DOON INTERNATIONAl SCHOOL,SRINAGAR
SUBJECT – Information technology
Assignment:II
Grade:IX
Chapter:-Basic ICT Skills -I

- ➢ The objective of this assignment is to make students acquainted with the Growing role and importance of ICT, will also learn about ICT tools.
- ➢ Basic components of a computer as well as the peripheral devices used in the computer system.
- ➢ Explains the role of operating system and also discuss the internet and its applications.

Role And Benefits Of ICT

ICT is known as information and communication technology which emphasis on imparting knowledge in the field of education. It helps individuals or institutions handle information by using computers and other digital technologies. ICT promotes usage of audio-visual equipment for imparting knowledge majorly at the school or college level. With the passage of time, ICT has proved to be an essential and basic step in the development of the modern society. In many countries, the learning of the concepts of ICT is considered as an important part of education. ICT has wide scope in various fields, such as education, health care, governance, design and manufacturing and business.

Benefits of ICT in education:
- The use of Computers in education domain has simplified the learning of students.
- By using ICT, teachers of primary and secondary schools have made the learning of students interactive and enjoyable.

Benefits of ICT in business:
- The data stored using ICT is accessible to everyone irrespective of geographical location.

- It provides quick and cost-effective communication, For example Video conferencing.

- Administrative costs have also reduced by linking various parties, such as insurers, consumers, service providers and financial institutions.

Benefits of ICT in health care:
- The use of ICT in the health care industry has given birth to a new concept i.e E-health.
- The process of scheduling tests through electronic and patient management systems has resulted in the radiation of the queues that would have been formed in hospitals.

BENEFITS OF ICT IN GOVERNANCE:
- ICT has helped in providing better response to people and effective management of services provided by the government.
- Use of ICT by governments has resulted in enhanced governance practices.

Benefits of ICT in design and Manufacturing:

- In CAD (Computer aided design), errors in design can be detected quickly, resulting in less time in manufacturing a product.
- The company can have bigger profit margins by using CAM (Computer Aided Manufacturing) is no labor cost.

Benefits of ICT in our daily life:

- We can read newspaper online
- We can book tickets or purchase any item by sitting at home.

ICT Tools

ICT tools help in the communication and broadcasting of information .E.g Radio and television help the people of the rural and urban areas to receive the news. Mobiles and tables are used for calling and conferencing purpose in our daily life.

Radio can prove to be a very useful tool in education as:

- It can be used in areas where there is no electricity, since it can operate on batteries.
- It can be used to listen to educational broadcasts by radio stations, even in remote areas.
- It is cheaper than other communication devices.

Components Of A Computer System

A computer is an electronic device which is used to perform a variety of operations on the basis of a set of instructions called program .The various components of a computer

are as follows the input unit, processing unit, the output unit and storage unit. All the components work together as a team. An input device takes input from the user and displays the result through an output device .The unit data processes the input to generate output is called processing unit. The unit that stores all the data and information of a computer system is known as storage unit. The physical components of a computer system such as Keyboard, Mouse and Monitor are termed as hardware. The programs or applications that provide instructions to a computer to carry out a particular task are knows as software .The additional parts, such as sound cards and headphone enhance the range of tasks that can be performed on a computer.

Input devices

The devices that let us enter a data or instructions in a computer are known as Input devices .

Keyboard :-A computer keyboard is like a typewriter. Besides the normal alphabets keys, It also has a numeric keypad to its right .The keyboard that we use is also known as the QWERTY/universal keyboard. Generally, keyboards are available in two models – Standard model with 83-84 keys and enhanced model with 101 or more keys. This model of the commonly used enhanced model windows keyboard contains 104 keys.

Mouse :- A mouse is a basic input device of a computer. It controls the Movement of the cursor or pointer on the display screen.

Joy stick :- A joy stick is hand held device that is used to control the movement of the cursor or other graphical elements in video games. It is normally used for playing a video game, where a user needs to move the pointer quickly across the screen. It is also used for drawing objects in Computer-Aided Design (CAD).

Scanner :- A scanner is an input device that scans images, printed text, or objects and converts them into a digital image. Instead of making a duplicate copy on a paper, the scanner stores the digital image in the computer memory.

Web camera:- is a device that is used to capture a real time image and provide the captured image on the computer of the other person (engaged in the communication).

Microphone:- is an input device that records voice or sound and transforms the recorded voice into digital data so that a user can play back or edit the digitized voice as required.

Bar Code Reader:- A Bar code reader is an input device that is used to read the information encoded on a bar code .The bar code reader is also known as a price scanner or point –of- scale (POS) scanner . A bar code is an optical machine readable code, which is printed on various type of products .It holds the necessary information about the product.

Light Pen:- A light pen is a pointing device that uses a photoelectric(light– sensitive) cell to indicate a position on the computer screen.

Output devices:- An output is an electronic equipment that is connected to a computer and is used to communicate results of the processed data to the user. Monitor is the most common output devices that is used to display the results of the processed data.

Monitor :- The term 'monitor' is often used to refer to a computer screen as it displays programs, allowing the user to interact with the software.
The following are the three types of monitors:
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- **Cathode Ray Tube (CRT):-** This monitor is heavy, thick and has a picture tube.

- **Liquid Crystal Display (LCD):-** An LCD monitor is one of the most widely used flat panel monitors. It is more popular as a display device as compared to the CRT monitor because of its economical power consumption, Thinness and high resolution.

- **Light Emitting Diode (LED):-** An LED monitor is one of the most widely used monitors nowadays. It uses the LED technology for generating images on the monitor screen. The ability of a standard LED monitor to consume up to 40% less power than a standard LCD monitor makes it more efficient to use.

Printer :- A printer is an output device that prints the data processed by a computer. After creating a document on a computer, you can send the document to the printer for printing. The printer generates a hard copy of the document known as a printout.

Plotter :- A plotter, similar to a printer ,produces a hard copy output. Plotters are generally more expensive than printers. Plotters are ideal for engineering, drafting and many other applications that require intricate graphics.

Speaker :- A speaker is an output device that produces sound .It receives sound in the form of an electric current from a sound card and then converts it into the sound format .

Memory:-
Memory is the area where we can store information .There are two types of memories in a computer system- primary memory or main memory and the Secondary memory .

Primary memory:- Primary memory is the main memory in a computer system where data is stored for quick access by the CPU. This type of memory stores the data temporarily. The CPU is associated with the following two types of memories:

Read-only Memory (ROM):- ROM is a built in computer memory containing data that normally can only be read but not changed .ROM contains the start up instructions for the computers .The data stored in ROM is not lost when the computer power is turned off.

RAM:-RAM is the main memory used in a computer system. It is an integrated circuit that enables you to access stored data in a random order. RAM stores instructions from the operating system, application programs and data to be processed, so that can be quickly accessed by the computer's processor.

Secondary Memory:- It is used to store the data permanently .The secondary memory is also knows as secondary storage. The storage capacity of secondary memory is measured in terms of Kilobytes(KBs),Megabits(MBs),Gigabytes(GBs) and Terabytes(TBs).

A **Compact Disc** is an optical media that is used to store digital data. CD's are categorized into the following types:
- **CD-ROM (Compact Disc-Read Only Memory):** A CD-ROM is an optical disc that is primarily used to store data in the form of text, images, audios and videos.
- **CD-R (Compact Disc-Recordable):** A CD-R has the ability to create CDs, but it can write data on the discs only once.
- **CD-RW (Compact Disc-Rewritable):** CD-RW (sometimes called Compact Disc-Erasable) is used to write data multiple times on a disc.

***Note :-** Prepare a Word document on various other storage devices (Floppy disc, Hard Disk, DVD, Blu-ray disc, Pen/thumb flash memory, Memory Stick)

OPERATING SYSTEM:-

Operating system is a system software that controls and manages the hardware or we can say that an OS enables a user to conveniently handle the computer and make the best use of its hardware .
- ➢ It performs the following basic and important operations in the computer:

- It recognizes the input entered by the user (such as key press or a mouse click)
- It displays the generated output on the computer screen .
- It keeps a log of the files and directories on the hard disk.
- It manages the various peripheral devices of the computer (such as printer and scanners)
- Some of the popular operating systems can be described as follows:

- **DOS:** DOS refers to Disk Operating System and is also known as MS-DOS. This operating system was developed by Microsoft for IBM-compatible personal computers.
- **Windows:** The term 'Windows' collectively represents all Microsoft OS products. Over the years, Microsoft has released various versions of Windows OS, such as Windows 95, Windows 98, Windows 7, Windows 8 and Windows 10.

- **UNIX:** UNIX is a multiuser and multitasking operating system, which means that it allows two or more users to execute several programs simultaneously. UNIX supports several interpreters and commands.

- **Linux:** Linux is a UNIX-based, freely distributable, open-source OS. Open source refers to a program whose source code is freely available on the Internet.

- **Mac:** Mac OS is GUI-based OS developed by Apple Inc. This OS was introduced for Macintosh operating systems with GUI ability.

- **Solaris:** It is a UNIX-based operating system that was originally produced by Sun Microsystems.

INTERNET:- The internet refers to a collection of a infinite number of computers spread across the world. It is the largest computer network (a group of interconnected computers that can interact with one another) in the world .The internet is also called a network of networks as it encompasses many small medium and large networks. The internet allows people to communicate with each other all over the world as compared to the traditional broadcasting media, it is a decentralized system, which means it has no centralized control. The interaction between two entities is not affected / observed by the third entity. Hence, each person who is connected to the internet can communicate with others and also publish his/her ideas freely on blogs, social forum, Chats and networking websites. The companies can advertise or sell their products online .Internet has also emerged as an important medium for imparting education .More and more schools and universities are now providing several online courses.

The applications of the Internet are as follows:

- **Surfing and Searching the Internet:** Surfing means moving from one website to the other using a Web browser. Searching the Internet means exploring various websites and Web pages on the Internet for the desired information.
- **Email:** It is an electronic letter that you can send or receive from any part of the world within seconds using the Internet.
- **Chatting:** Chat, as the name suggests, allows you to 'talk' real time through messages.

- **E-learning:** Electronic learning (e-learning) is the mode of acquiring knowledge by means of the Internet and computer based training programs.
- **E-commerce:** The concept of e-commerce is similar to commerce, which means transaction or exchange of goods and services. However, e-commerce differs from commerce because e-commerce involves selling and purchasing of commodities and services using a computer network, usually the Internet.
- **Entertainment:** You can use the Internet to play music, videos, and games online.

SOCIAL MEDIA:-

Social media plays an important role to bind such people and create a social circle for people who are very busy with their lifestyle. Social media are Internet-based technologies that facilitate the sharing of information, ideas, career interests and other forms of expression within virtual communities and networks.

