale for the purpose of extraction of honey and wax.	It is the rearing of the silkworms to obtain silk. During a stage of its life cycle, the silkworm weaves a cocoon around itself and silk is obtained from the cocoon.

4. Intercropping and Crop rotation

Intercropping	Crop Rotation
It invovles growing two or more crops simultaneously on the same field in definite proportion or pattern.	The growing of different crops on a piece of land in a pre-planned succession is known as crop rotation.
e.g. - soyabean + maize, etc	e.g. - corn, mixed grass, etc.

Q.8

1.	(d)	Gram	2.	(a)	hybridization	3.	(d)	loss of nitrogen
4.	(b)	freshwater fish	5.	(d)	They have no sense of direction	6.	(b)	milk
7.	(a)	mango	8.	(c)	Hay	9.	(d)	all of them
10.	(b)	Elephant						

Q.9 1. **Animal Husbandry** : Animal Husbandry is the management and care of farm animals by humans for profit.
2. **Swarming :** A group of bees, social wasps, or ants is called swarming. When migrating with a queen establish a new colony.
3. **Poultry farming :** Poultry farming is undertaken basically to raise fowl for egg production and chicken meat.
4. **Growers :** Growers are the persons who grows large quantities of a particular plant or crop in order to sell them**.**
5. **Green revolution :** Bumper production of cereals by using high yielding varieties (HYV), higher dose of fertilizer and better modes of irrigation is known as green revolution.

Q.10 1. Red sindhi and sahiwal
2. '*Apis Cerana Indica*' and '*Apis dorsata*'
3. It slow runoff velocity and promote infiltration.
4. Smallpox and cattle plague
5. FCI and CWC
6. (18-25)%
7. (a) Nature of crop plants
   (b) Nature of soil of the crop fields
8. Rice is a crop that can tolerate water logging in the field while example of crops that cannot tolerate water logging are wheat and cotton

Q.11 1. Hybridization is the process of interbreeding between individuals of different species or genetically divergent individuals from the same species. Its types are:
   (a) Single cross hybrides
   (b) Double cross hybrides
   (c) Triple cross hybrides
   (d) Population hybrides
2. It can kill many useful microorganisms present in the soil which help in renewing the soil.
3. Characteristics of a good animal shelter are:
   (a) The shelter should be big and open.
   (b) The shelter should protect the animals from heat, cold and rain.
   (c) Proper water arrangement should be available.
4. Animal husbandry provides livestock production. It is an integral part of crop farming and contributes significantly to household nutritional security.
5. When plants do not get enough of these nutrients, plants start showing deficiency symptoms such as stunted growth and poor colour.
6. Photoperiod is the physiological reaction of organisms to the length of day or night. It occurs in plants and animals. Photoperiod in agriculture provides adequate light for flowering.
7. It is the farming in which no chemical fertilizers, pesticides or herbicides are used. But uses all organic matter for its growth like manure, neem leaves as pesticides and for grain storage.
8. The main elements of animal husbandry are :
   (a) Proper feeding of animals
   (b) Providing freshwater to animals
   (c) Providing safe and hygienic shelter to animals
   (d) Proper breeding in animals

Q.12 1. (a) Composite fish culture is a system in which five or six different species of fishes are grown together in a single fish pond. Fishes with different food habitats are chosen so that they don't compete for food among themselves.
   (b) Catla, rohu, mrigals, etc.
   (c) Catla : Surface feeders
   Rohu : Feed in the middle - zone
   Mrigals : Bottom feeders
2. (a) **Irrigation** : The process of supplying water to crop plants through human efforts by means of canal, wells, reservoirs, tube-wells, etc.
   (b) It is essential, because it maintains moisture in the soil, for the growth of the roots of the crop plants, etc.
   (c) Three effects of excessive irrigation are:
      (i) Increase in saline and alkaline elements in soil or increase in salinity.
      (ii) Shallowness of roots
      (iii) More nitrate formation.
      (iv) Reduction in temperature of roots.
3. (a) Advantages of crop rotation are:
      (i) It prevents soil depletion.
      (ii) Increases soil fertility.
      (iii) Reduces soil erosion.
   (b) The three main criteria, while selecting the crops for rotation are:
      (i) Soil and type of crop depending on duration
      (ii) Livestock on the farm
      (iii) Occurrence of pests and diseases
4. Sporadic diseases : Diseases which occur at very irregular intervals and locations is called as a sporadic disease. Based on their transmission plant disease are classified as:
   Infectious disease : Disease that spread from one plant to other.
   Plant diseases are caused by a pathogenic organisms such as fungus. bacterium, virus, etc.
   Deficiency diseases: these occur in plants due to deficit of nutrients thus affecting its physiological processes, reproduction etc.
5. The factors responsible for losses of grains during storage are:
   (a) Abiotic factors like moisture, humidity and temperature.
   (b) Biotic factors like insects, rodents, birds, mites, bacteria and fungi.
   The various measures for safe storage of grain are:
   (a) Be sure that there is no moisture where you are storing grain.
   (b) Be sure that the place is free from pesticides, insecticides, etc.
6. (a) **Murrah** : It is breed of domestic water buffalo kept for dairy production.
   Tharparkar : It is one of the most important milch breed of the western region of India.
   (b) **Karan swiss** : They were developed in India at the National Dairy Research Institute at Karnal.