The following are the different types of social media elements:

- **Social Network:** It is a convenient way to get to know people whose interests, opinions, and likes and dislikes are quite similar to yours.
- **Media-Sharing:** It lets you upload and share different media, such as videos, audios, or pictures.
- **Blogs:** A blog can be defined as a website or part of a website containing the thoughts and ideas of a user. It is written in the form of a continuous commentary on any subject.
- **Social News:** Social news is a platform that allows users to share different news items and also enable them to vote for these items. The news item that gets the maximum votes is displayed more prominently.
- **Social Networking Apps:** There are plenty of social networking apps available online which can be downloaded easily on mobile phones.

DIGITAL INDIA:-

The vision of Digital India is segregated into three subdivisions:

a. Infrastructure as utility to every citizen:
- To avail high-speed Internet in all gram panchayats.
- To provide digital identity having various characteristics, such as uniqueness, enduring, online and authenticity.
- To enhance the participation of mobile phones and bank accounts in digital and financial domains at a user level.

b. Governance and services on demand:
- To provide easy and single-window access to all persons through flawlessly integrated programs across departments or jurisdictions.
- To avail government services in real time by using online or mobile platforms.
- To avail easy access to all citizens on the cloud.

- To transform government services digitally in order to improve business.

c. Digital empowerment of citizens:
- To enhance universal digital literacy.
- To make all digital resources globally accessible.
- To avail all government documents/certificates on the cloud.

On the basis of understanding of chapter answer the following questions.

1.What are the benefits of ICT in the field of education?

2.What is a Pen drive? Explain the significance of using Pen drive in a computer

3.What are the different components of a hard disk?

4.Differentiate between the Linux and Unix .

5.Discuss the relation between Web pages and Websites.

Practical work:-.

- Using the internet connection, list three mobile operating systems being used today Submit a report on the evolution of mobile operating systems from their original to their latest developments used in market .Explain in depth which operating system is being preferred by the youth today and why .

Instructions:

- ➤ Students are to read and understand the chapter on their own before initiating to respond to the given assignment.
- ➤ The objective of this assignment is to make the students acquainted with;
- ➤ Basic ideas about the purity of the matter.
- ➤ How classification of matter is done.
- ➤ Descriptive knowledge of mixtures
- ➤ How solutions are are in the laboratory work.
- ➤ How separation of pure substances is one from impure substances

Pure substance:

A pure substance is a substance which is made up of only one kind of particles (atoms and molecules). For example compounds, NaCl is made up of Na & Cl atoms, therefore NaCl is a pure substance. Similarly, all other elements, C, H_2, N_2 etc are also pure substances.

Types of Pure Substances:

On the basis of chemical composition, pure substances are classified as:

Elements   and   compounds.

Elements:

- • According to *Antoine Laurent Lavoisier*, element is a basic form of matter that cannot be broken down into simpler substances by chemical reactions.

- • It is divided in three types which are metals, non-metals and metalloids.

Properties of Metals:

I.   They have lustre (shine).

II.   They have silvery-grey or golden-yellow colour.

III.   They conduct heat and electricity.

IV.   They are ductile (can be drawn into wires).

V.   They are malleable (can be hammered into thin sheets).

VI.   They are sonorous (make a ringing sound when hit).

• Examples of metals are gold, silver, copper, iron, sodium, potassium etc.

• Mercury is the only metal that is liquid at room temperature.

Properties of non-metals:

I.   They display a variety of colours.

II.   They are poor conductors of heat and electricity.

III.   They are not lustrous, sonorous or malleable.

• Examples of non-metals are hydrogen, oxygen, iodine, carbon (coal, coke), bromine, chlorine etc.

Metalloids:

Elements having intermediate properties between those of metals and non-metals are called metalloids. Examples are boron, silicon, germanium etc.

COMPOUND:

A compound is a substance which is made up of two or more elements combined chemically in a definite proportion by weight. For example: water is a compound of H_2 & O_2. It contains oxygen & hydrogen in a fixed ratio i.e. 1 : 8 or 2 : 16.

Depending upon the source of formation, compounds are of two types:

1. Inorganic compounds.
2. Organic compounds.

I.   Inorganic compounds: These compounds have been mostly obtained from non-living sources such as rocks and minerals. A few examples of inorganic compounds are: common salt, marble, washing soda, baking soda, carbon dioxide, ammonia, sulphuric acid etc.

II. Organic compounds: The word 'organ relates to different organs of living beings. Therefore, organic compounds are the compounds which are obtained from living beings i.e., plants and animals. It has been found that all the organic compounds contain carbon as their essential constituent. The organic compounds are quite often known as 'carbon compounds. A few common

examples of organic compounds are: methane, ethane, propane (all constituents of cooking gas), alcohol, acetic acid, sugar, proteins, oils, fats etc.

We have classified the chemical compounds based upon their source of origin. In addition to this, they have been classified as **acids, bases and salts** based upon their characteristics. For example, sulphuric acid, hydrochloric acid and nitric acid are the common acids. Sodium hydroxide, potassium hydroxide and calcium hydroxide are the well known bases. The list of salts includes sodium chloride, calcium nitrate, zinc sulphate etc. It may be noted that the salts are generally formed by the chemical combination of acids and bases dissolved in water. For example,

sodium hydroxide + hydrochloric acid ⟶ **sodium chloride + water**

Characteristics of a compound:-

I)   A compound is formed by the reaction of two or more elements in a definite ratio.
II)   Compounds are homogeneous i.e. consists of same kind of molecules & thus their properties are same throughout.
III) The components of a compound can't be separated easily by physical methods.
IV) The properties of a compound are entirely different from those of its constituent elements.
V)   Compounds have sharp melting & boiling points.

MIXTURE:

A mixture is a substance which consists of two or more elements or compounds in any   proportion which are not chemically combined together.

OR

A mixture is a substance in which two or more elements or compounds are simply mixed together in any proportion. There are two types of mixtures:

Homogeneous Mixtures:

A mixture is said to be homogeneous if the different constituents or substances present in it are uniformly mixed without any clear boundary of separation.

A homogeneous mixture has a uniform composition throughout and is also known as solution. A few examples of homogeneous mixtures are as follows

(a) When we dissolve a salt like sodium chloride or sugar in water, the solution formed is known as homogeneous mixture. The different constituents are so uniformly mixed that it may not be possible to identify them. This means that there is no

boundary of separation between them.

(b) Air is also a homogenous mixture of a number of gases like nitrogen, oxygen, carbon dioxide, water vapours, inert gases etc. All the gases present in air are uniformly mixed throughout. It is not possible to identify these gases

Heterogeneous Mixture:

A mixture is said to be heterogeneous, if it does not have a uniform composition and also has visible boundaries of separation between the constituents.

A few examples of heterogeneous mixtures are listed.

(a) A mixture of sand and common salt is regarded as a heterogeneous mixture. No doubt, these are present in the same phase i.e., solid phase but have clear boundaries of separation. The particles of sand and common salt can be easily seen in the mixture.

(b) A mixture of two immiscible liquids.

(c) Muddy water.

Characteristics of mixture:

1.   The constituents of a mixture are not present in any definite proportion.
2.   A mixture shows almost all the properties of its constituents.
3.   The components of a mixture can be separated by physical methods.
4.   The melting & boiling points of a mixture are not fixed.

SOLUTION-A Homogeneous Mixture:

A solution may be defined a homogeneous mixture of two or more pure non-reacting substances whose composition can be varied within certain limits.

For e.g., when sugar / salt is dissolved in water, a homogeneous mixture so obtained in water is called solution of sugar / salt in H_2O. .

Components of solution:

I. **Solvent (Dispersion medium):-** The component of solution which is present in larger proportion is known as solvent.

OR

It is the substance in which solute gets dissolved. E.g. water, ether, acetone, etc.

II. **Solute (Dispersed particles):-** *The component of solution which is present in small proportion is known as solute.*

OR

It is the substance which gets dissolved in solvent. E.g. NaCl, Sugar, etc.

Types of Solutions:

Solid, liquid and gas are the three phases in which substances are distributed. All of them can form homogeneous mixtures or solutions. This means that in a binary solution, any of these can act as the solvent or solute. Nine different types of binary solutions are possible. These have been further divided into three types depending upon the nature of the substance acting as the solvent.

A. The three types of solutions based upon the solvent are:

1. **Solid solutions**: *In these, solid acts as the solvent.*

2. **Liquid solutions**: *In these, liquid acts as the solvent.*

3. **Gaseous solutions**: *In these, gas acts as the solvent.*

B: Types of Solutions based upon the nature of solvent / amount of solute present:

1. **Aqueous solution**: - *When water is used as a solvent to prepare a solution, the solution so obtained is called aqueous solution e.g. sugar in water, salt in water etc.*
2. **Non- aqueous solution:** - *When   a liquid other than water is used as a solvent to prepare a solution, the solution so obtained is called non- aqueous solution. Iodine dissolved in CCl_4, sulphur dissolved in CS_2, sugar dissolved in alcohol etc.*
3. **Saturated solution**: - *A solution in which the maximum amount of solute is dissolved at a particular temperature is called a saturated solution.*
                                        OR

           It is a solution in which no more solute can be added at a fixed temperature.

4. **Unsaturated solution:** - *A solution in which more solute can be dissolved at any particular temperature is called unsaturated solution.
    A solution which contains solutes more than the saturation level is called supersaturated solution.*

SOLUBILITY:

The maximum amount of a solute which can be dissolved in 100 ml of a solvent at a particular temperature is known as the solubility of that solute. E.g, the

solubility of NaCl in H_2O is 36 g at 293 k. It means 36 g of NaCl can be dissolved in H_2O at 293k (20^0C).

Effect Of Temperature On The Solubility Of A Salt In Water:

Whenever we talk about the solubility of a salt, the temperature at which the process of dissolution is carried is always mentioned. This means that the solubility of salts in solvents (generally water) is influenced by the change in temperature. Actually, the effect of temperature depends upon the heat energy changes which accompany the process.

➢ If heat energy is needed or absorbed in the process, it is of **endothermic nature.**

➢ It heat energy is evolved or released in the process, it is of **exothermic nature.**

✓ Effect Of Temperature On Endothermic Dissolution Process:

Most of the salts like sodium chloride, potassium chloride, sodium nitrate ammonium chloride etc. dissolve in water with the absorption of heat. It is up to us to separate the ions from these salts which later on dissolve in water. In these salts, the solubility increases with rise in temperature. This means sodium chloride becomes more soluble in water upon heating.

✓ Effect Of Temperature On Exothermic Dissolution Process

Only a few salts like lithium carbonate, sodium carbonate monohydrate, cerium sulphate etc. dissolve in water with the evolution of heat. This means the process is of exothermic nature. In these salts, the solubility in water decreases with rise in temperature.

Characteristics of a true solution:-

1. A true solution is homogeneous in nature.
2. The size of solute particles is very small. It is less than 1nm. (1nm = 10^{-9}m)
3. The solute particles of a true solution can't be separated by filtration.
4. In case of true solution the solute particles don't settle down.
5. A true solution is clear and transparent.
6. A true solution does not scatter beam of light. Due to the very small size, the solute particles in a solution do not scatter the beam of light if made to pass through it. This means that the path of the light is not visible in a solution.
7. A saturated solution generally becomes unsaturated upon heating.

SUSPENSIONS:

A suspension is a heterogeneous mixture in which fine solid particles are dispersed throughout the medium without dissolving in it. E.g. when chalk powder is put into water in a beaker, a milky suspension of chalk in H_2O is obtained. The particle size in suspensions is larger than 100nm.

Properties Of Suspension:

1. *A suspension is heterogeneous in nature.*

2. *The particle size of a suspension is more than 100nm.*

3. *The particles in a suspension can b seen with naked eyes and also under microscope.*

4. *The solid particles in suspension can easily be separated by ordinary filter papers.*

5. *The particles of a suspension are unstable. The settle down after sometime under the influence of gravity when the suspension is kept undisturbed. This is known as* **precipitate**.

Colloidal Solution:

A colloidal solution is a heterogeneous mixture in which particles are dispersed in a continuous dispersion medium. The continuous, medium (solvent) in a colloid is known as **'dispersion medium'** *and the particles forms the* **'dispersion phase'**. *The particles of dispersed phase are known as* **colloidal particles**. *Colloidal solutions are also known as* **sols**. *They are called* **hydro sols**, *if the dispersion medium is water.*

Most of the substances that we use are colloidal in nature. E.g. vegetables, milk, blood, juices, bread , jelly, toothpaste etc.

Types Of Colloidal Solutions:

We know that the colloidal solutions are the heterogeneous mixtures. This means that the constituents are not present in a single phase.

Actually there are two phases in a colloidal solution. These are known as dispersed phase and dispersion medium.

The component present in smaller proportion is the dispersed phase while the one present in greater proportion is the dispersion medium. *Based upon the dispersed phase and dispersed medium, colloids are of eight types:*

S.No	Disperse Phase	Dispersed Medium	Name of the Colloidal solution	Examples

1	Gas	Liquid	Foam	Soap leather, whipped cream
2	Gas	Solid	Solid foam	Pumice stone, rubber, bread
3	Liquid	Gas	Aerosol	Mist , fog cloud
4	Liquid	Liquid	Emulsion	Milk ,tonic in liquid form
5	Liquid	Solid	Gel	Jelly , butter, cheese
6	Solid	Gas	Aerosol	Smoke ,dust storm
7	Solid	Liquid	Sols	Paints , gold sol
8	Solid	Solid	Solid sol	Alloys ,gem stones

Properties of Colloidal Solutions or Colloids:

The important properties of colloidal solutions are briefly discussed.

1. **Colloidal solutions appear to be homogeneous but are actually heterogeneous in nature.**

   This happens because of particle size (1 nm to 100 nm) which is quite close to particles in true solution. We cannot see the particles in a colloidal solution as such with our naked eyes.

2. **Colloidal solutions are a two phase system.**

   We have discussed above that the colloidal solutions represent a two phase system. These are dispersed phase and dispersion medium. That is why; the colloidal solutions are of heterogeneous in nature.

3. **Colloidal particles pass through ordinary filter papers.**

   In most of the cases, the colloidal solutions pass through ordinary filter papers like true solutions. This is because of the fine size of the dispersed phase or colloidal particles. However they cannot pass through an animal membrane such as parchment membrane or goat skin which is of semi permeable nature. It allows only the particles of the dispersion medium to pass but not the colloidal particles or the dispersed phase.

4. **Colloidal particles carry charge.**

We know that the dispersed phase particles in a colloidal solution remain dispersed or suspended. They do not come close to one another as in case of suspension. This happens due to the presence of some charge (positive or negative) on these particles. Please remember that all the particles belonging to a particular colloidal solution carry the same charge. That is why; these similarly charged particles repel each other and remain dispersed or suspended.

5. **Particles in a colloidal solution follow zigzag path.**

It is normally not possible to see the colloidal particles because of their small size. However, their path can be seen under a microscope. These particles follow a zigzag path. You can observe this motion while watching a film in a theatre. The beam of light which falls on the screen from behind has dust particles present in it. They follow zigzag path. Such type of movement of the colloidal particles was noticed for the first by *Robert Brown*, an English scientist in 1828.This is known as Brownian-Movement.
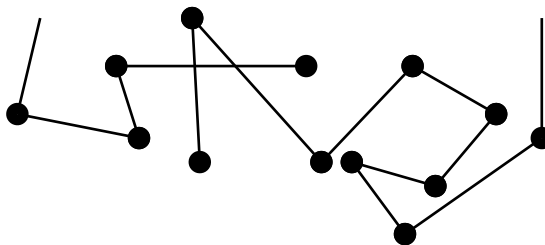
6. **Colloidal solution scatters the beam of light passing through it.**

When a beam of light from a certain source is focused or passed through a colloidal solution kept in the dark, its path becomes visible while passing through the solution. Along with this, the colloidal particles can also be seen following a zig-zag path. But it does not happen when the same beam is passed through a true solution (e.g, sodium chloride solution). Actually, the particles present in a colloidal solution have size big enough to scatter or disperse the light rays present in the beam as they fall on them. As a result, these rays as well as the colloidal particles become visible.

7. Colloidals solutions in which only liquids participate are known as emulsions.

Applications of Colloidal Solutions:

The field of colloids is so vast that it may not be possible to describe the same to this level of the students. Similarly, the colloidal solutions have wide range of applications. Only a few out of these are discussed to generate some interest about

this field.

1. **Bleeding from a fresh cut can be immediately stopped by applying alum or ferric chloride.**

   Blood consists of hemoglobin which are charged colloidal particles. Both alum and ferric chloride are salts and dissolve in water to provide ions. As they come in contact with blood they neutralize the charge on the colloidal particles. In the absence of charge, blood becomes thick and bleeding stops.

2. **Medicines in colloidal form can be easily absorbed by the body.**

   Mostly medicines, particularly antibiotics and B-complex etc. are in the form of colloidal dispersions or emulsions. These are readily absorbed in the intestines.

3. **Soaps clean dirty clothes due to the formation of colloidal solutions.**

   Clothes initially become oily because of perspiration coming out of the pores of the body. When dust particles and organic matter suspended in air come in their contact, they become dirty. Now ordinary water cannot remove oil (non-polar) because oil cannot dissolve in water (polar solvent). Soap helps in forming an emulsion between water and oil drops carrying dust. As a result, these are removed from the clothes and they get washed.

4. **Delta is formed when river water comes in contact with sea water for a long period.**

5. **Sky appears to be blue in colour.**

   When we look at the sky, it appears to be blue in colour. It is for your knowledge that there is no blue colour as such in the sky. Actually, fine particles of dust etc. are always present in the atmosphere. When sun light falls on these particles, they scatter light with a blue colour or tinge. That is why sky is blue.

Application of colloids:

1. **In food items:** *Most of the food items that we eat are colloidal in nature. Eg. Milk is an emulsion of butter fat in water, protected by casein (milk protein).*
2. **In medicine:** *A large no. of medicines and pharmaceutical preparations are colloidal in nature. For e.g. Antibiotics like penicillin and streptomycin are produced in colloidal form suitable for injections.*
3. **In paints:** *All paints are colloidal dispersions of solid pigment in liquid*

medium.

4. **Purification of water:** *Water obtained from natural resources often contains some colloidal particles. This water is treated with alum which causes colloidal particles to precipitate. These particles settle at the bottom, leaving the water clean.*

Some terms associated with colloids:

1. **Brownian movement:** *When a colloidal solution is examined under an ultra microscope, the colloidal particles appear to be in a state of haphazard or zig-zag motion. This zig-zag motion of colloidal particles is known as Brownian movement.*
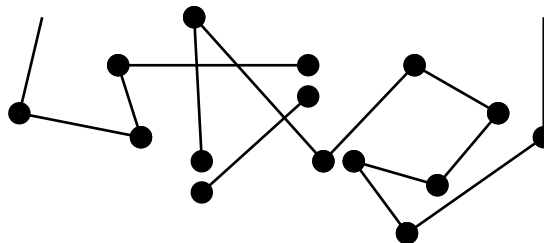
Fig: Brownian movement of col. particles.

2. **Tyndall effect:-** *If a strong beam of light is focused on a colloidal solution in a dark room, the path of light becomes visible. This phenomenon is known as Tyndall effect. It occurs due to scattering of light by colloidal particles.*
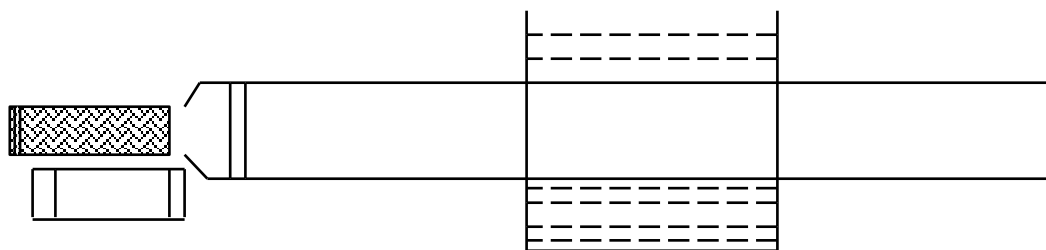
Beam of light   Beam of light visible due to scattering of light

Torch

Ferrous sulphate solution (Light invisible)

Milk (Light visible)
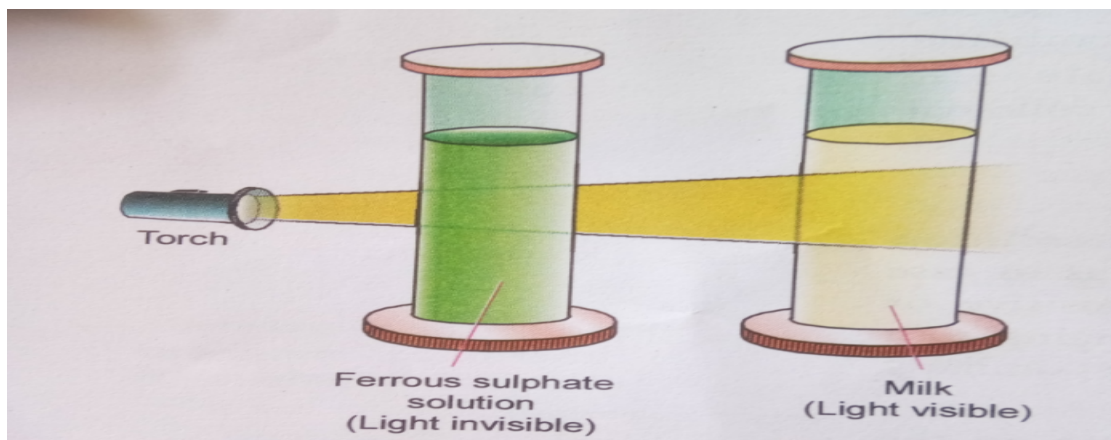
3. **Electrophoresis**: *The movement of colloidal particles under the influence of electric field is known as electrophoresis. The reason behind this movement of colloidal particles is that they are electrically charged; they may either have positive (solution of Fe (OH)$_3$) or negative charge (solution of AS_2S_3 – Arsenic sulphide)*

PHYSICAL CHANGE:

A change in which no new substances are formed and only physical properties of a substance get changed while its chemical composition remains the same is known as a physical change e.g. melting of ice, glowing of electric bulb, breaking of glass etc.