Jersey : It is a breed of small diary cattle. Originally, breed in the channel Island of Jersey.

(c) **Sahiwal** : It is a breed of zebu cattle which primarily is used in dairy production.
Brown swiss : Brown swiss is a swiss breed of dairy cattle.

7. (a) The characteristic symptoms of anthrax :
Flu-like symptoms, such as sore throat, mild fever, fatigue and muscle aches, which may last a few hours or days.

(b) The symptoms of foot and mouth disease are:
Fever, sore throat and sometimes a poor appetite and malaise.

Q.13 1. (a) Manure and fertilizer

Manure	Fertilizer
a. Increases soil fertility by enriching the soil with organic matter and nutrients as it is prepared by the decomposition of animal excreta and plant wastes.	a. Mostly inorganic compounds which provide specific nutrients like nitrogen, phosphorus and potassium.
b. Improves soil fertility. Do not lead to pollution.	b. Excessive use may destroy soil fertility and pollution.
c. e.g. - manure waste, yard compost, etc.	c. e.g. - synthetic chemicals, nutrients etc.

(b) Advantages of using fertilizers are:
(i) It increases crop yield and improves poor quality land.
(ii) Manure improves soil texture, recycles nitrogen and introduces essential bacteria.
(iii) Pasture is improved so animals fatten up quicker.
Disadvantages of using fertilizers are:
(i) Crops grow better, but so do weeds. Therefore, herbicide sprays are required too.
(ii) Better quality plants attract insects so pesticides may be needed.
(iii) Excess nitrogen from fertilizers gets into water supply, causing fish to die.

2. (a) We can control plant disease by using some prevention:
(i) Picking off infected leaves helps prevent a disease from spreading.
(ii) Avoid wetting foliage : Most plant disease require moisture to spread.
(iii) Avoid overhead watering. and apply water to soil, not foliage.

(b) (i) Maintain proper hygiene near your surrounding:
(ii) Spray some pest killing spray which are natural and do not harm. For example neem. You can put some cloves in lemon if want to prevent mosquitoes.

3. (a) Well irrigation is common is alluvial plains of the country.

(b) Canals are second most important source of irrigation in India after wells and tube wells. The canals are irrigating those lands which have large plains, fertile soils and peremist rivers.

(c) Tank irrigation is more in the rocky plateau area of the country, where the rainfall is uneven and highly seasonal.

4. (a) Bacterial diseases :
(i) Anthrax - Nausea, fever
(ii) Tuberculosis - Infection of lungs
Viral diseases :
(i) Ranikhet - Lack of appetite, respiratory distress.

(b) Following preventive measures should be adopted :
(i) The premises and pastures should be prevented from contamination.
(ii) Elimination of parasites from the host at the most appropriate time.
(iii) Reducing the stock rate can significantly reduce the parasite burden in animals.

5. (a) Apiary is a place where bees and their hives are kept while bee hive is an enclosed structure in which some species of honey bees live and raise their young.

(b) Apiaries are usually situated on high ground in order to avoid moisture collection, though within a proximity of a consistent water resource.

WORKSHEET 2

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

Q.2 1. It is for free movement of animals so as to keep them healthy.
2. It will protect them from insects and microbes harming them.
3. To give more meat, broilers are feeded with much care.
4. Kharif crops are rainy crops and rainy season is more favourable for pests and worms.
5. Because it can reduce the fertility of soil and decrease the quality of crops.

Q.3 1. The rapid increase in the yield of milk is called white revolution.
2. Blue revolution aimed to management of water resources that can steer humanity to achieve drinking water.
3. Yellow revolution is the sudden increase in the production of edible oil due to plantation.
4. Fumigation is a method of pest control that completely fills in areas with gaseous pesticides.
5. Artificial insemination is the medical or veterinary procedure of injecting semen into the vagina or uterus.

Q.4

1.	Fish	2.	Fish hatchery	3.	Nitrogenous	4.	Air, water or touch
5.	*kharif*	6.	selective breeding	7.	second	8.	eggs

Q.5 1. False. Weeds decreases the yield of crop.
2. True.
3. False. Drought animals are used to carry load.
4. True
5. False. Drones are male bees.
6. False. Manures are produced by animal dung.
7. True.