Important Characteristics Associated With Physical Changes Are Listed:

1.   A physical change involves a change in the physical state of a substance by changing the temperature or pressure.

2.   There is no change in the composition of the substances during the physical change.

3.   The substances undergoing physical change don't change their main characteristics.

4.   No new substance is formed during a physical change.

5.   The change is temporary and can be reversed by reversing the conditions which bring about the change.

6.   No energy change normally occurs during a physical change.

CHEMICAL CHANGE:

A change in which new substances are formed and chemical composition and chemical properties of the reacting substances undergo a permanent change is known as chemical change It is followed by the evolution of energy (e.g. heat, light, sound) etc. e.g. Rusting of iron, combustion of fuel, burning of candle, curdling of milk etc.

 For example,

Silver nitrate + sodium chloride ⟶ silver chloride + sodium nitrate
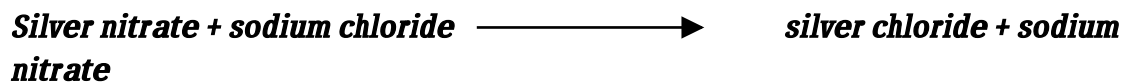
Important characteristics associated with chemical changes are listed:

1. As a result of chemical change, the physical state of the substance may or may not change.

2. There is always a change in the chemical composition of the substances undergoing chemical changes.

3. There is also change in characteristics of the substances involved in these changes.

4. New substances are always formed during chemical changes.

5. The chemical change is of permanent nature and cannot be easily reversed.

6. Energy changes always occur n the chemical reactions responsible for these changes.

Physical Change	Chemical Change
It brings about change in physical properties such as physical state, shape, size etc. .	It brings about changes in chemical properties
No changes in chemical compositions are observed.	Changes in chemical properties are observed
It is reversible	It is irreversible that means permanent
No new substance is formed.	New substance is formed.

Ways Of Expressing The Concentration Of Solution:

The concentration of a solution is the amount of solute present in a definite amount of

solution. There are two ways through which we can express the concentration of solutions.

1. **Mass percentage or percentage by weight**: It is defined as the no. of parts by mass of the solute per hundred parts by mass of the solution. Mathematically, we can express it as :

$$\text{Mass Percent} = \frac{\text{Mass of Solute}}{\text{Mass of Solution}} \times 100$$

If A and B are the two components of a binary solution, and W_A and W_B be their respective masses:

$$\text{Mass percent of A} = \frac{W_A}{W_A + W_B} \times 100$$

$$\text{Mass percent of B} = \frac{W_B}{W_A + W_B} \times 100$$

2. **Percentage by volume**: It is defined as the no. of parts by volume of the solute dissolved in 100 parts by volume in the solution. Mathematically, it is expressed as

$$\text{Percentage by volume} = \frac{\text{Vol. of Solute}}{\text{Vol. of Solution}} \times 100$$

If A and B are the two components of a binary solution, and V_A and V_B be their respective masses, then

$$\text{Volume percent of A} = \frac{V_A}{V_A + V_B} \times 100$$

$$\text{Volume percent of B} = \frac{V_B}{V_A + V_B} \times 100$$

EXAMPLE: *A solution has been prepared by dissolving 5 g of urea in 95 g of water. What is the mass percent of urea in the solution?*

Solution: **Mass percent (Mass %)** = $\dfrac{\text{Mass of solute}}{\text{Mass of solution}}$ X 100

Mass of urea = 5 g, Mass of water = 95 g

Mass of solution = (5 + 95) = 100 g.

Mass percent of urea = $\dfrac{5g}{100g}$ X 100 = 5%

EXAMPLE: *A solution contains 5 mL of alcohol mixed with 75 mL of water. Calculate the concentration of the solution in terms of volume percent.*

Concentration of solution = $\dfrac{\text{Volume of solute}}{\text{Volume of solution}}$ X 100

Volume of alcohol = 5 mL

Volume of solution = (5 + 75) = 80 mL

Concentration of solution = $\dfrac{(5\ mL)}{(80\ mL)}$ X 100 = 6-25%

Methods of separating mixtures:

- ✓ **Sedimentation and Decantation:**-*The process of allowing the insoluble solid component of a mixture to settle down at the bottom of container is known as sedimentation while as the process of separating an insoluble solid from a liquid by allowing the solid to settle and pouring off the liquid is known as decantation.*

✓ **Crystallization**

• Used to remove impurities from solid and purify it.

• It separates a pure solid from mixture in the form of crystals.

• This process is used in purification of salt from sea water, separation of crystals of alum from impure samples.

• It is better method than evaporation because:

(i) Solids decompose or some, like sugar, may get charred on heating to dryness.

(ii) Some impurities may remain dissolved in the solution even after filtration. On evaporation these contaminate the solid.

Separation of cream from milk

• The process of centrifugation is used to separate the cream from milk. It is a method of separating the suspended particles of substance from a liquid.

• This process is carried out by the machine called centrifuge.

• Sometimes, the solid particles in a liquid are very small and pass through a filter paper. For such particles the filtration technique cannot be used.

• The mixture is rotated rapidly so that the heavier particles in the mixtures settle down to the bottom.

• The basic principle of centrifugation is that the denser particles are forced to the bottom and the liquid being lighter remains at the top.

Steps of separating cream from milk:

• Take some full-cream milk in a test tube.

• Centrifuge it by using a centrifuging machine for two minutes.

Application of centrifugation:

• Used in diagnostic laboratories for blood and urine tests.

• Used in dairies and home to separate butter from cream.

• Used in washing machines to squeeze out water from wet clothes.

✓ **Filtration**

The process of separating insoluble solid that is present in the form of small particles from a liquid with the help of filter paper is known as filtration.
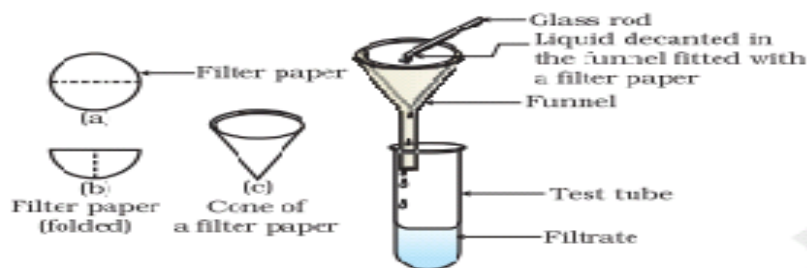
✓ **Evaporation**

The process of separating dissolved material from a solvent by heating the mixture is known as evaporation. The logic behind this process is that liquids vaporize easily than solids. So, liquid evaporates quickly and solute is left behind as solid residue.

Obtaining coloured components from blue/black ink

Process of evaporation is used to obtain coloured components from blue/black ink. The process of evaporation is used to separate a substance which is dissolved in water.

• It is based on the fact that liquid vaporises easily than the solid.

• Helps in separating volatile substances from non-volatile substances.

Steps of obtaining coloured components from blue/black ink:

• Fill half a beaker with water.

• Put a watch glass on the mouth of the beaker.

• Put few drops of ink on the watch glass.

• Now start heating the beaker. We do not want to heat the ink directly. You will see that evaporation is taking place from the watch glass.

• Continue heating as the evaporation goes on and stop heating when you do

*not see any further change on the watch glass.*
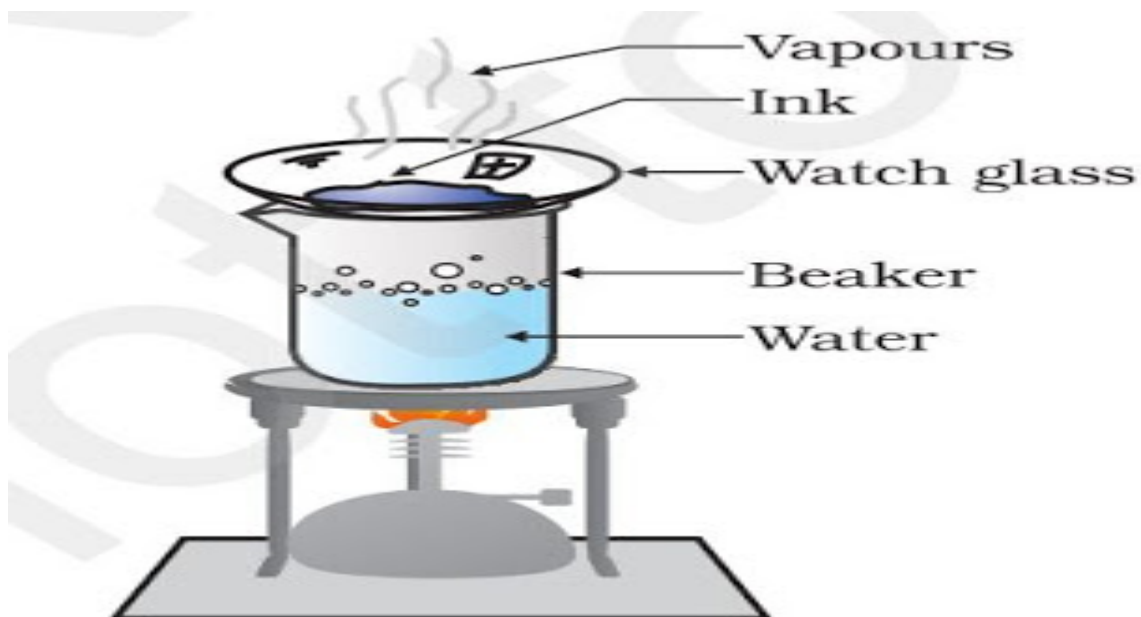
- ✓ **Dissolution followed by filtration**: *It is the process of separating two solid materials from a mixture (salt, sand, in water) where one solid is soluble (NaCl) in solvent and other (sand) is insoluble in that liquid.*
- ✓ **Distillation**: *It is the process of converting a liquid into vapours and then cooling the vapours and then collecting the liquid in the form of distillate.*

$$\textbf{Liquid} \quad \underset{\textit{Cooling}}{\overset{\textit{heating}}{\rightleftharpoons}} \quad \textbf{vapours}$$
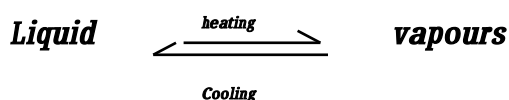
The process of distillation is used to separate mixtures having liquids with different boiling points

• Used for separation of components of a mixture containing two miscible liquids that boil without decomposition and have sufficient difference in their boiling points.

*• Mixture of acetone and water is separated by this method.*
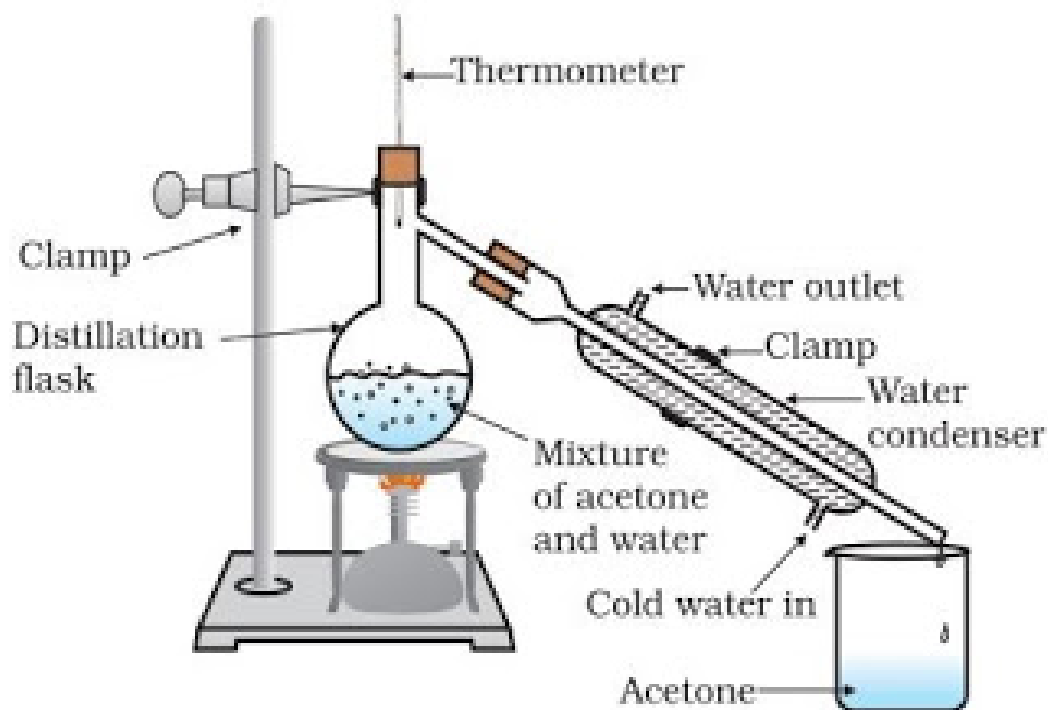
Separation of two miscible liquids by distillation

✓ **Fractional distillation:**

It is a process used for the separation of a mixture of two or more liquids that have different boiling points at controlled temperatures. E.g. using fractional distillation, we can separate a mixture of two miscible liquids like benzene whose boiling point is 80^0 C and toulene whose boiling point is 110^0 C.

• Fractional distillation is used to separate a mixture of two or more miscible liquids for which the difference in boiling points is less than 25 K.

• It used to separate a gas from the air.
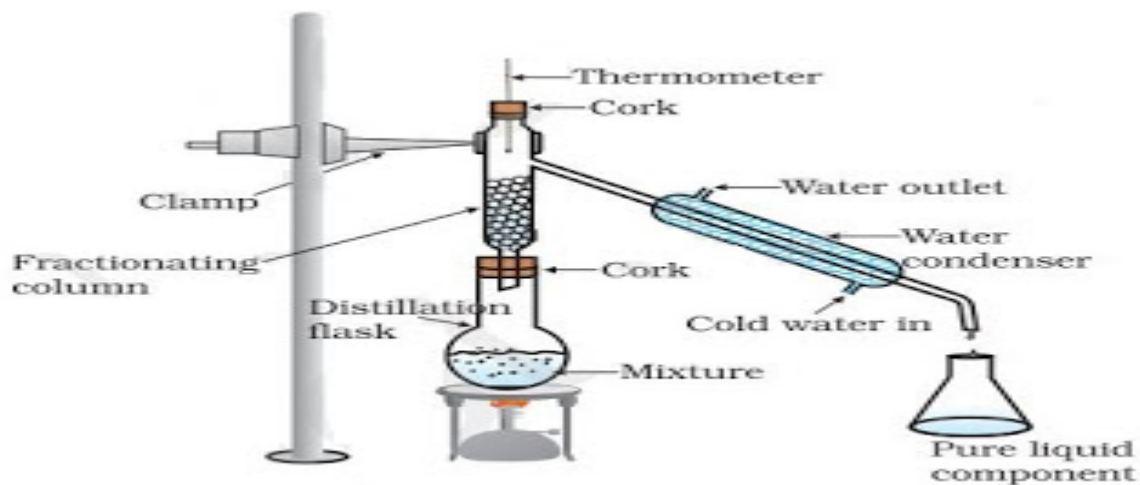
Separating the components of air

• Air is a homogeneous mixture and can be separated into its components by fractional distillation.

Below is diagram which shows the steps of separation of air.

• The air is compressed by increasing the pressure and is then cooled by decreasing the temperature to get liquid air.

• The liquid air is warm-up slowly in a fractional distillation column, where gases get separated at different heights depending upon their boiling points.
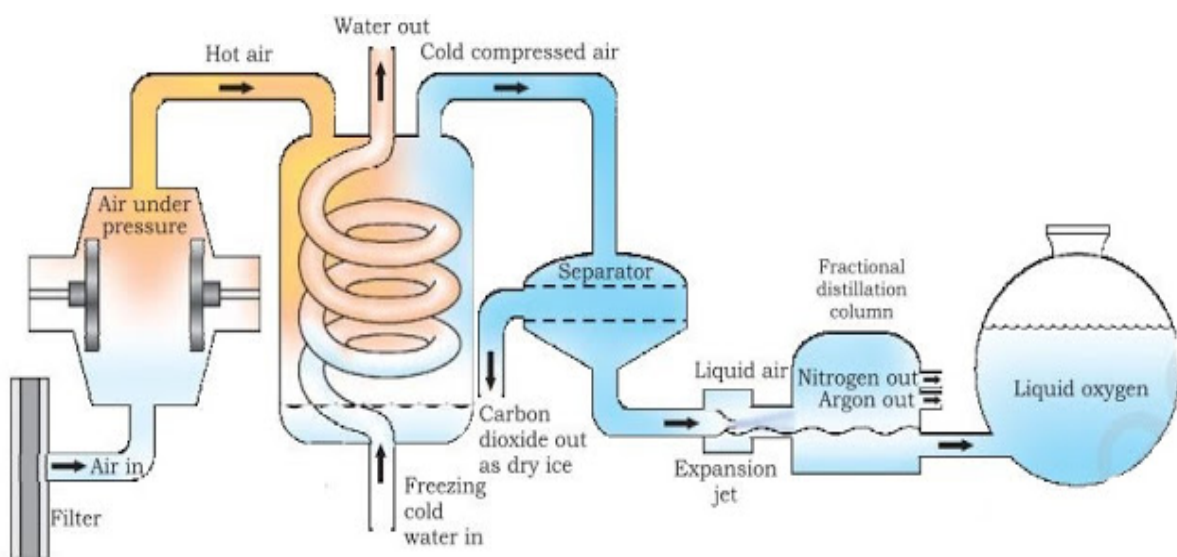

Separation of components of air

✓ **Sublimation:**

  It is a process in which a solid directly changes into gaseous state without passing through liquid state. This method of separation of mixtures is used to separate two solids from a mixture, one of which undergoes sublimation like Iodine, Ammonium chloride, Camphor, naphthalene, Anthracene, etc.

Separation of ammonium chloride and salt by sublimation
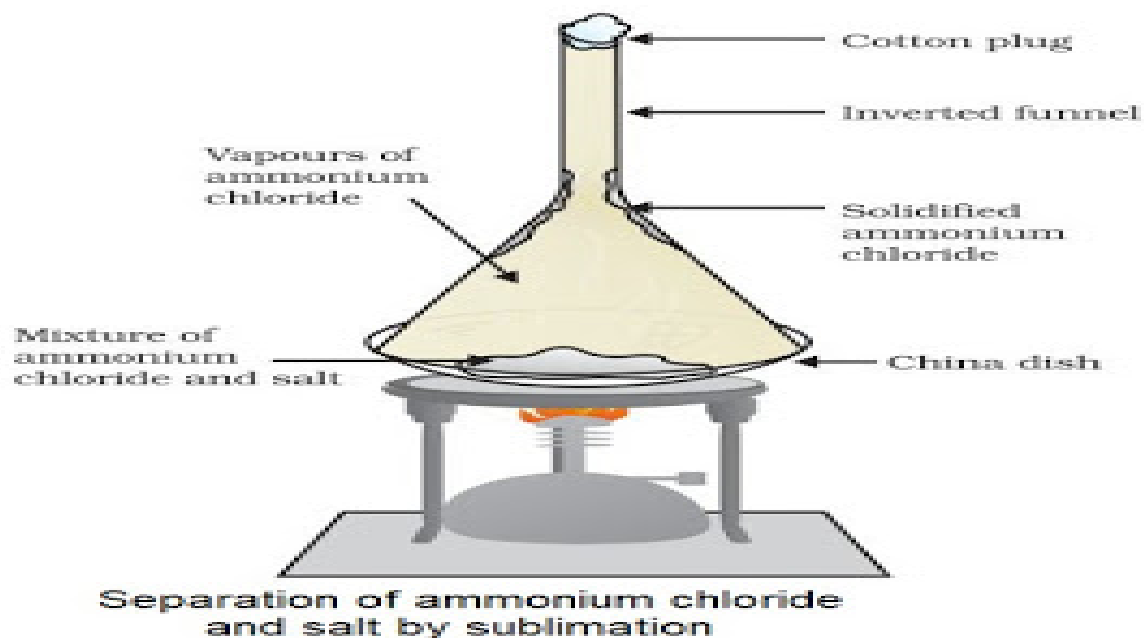
✓ **Paper chromatography:**

  It is a technique used for the separation of a mixture which contains two or more solids in very small quantities brought about by distribution of dissolved material (solids) between two immiscible phases, one of which is mobile phase and the other is stationary phase. It is mainly done by the flow of solvents on a filter paper called **whatman chromatographic paper**. It can be used to separate a mixture of blue and red ink, mixture of D-glucose, D- xylose and lactose, pigments of flowers etc.
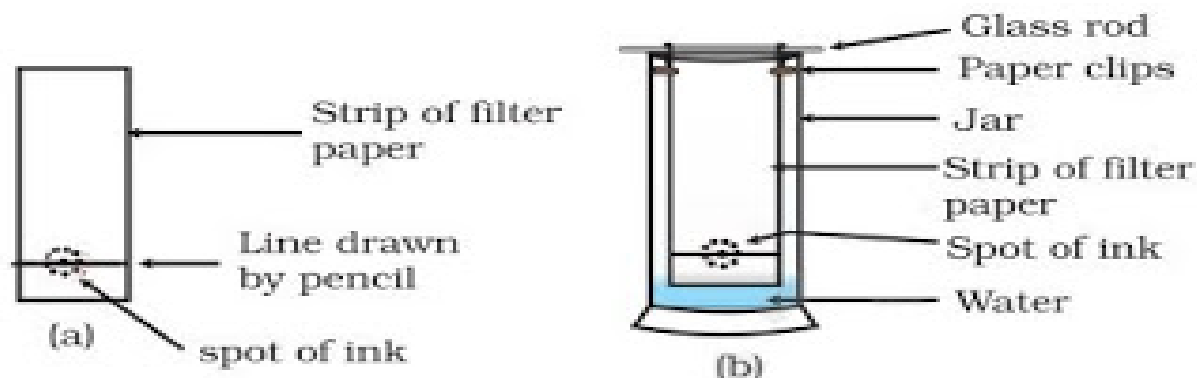
Separation of dyes in black ink using chromatography

Applications:

To separate

• colours in a dye.