Q.6 1. Fertilizer 2. Breeding 3. Hand pulling 4. Pisciculture 5. Horticulture

Q.7

1.	Spices	(d)	Chilly, Black Pepper
2.	Oil seed crops	(a)	Ground nut, mustard
3.	Fodder crops	(f)	Oat, Sudan Grass
4.	Cereal crops	(b)	Rice, Wheat, Maize
5.	Pulses	(g)	Pea, Gram, Pea
6.	Micronutrients	(c)	Iron, Manganese
7.	Macronutrients	(e)	Nitrogen, Potassium

Q.8
1. Dog , fish
2. Wheat , barley
3. Beans , peas
4. Plants , Animals
5. Air , water

Q.9
1. Aseel, Ghagns, Chattisgarh and Bursa.
2. 12 months
3. Apiculture is the maintenance and rearing of bee-colonies to obtain honey and bee wax.
4. Honey and wax.
5. Mixed cropping, inter-cropping and crop rotation.
6. Compost and Green manure
7. *Manganese, Zinc, Nitrogen, Phosphorus*
8. Protein - Beans, Spirulina and lentils
   Fats - Avocados, Olive oil, Seasame
   Carbohydrates - Sweet potatoes, Brown rice, Oatmeal.

Q.10
1. Useful effects of Green Revolution :
   (a) Rapid increase in wheat and rice.
   (b) Expanded use of fertilizers has had a dramatic impact on income and food supply.
   Harmful effects:
   (a) Increased pollution and soil erosion.
   (b) More pressure on water systems.
2. (a) Due to less irrigation of crop plants, they may get dehydrated.
   (b) Nutrients may not reach each and every part of the plant due to less water.
3. Leguminous crops fixes nitrogen with the soil without the help of nitrogen fertilizers. It gets sufficient amount of nitrogen.
4. Layers are poultry birds raised to lay eggs while broilers are poultry birds reared for meat production.
5. Main elements of animal husbandry:
   (i) Proper feeding of animals.
   (ii) Proper freshwater to animals.
   (iii) Providing safe and hygienic shelter.
   (iv) Proper breeding of animals.
6. Feeding animals well increases their overall growth and health. Dairy animals require a balanced diet for milk production, body maintenance and good health.
7. (i) Causal organism - Virus
   Symptoms - Lack of opposite, respiratory distress.
   (ii) Animal affected - Domestic animals
   Symptoms - Nausea, fever
   (iii) Causal organism - Bacteria
   Animal affected - Dairy animals
   (iv) Causal organism - Bacteria

Q.11
1. (a) Different parameters are used to check the success of artificial insemination in animal. By regular insemination of semen after collection and frequent checking on fertility.
   (b) (i) There is no need of maintenance of breeding bull for a herd.
   (ii) It prevents the spread of certain diseases and sterility.
2. (a) Broilers are chickens raised to produce meat and layers are raised to give eggs. They are kept in free run barns while layers are kept in bars.
   (b) A broiler chicken will eat about one kg of food every day.
3. (a) Unfertilized eggs of honeybee grows into a drone bee and fertilized eggs will hatch into female worker bees.
   (b) Swarming benefit the bee colony by increasing space within a hive and expanding the range of these pollinators.
4. (a) Mixed cropping is the practice of growing two or more crops together on the same piece of land in one crop season.
   (b) Crops are selected carefully so that they do not compete with each other for light, nutrients and water. Seeds should be sown at approximate distance.
   (c) Advantages of mixed cropping:
   (i) It acts as an insurance against the possible total crop failure in poor rainfall areas.
   (ii) It saves time and labour of farmer.
5. (a) Before storing the grains, they are properly dried in the sun to reduce moisture in them. This prevents the attack by insects, pests, bacteria and fungi.
   (b) Stored food grains are prone to attack by insects, pathogens and other rodents. Hence, they need to be dried before storage.
6. (a) General utility breeds of Cow are dual purpose breeds which are both good milk producers as well as draught animals.
   (b) Murrah, surti, Jaffrabadi, Bhadawari, Mehsana, Nagpuri and Nili-Ravi.
7. Capture fisheries refers to all kinds of harvesting of naturally occurring living resources in both marine and freshwater environments.
   Inland fisheries are the commercial fishing operations taking place in freshwater.
   Aquaculture is the farming of fish, and other aquatic animals.

Q.12 1. (a) Inter cropping is a multiple cropping practice involving two or more crops in proximity.

(b) Beans and vine crops with corn are examples.
(c) Advantages :
(i) A complementary sharing of plant resources such as nitrogen.
(ii) Weed suppression.
(iii) Reduction in susceptible insects and disease.

2. (a) The process of farming of animal and keeping it as a pet or in any other form is called domestication.
(b) Horse and sheep.
(c) Milk and cheese.
(d) Improving the animals cooling process through proper water, shedding and ventilation. Increasing the milking frequency during a 24-hour period.

3. (a) Buffalo milk contains higher total solids than cow milk. In fact, buffalo milk is considered to have almost twice as much as content as cow's milk.
(b) Jersey and Brown swiss.
(c) Leghorn and Aseel.

4. (a) Hen - Poultry farming
(b) Cow - Cattle farming
(c) Laccifer lacca - lac culture
(d) Pulses - Crop breeding

5. (a) *Apis mellifera*
(b) These species are used to produce honey at commercial level.
(c) For best results in honey production, first suitable location for keeping beehives should be selected, proper management of beehives during season needs to be done. Do not add more bees to another area that is about to spread. This retains good bees and raise queens from best colonies.