• pigments from natural colours.

• drugs from blood.

✓ **Separation using separating funnel:**

This method of separation is used to separate a mixture of two liquids, which are completely immiscible for example, carbon disulphide and alcohol, water and oil are immiscible liquids. Separating two immiscible liquids

• The separation of two immiscible liquid is carried out by the use of funnel.

• The basic principle involve is the difference between the densities of two liquids form two separate layers.

Steps of separating kerosene oil and water.

• Pour the mixture of kerosene oil and water in a separating funnel.

• Let it stand undisturbed for sometime so that separate layers of oil and water are formed.

• Open the stopcock of the separating funnel and pour out the lower layer of water carefully.

• Close the stopcock of the separating funnel as the oil reaches the stop-cock.

Application of funnel:

• To separate mixture of oil and water.

• In the extraction of iron from its ore, the lighter slag is removed from the top by this method to leave the molten iron at the bottom in the furnace.
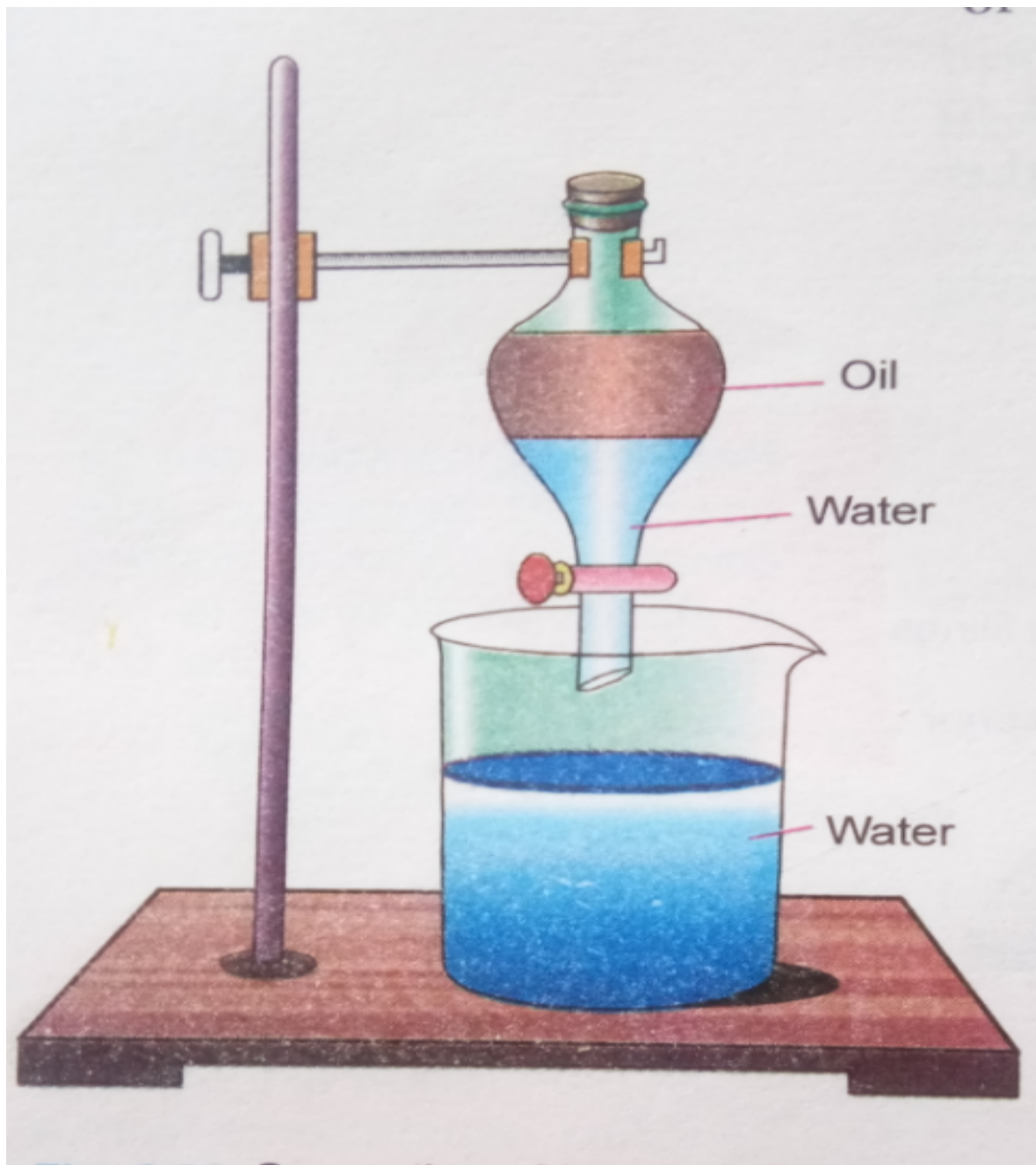
QUESTIONS FOR PRACTICE:

1. How Tyndall effect can be observed in the canopy of a dense forest.

2. What volume of ethyl alcohol and water must be mixed together to prepare 250 ml of 60% by volume of alcohol in water.

3. Sea water can be classified as homogeneous as well as heterogeneous mixture.' Comment.

4. Explain why particles of a colloidal solution do not settle down when left undisturbed, while in the case of a suspension they do.

5. A solution contains 50 g of sugar in 350 g of water. Calculate the concentration of solution in terms of mass by mass percent of the solution.

6. What is tincture of iodine? Identify the solute and solvent in it.

7. When is a solution said to be saturated? How can you change an unsaturated solution to a saturated solution without adding any more solvent to it?

8. Smoke and fog are aerosols. How do they differ from each other?

9. What is Tyndall effect? Why the solution of copper sulphate does not show Tyndall effect?

10. State the separation technique used for the separation of the following.

   A. Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.

   B. Copper sulphate from its solution in water.

DOON INTERNATIONAL SCHOOL,SRINAGAR .

SUBJECT: ENGLISH

Assignment:II

Grade:IX

- ➢ The objective of this assignment is to make the students get acquainted with the following ideas:
- Life is a challenge.
- The healing power of nature.
- Usage of modals.

Poem: Rain on the Roof. (Beehive)

About the Poet:

Coates Kinney (November 24, 1826 – January 25, 1904) was an American lawyer, politician, journalist and poet who wrote Rain On The Roof.

Introduction to the Poem:

From the title of the Poem 'Rain on the Roof', we can make out that the poem is about the rain. The poet is telling us about the memories he has of the rain. The sound of the raindrops falling on the roof of his house brings back sweet memories of the past.

Stanza-wise Explanation:

Stanza 1

The poet is saying that when the humid shadows hover (here, 'humid shadows' refers to dark clouds which are full of water), The poet is saying that when the sky is full of these clouds which are moisture and are full of water and are about to bring rain, when such clouds hover around in the sky, over all the starry spheres ('starry spheres' refers to the sky at night time which is full of stars).At that time, huge clouds which are full of moisture, move around in the sky and the sad darkness of the night is wiped off by the raindrops which seem like tears falling from the sky. The poet is comparing rain drops to tears and he says that the dark sky which seems to be very sad, it appears as if it is crying and the raindrops are the tears shed by it. He adds that it is a like a blessing to lie on the bed in his room (Cottage chamber means bedroom) and listen to the sound made by raindrops falling on the roof.

Literary Devices:

Rhyme scheme of this stanza: abcbdefe

1.Alliteration: It is the repetition of speech sounds in a sequence of nearby words. In this stanza the 'h' sound is repeating 'Humid Hover', 'starry spheres' 's' sound is repeating, press pillow' 'p' sound is repeating and 'lie listening' 'l' sound is repeating.

Onomatopoeia: It is the process of creating a word that phonetically imitates, resembles, or suggests the sound that it describes. In this stanza 'Patter' is the use of sound word. It is the sound made by the rain drops falling on the roof top.

Personification: A figure of speech in which an inanimate object or an abstract concept is spoken as though it were endowed with life or with human attributes or feeling. In this stanza, darkness has been personified when he says that it is sad.

Transferred Epithet: It is the use of an adjective with a noun when it refers to another noun. In 'melancholy darkness', the darkness is not melancholy, but it refers to the sad people.

Stanza 2

The poet is expressing his feelings when he hears the raindrops falling on the roof top of his house. He says that every tinkle on the shingles has an echo in the heart. Whenever he hears rain falling on the roof top, the sound repeats in his heart and in his dreams, he has many different, fanciful imaginations. He adds that this sound of the rain falling on the roof top creates many new different dreams in his mind. He recollects many memories of the past which come back into his mind as dreams. So, he says that as he listens to the patter of the rain upon the roof, he has many new dreams in his mind and the memories of the past that come back in the form of dreams.

Literary Devices:

Rhyme scheme of this stanza: abcbdefe

1.Alliteration: It is the repetition of speech sounds in a sequence of nearby words. In this stanza the
'busy being' - 'b' sound is repeating
'their thread' - 'th' sound is repeating
'rain roof' - 'r' sound is repeating
Onomatopoeia: It is the process of creating a word that phonetically imitates, resembles, or suggests the sound that it describes. In this stanza 'tinkle', 'patter' – sounds made by the raindrops
Personification: A figure of speech in which an inanimate object or an abstract concept is spoken as though it were endowed with life or with human attributes or feeling. In this stanza, recollection is personified when he says that they weave dreams.
Transferred Epithet: It is the use of an adjective with a noun when it refers to another noun.
'dreamy fancies' – it does not mean that the fancies are dreamy but refers to the people who have dreams.

Stanza 3

Here, the poet introduces his mother. He says that he is dreaming of his mother. As he had told in the previous stanza that rain brings memories of the past – it is the memory of his mother who is no longer alive. In the past, she used to love him a lot, she used to consider him a darling and she would let him sleep till day break and have sweet dreams. The poet can still feel that his mother is looking at him as he listens to the song made by the rain drops falling on the roof top of his room. The sound of the rain makes him correlate

his past with his present. That is why the poet is moved by the sound of the rain drops on the shingles of his room. Whenever he hears this sound it brings back memories of the past and he is reminded of his mother.

Literary Devices:

Rhyme scheme of this stanza: abcbdefe

Alliteration: It is the repetition of speech sounds in a sequence of nearby words. In this stanza the 'memory my mother' - 'm' sound is repeating, 'Darling dreamers' - 'd' sound is repeating.

Onomatopoeia: It is the process of creating a word that phonetically imitates, resembles, or suggests the sound that it describes. In this stanza 'patter' – sound of raindrops falling on the shingles of the roof.

Note: **'Thinking about the poem' to be done by the students themselves on their classwork notebook.**

Poem: The Lake Isle of Innisfree (Beehive).

About the Poet:

William Butler Yeats was born in Ireland in 1865, he published his first works in the mid-1880s. His early accomplishments include 'The Wanderings of Oisin and Other Poems' (1889) and such plays as 'The Countess Cathleen' (1892) and 'Deirdre' (1907). In 1923, he was awarded the Nobel Prize for Literature. He went on to pen more influential works, including 'The Tower' (1928) and 'Words for Music Perhaps and Other Poems' (1932). Yeats died in 1939, he is been remembered as one of the leading Western poets of the 20th century.

Introduction to the Poem:

This poem is a lyric. It is a musical poem. It explores the poet's longing for the peace and tranquility of Innisfree, a place where he spent a lot of time as a boy. Innisfree is the name of a place. It is a very quiet place and that is the reason the poet wants to go there. He had spent his childhood in this place. He has very sweet memories of that place, that is why he wanted to go back to the lake island of Innisfree.

Stanza-wise Explanation:

Stanza 1

'I' here refer to the poet William Butler Yeats. He says that he wants to go to Innisfree. Over there, he will build a small room for himself with clay and small sticks which are used to make the walls or the fences of the cabin. As he will need some food to eat also, so he will grow nine rows of beans near his room. Also, he will get the honey from the honey bee hive. He says that the open space, where he will build his room will be full of the buzzing sound of the bees and over there he will live all alone, in peace and tranquility.

Literary Devices:

Rhyme Scheme of this stanza: abab

Alliteration: It is the repetition of speech sounds in a sequence of nearby words. In this stanza the 'hive', 'honey bee' - 'h' sound is repeated;

Repetition: It consists of repeating a word, phrase or sentence. 'I will arise and go now' is repeated in stanza 1 and 3.

Stanza 2

In this stanza the poet says that when he will be in Innisfree, he will feel peaceful, and he says that the feeling of peace is felt slowly and gradually. He describes how he would feel peaceful. In the morning time, when it is cloudy, and the view is not very clear, then it will appear as if the morning has worn a veil and has hidden itself. Looking at this scene will make him feel peaceful. Further he says that when the male cricket insect will sing a song, that sound will bring him peace. Also, at midnight when he will see the twinkling stars in the open sky, their shine will give him peace. In the afternoon, when the sun light will give a purplish glow, it will also give him peace. During the evening, when he will see the linnet bird flying in the sky, then also he will feel peaceful.

Literary Devices:

Rhyme Scheme of this stanza: abab

Personification: A figure of speech in which an inanimate object or an abstract concept is spoken as though it were endowed with life or with human attributes or feeling. In this stanza 'morning' is personified.

Stanza 3

In this stanza the poet says that now he will stand up and go to Innisfree because all the time, the sound of the lake waters striking the shore repeats in his mind. This sound attracts him towards the lake. Wherever he is – either standing on the roadway or on the grey - coloured pavements, he hears the sound deep in the innermost part of his heart.

Literary Devices:

Rhyme Scheme of this stanza: abab

Alliteration: It is the repetition of speech sounds in a sequence of nearby words. In this stanza the 'l' sound in 'lapping', 'low' is repeated.

Repetition: It consists of repeating a word, phrase or sentence. 'I will arise and go now' is repeated in stanza 1 and 3.

Note: **'Thinking about the poem' to be done by the students themselves on their classwork notebook.**

Chapter no. 2: The Adventures of Toto (Moments)

About the Author:

Ruskin Bond is an Indian author of British descent. He lives with his adopted family in Landour, Mussoorie, India. He is an Indian author of British descent. He is considered to be an icon among Indian writers and children's authors and a top novelist. He prolifically authored inspiring children's books and was awarded the Sahitya Akademi Award to honor his work of literature.

Plot Summary:

The narrator's Grandfather was very fond of animals. He had a nice collection of animals such as a tortoise, a tame squirrel, a pair of rabbits and a goat. But he didn't have a monkey. So, one day, he bought a baby monkey from a tonga-driver and named it Toto. Toto's arrival not only gladdened him but also enriched his private zoo.

Toto was an attractive monkey with sparkling eyes and pearl white teeth. He would take special delight in scaring elderly Anglo-Indian ladies. His tail added to his good look, and also served as a third hand. Since Grandmother did not have any interest in animals, she never welcomed Grandfather with a new bird or animal in the house. So, it was decided that Toto's presence should be kept a secret until Grandmother was in good mood.

Toto was temporarily kept in a little closet opening into the narrator's bedroom wall, where he was tied securely to a peg fastened into the wall. Being mischievous by nature, Toto began to create a nuisance from the very first day. He removed the ornamental wall paper, pulled out the peg and tore off the narrator's blazer. Grandfather was quite happy to see Toto's performance.

Toto was now transferred to a big cage in the servants' quarters where Grandfather's other animals lived together. But Toto would create troubles for them. He did not let them sleep peacefully. His pernicious activities were increasing day by day.

So when Grandfather had to go to Saharanpur to collect his pension, he carried Toto with him in a big black canvas kit-bag. Since there was no opening in the bag to allow his hands or face to come out, he would often jump inside the bag, making the bag roll about on the floor of the Dehradun railway platform. On reaching Saharanpur Toto was caught by the ticket-collector who classified him as a dog, so that Grandfather had to pay for his (Toto's) fare.

Toto was finally accepted by Grand mother. He was then shifted to the stable, where Nana, the family donkey lived. But Toto continued teasing her as a result of which they could never became friends.

Toto loved to take bath in hot water in winter. One day, he nearly succeeded in boiling himself alive by jumping in a large kitchen kettle that had been left on the fire to boil for tea. It was Grandmother who came to his rescue and saved him.

Toto continued his antics by tearing clothes to shreds, breaking plates and other utensils. Everyone in the family got fed up with his mischievous activities. Even Grandfather began to think seriously about him. And finally he took a hard decision to get rid of the monkey. He found the tonga-driver and sold Toto back to him for only three rupees.

Question and Answers

1. How does Toto come to grandfather's private zoo?

A. The writer's grandfather liked to collect animals and had made a zoo at home. One day, he saw a red - coloured monkey tied to a trough with a tonga driver. He liked the monkey and wanted to add it to his collection. He bought Toto from the tonga driver for a sum of five rupees.

2. "Toto was a pretty monkey." In what sense is Toto pretty?

A. The writer says that Toto was pretty. He had bright, shining eyes which were full of mischief. His teeth were like pearls. He had a long tail which was like a third hand for him. The writer's grandfather felt that a tail added to the beauty of an animal. So, Toto was thought to be a pretty animal.

3. Why does grandfather take Toto to Saharanpur and how? Why does the ticket collector insist on calling Toto a dog?

A. Grandfather took Toto along with himself to Saharanpur because as he was mischievous, it was not safe to leave him alone at home. A bag made of strong canvas material was arranged. Some straw was placed in it. Toto was placed inside the bag and the bag was sealed with the zipper.

The ticket collector did not accept grandfather's claim that Toto was not a dog. He called it a dog and charged a ticket fee for it because only dogs were allowed to travel on trains. If Toto had to travel by train, then, he would have to be termed a dog.

4. How does Toto take a bath? Where has he learnt to do this? How does Toto almost boil himself alive?

A. Toto would check the temperature of the water by inserting his hand in it. Then he would step into the tub, one foot at a time. Finally, he would sit in it, with his face out. Then he would rub soap on his body. When the water became cold, he would jump out and run to the stove in the kitchen to dry himself. He had learnt this way of bathing from the narrator.

One day, Toto jumped into a kettle of water kept on the stove for boiling as he found it warm enough for a bath. As the water grew hotter, he thought of ascending but the cold weather made him go back into the kettle. Toto kept on doing this for a while till he was spotted by the grandmother. She pulled him out of the kettle in time or else he would have boiled himself that day.

5. Why does the author say, "Toto was not the sort of pet we could keep for long"?

A. The author says that Toto was not the kind of pet that they could keep for long because he was extremely mischievous. He destroyed many things - he tore the wallpapers, clothes and curtains. He broke dishes too. The family could not afford all this and so, decided to get rid of Toto.

Chapter no. 4: A Truly Beautiful Mind (Beehive)

About the Author:

Albert Einstein was a German-born theoretical physicist who developed the theory of relativity, one of the two pillars of modern physics. His work is also known for its influence on the philosophy of science. He is best known to the general public for his mass–energy equivalence formula $E = mc2$, which has been dubbed "the world's most famous equation". He received the 1921 Nobel Prize in Physics "for his services to theoretical physics, and especially for his discovery of the law of the photoelectric effect", a pivotal step in the development of quantum theory.

Plot Summary:

This chapter is about Albert Einstein. The title of the chapter 'A Truly Beautiful Mind' refers to Albert Einstein as he was a great scientist. Moreover, this chapter is a short biography of Albert Einstein. The chapter shows Albert's interest in Mathematics and Physics and his ordinary human attribute. That's why the title refers to him as a truly beautiful mind.

On 14th March 1879, Albert Einstein was born in the German city of Ulm. Until the age of two and a half years, he could not speak. And when he began speaking then he spoke every word twice. In childhood, his playmate considers him to be boring. His mother also thought that he was crazy because of the abnormally large size of his head.

The headmaster of his school regarded him as stupid and good for nothing. But then he proved all of them wrong. When he was 6 years-old, he learned to play the violin and became a skillful violinist. His family shifted to Munich when he was 15 years-old. But there he felt uncomfortable with the strict discipline of the school so he left the school.

After completing his schooling, he got his admission in the University of Zurich. As the atmosphere in the university was more liberal and they accepted new ideas and concepts. Besides, he was more interested in Physics and Mathematics. At the university, he met a fellow student Mileva Maric. She was equally clever and intelligent. Afterwards, they married and had two sons but unluckily their marriage didn't last and they split in 1919. He married second time his cousin namely Elsa. Subsequently, after finishing his education, Albert worked as a technical expert in the patent office at Bern. Also, there he secretly worked on his idea on relativity.

He put out his paper on the special theory of relativity, which follows by the world-popular equation $E = mc2$. In addition, he also publicized his paper on General Theory of Relativity in 1915. This gave an absolutely new definition to the concept of gravity. Also, this theory made him a famous figure.

During the solar eclipse of 1919, his theory came out as accurate and changed physics. When Nazi came to power in Germany he immigrated to the USA. He did so because he did not want his research and findings to be used for destruction. Further, when Germany discovered the principle of Nuclear Fission in 1939. He was the first person to write to the American President about the dangers of atomic bombs.

Moreover, in 1945 when America threw down the atomic bombs on Hiroshima and Nagasaki he was deeply hurt. Also, he has written a letter to the United Nations for the formation of a world government. So that it can prevent recurrence of such destruction.

He spent most of his last days, in politics advocating world peace and democracy. The great scientist died at the age of 76 in the year 1955.

Question and answers:

Q1: To be done on the book by the students themselves.

Q 2: Who had these opinions about Einstein?

(i) He was boring.

(ii) He was stupid and would never succeed in life.

(iii) He was a freak.

Ans: (i) Albert Einstein's playmates had the opinion that he was boring.

(ii) Albert Einstein's headmaster had the opinion that he was a stupid and would never succeed in life.

(iii) Albert Einstein's mother had the opinion that he was a freak.

Q3. Explain what the reasons for the following are.

(i) Einstein leaving the school in Munich for good.

(ii) Einstein wanting to study in Switzerland rather than in Munich.

(iii) Einstein seeing in Mileva an ally.

(iv) What do these tell you about Einstein?

Ans. (i) Albert Einstein left the school in Munich because the school had strict regimentation.

(ii) Albert Einstein wanted to study in Switzerland rather than in Munich because there was liberal atmosphere for the students in Switzerland.

(iii) Like Albert Einstein, Mileva also disapproved the 'philistines' – those who disliked art, literature or music.

(iv) He loved freedom. He was a liberal and cultured person

Q4. What did Einstein call his desk drawer at the patent office? Why?

Ans. Albert Einstein called his desk drawer at the patent office 'the bureau of theoretical physics' because he stored his secret papers on ideas on physics there.

Q5. Why did Einstein write a letter to Franklin Roosevelt?

Ans. Einstein feared that the Germans under the rule of the Nazis had developed the atomic bomb and could misuse it. He wrote to the president of USA to warn him of this development.

Q6. How did Einstein react to the bombing of Hiroshima and Nagasaki?

Ans. Einstein was deeply shaken by the disaster caused in Hiroshima and Nagasaki. He wrote a public missive to the United Nations demanding the formation of a world government to stop the development of nuclear weapons.

Q7. Why does the world remember Einstein as a "world citizen"?

Ans. Einstein was a 'world citizen' because of his contribution for world peace and non – violence.

GRAMMAR:

Modals:

In English grammar, a modal is a verb that combines with another verb to indicate mood or tense. A modal, also known as modal verb or modal auxiliary, expresses necessity, uncertainty, possibility, or permission.

The modals which are used in English are listed in the following table. Based on their varied meanings, a speaker/writer can decide which modal should be used to express which meaning. Some modals carry overlapping meanings but still each one at least carries a definitive feature that distinguishes it from others.

Modal Verbs	Meaning Expressed	Example
Can	- Ability - Permission - Possibility	- I **can** write English. **Can** I drop you somewhere? - Obesity **can** lead to diabetes.
Could (past form of Can)	- Ability in the past - Request - Possibility	- As a kid, I **could** run fast. **Could** you bring me some water? - Their protest **could** lead to trouble.
Will	- Future actions - Determined, certain actions - Issue invitation	- I **will** meet him tomorrow. - She **will** surely punish me. **Will** you accompany me to the party?
Would (past form of Will)	- Past habits - Request - Present hypothetical situation	- When I was a child, I **would** spend hours in the park. **Would** you bring me a gift? - If I were married, I **would** be happier.
May	- Possibility - Show purpose - Permission - Request	- It may rain tomorrow. - She has worked hard for the project so that she may win the competition. - May I leave the room? - May I borrow your pen?
Might (past form of May)	- Polite Permission - Express intuition - Lesser possibility	**Might** I give you a suggestion? - I feel she **might** take a class today as well. - Like the previous year,

		you never know she **might** take a long holiday this year too.
Shall	• Future action • Suggestion, advice	• I **shall** take a class tomorrow. • **Shall** I bring you some books?
Should (past form of Shall)	• Advice • Express instructions • Express opinion	• You s**hould** practice enough questions. • You **should** behave properly in front of the guests. • He **should** be concerned about his future.
Must	• Show necessity • Express sense of duty • Show obligation	• I **must** see him. • You **must** ensure savings for the family. • Children **must** obey their parents.
Ought To	• Obligation • Sense of duty • Express desirability	• They **ought to** tell the truth. • I **ought to** protect my family the best possible way. • She **ought to** meet him before he leaves.

Exercise:

Fill in the blanks with the most appropriate modals:

1. He _____ (would not, dare not, need not) buy vegetables. I have a stock for an entire week.
2. I _____ (shall, can, might) follow all the rules and regulations laid by the department.
3. I _____ (would, may, could) like to help her if she allows.
4. _____ (Would, May, Have) you like to have some coffee.
5. The Principal is not in his room. He _____ (could, might, will) have left for the day.

Note: **Do all the questions and answers on your respective classwork notebook.**

DOON INTERNATIONAL SCHOOL, SRINAGAR
SUBJECT: S.ST
Assignment: II
Grade: IX
Chapter: Russian Revolution.

Instructions:

➤ The objective of this assignment is to make the students acquainted with;

1**. The February Revolution in Petrograd**.

2**. Suspension of Duma**.

3. **The Revolution of October 1917.**

4. **The Civil War.**

5. **Creation of Soviet Union.**

6. **Stalinism and Collectivization.**

7. **Stalin's Policies.**

Terms to know

1: Suffragette movements: Movements for giving women the Right to Vote.

2: Tsar: The title of the Emperor of Russia.

3: Bolsheviks: The majority group of the Russian Social Democratic Workers Party led by Lenin based on the ideology of Karl Marx and Friedrich Engels.

4: Mensheviks: The majority group of the Russian Social Democratic Workers Party formed in 1898. They favored a parliamentary model of government like that of Britain and France.

4: Autocracy: A country that is ruled by one person who has complete power.

5: Jadidists: Muslim reformers within the Russian empire.

6: Real wages: Reflects the quantities of goods which the wages will actually buy.

7: Cossacks: A group of pronominally East Slavic people who were members of democratic, semi-military communities in Ukraine and Southern Russia.

8: Duma: The Russian Parliament or Legislature. Its members were elected and charged with the responsibility of making laws.

9: Autonomy: The right to govern themselves.

10: Nomadism: Lifestyle of those who do not live in one place, but move from area to area to earn their living.

11: Kulaks: The name for well-to-do-peasants.

12: Deported: Forcibly removed from one's own country.

13: Exiled: Forced to live away from one's own country.

The February Revolution in Petrograd

In the winter of 1917, conditions in the capital, Petrograd, were awful. The layout of the city seemed to emphasize the divisions among its people as workers' quarters and factories were on right bank of Neva river while winter palace and official building on the left. In Feb. 1917, there was acute shortage of food in Russia which made the life of workers very difficult. Parliamentarians were opposed to the Tsar's desire to dissolve the Duma.

On 22nd February, a lockout took place at a factory on the right bank of the river Neva. The next day, fifty factories called a strike in sympathy. In many factories, women also led the way to strikes on 23rd February, 1917. This day came to be called **International Women's day.**

Suspension of Duma

Demonstrating workers crossed from the river Neva, and the quarters to the center of the capital and official buildings were surrounded by workers. All the demonstrators dispersed by the evening, but they come back on the 24th and 25th. The government tried to control the situation and called out the cavalry and police. The Duma was suspended on Sunday, 25th February.

The Revolution of October 1917

Growing conflict between the Provisional Government and Bolshevik made Lenin to persuade the Petrograd Soviet and the Bolshevik party for a socialist seizure of power.
He united supporters from army, Soviets and factories for socialist seizure on 16th October, 1917. The Soviet appointed a Military Revolutionary Committee under the leadership of Leon Trotskii to organize the seizure. As the uprising began on 24th October, 1917, prime Minister Kerenskii left the city to summon troops in fear. Same evening, loyal, military men of government seized the buildings of two Bolshevik newspapers. Pro-government troops were sent to take over telephone and telegraph offices' and protect the winter palace. In response to these measures, military Revolutionary Committee ordered its supporters to seize govt. offices and arrest ministers. Other vessels sailed down the Neva and took over different military points. By nightfall, the city was under the committee's control and the ministers had surrendered. There was heavy fighting between pro-government troops and the Bolsheviks. By December 1917, the Bolsheviks controlled the Moscow-Petrograd area.

The Civil War

The decision of redistribution of land by Bolsheviks caused break up of army. Clashes between supporters of authority, liberals and Bolshevik soldiers started.

The pro-Tsarists (the 'Whites') and the Socialist Revolutionaries (the 'greens') fought a Civil War with Bolshevik (the 'reds') troops during 1918 and 1919. The pro-Tsarists and socialist were backed by French, American brutish and Japanese troops. Non-Bolsheviks took harsh steps against the peasants. This made them unpopular. The Bolsheviks took help of the non-Russian people and Muslim jadidists to take control of most of the former Russian empire by 1920. Most non-Russian nationalist were given political **autonomy** in the USSR created by the Bolsheviks in 1922.

Creation of Soviet Union

In March 1918, the Bolsheviks entered into a treaty with Germany at Brest Litovsk and ended the war with Germany. The Bolsheviks became the only party to participate in the elections to All Russian Congress of Soviets which was the parliament of the country and they won. Russia became a one-party state. The secret Police (called the Cheka first and later, OGPU and NKVD) punished those who criticized the Bolsheviks. Many young writers and artists rallied to the party because it stood for socialism and change.

Stalinism and Collectivization

The period of the early planned economy was linked to the disasters of the collectivization of agriculture. Joseph Stalin became the leader of the Soviet Communist Party after the death of Lenin in January 1924. By 1927-1928, the towns in Russia were facing an acute problem of grain supplies. The government fixed prices of grains, but the peasants refused to sell their grain to government buyers at these prices. Stalin believed that rich peasants and traders in the countryside were holding stocks in the hope of higher prices. So, Stalin introduced the collectivization of Soviet agriculture.

It bought the great majority of peasants into collective and state farms. In 1928, party members toured the grain producing areas, supervising enforced grain collections and raiding the **KULAKS**. After 1917, land had been handed over to the peasants. For the development of modern farms, it was necessary to eliminate **KULAKS,** take away land from peasants and establish large state-controlled farms.

Stalin's Policies

From 1929, the Communist Party forced all peasants to cultivate in collective farms(Kolkhoz). Peasants worked on lands and the profit of the collective farms was shared among them. Those who opposed the collectivization were severely punished; many were deported and exiled.

The bad harvests of 1930-1933 led to one of the most devastating famines in Soviet history in which over 4 million died. Those who criticized Stalin's policies were charged with conspiracy against socialism. By 1939, over 2 million were imprisoned or sent to labour campus.

Write down the answer of these questions on your fair notebook:

Q1: What was Kolhaz?

Q2: Who were regarded as Kulaks in Russia?

Q3: Name two Indians who wrote about Soviet Socialism.

Q4: How many causalities happened in 1917 during first world war?

Q5: Who led the February Revolution?

Q6: Name the ruler of Russia at the start of the first world war.

Q7: Who opposed the ideas of both liberals and radicals?

Q8: Who was Robert Owen?

Q9: Who were Liberals?

Q10: How were the ideas of radicals different from conservatives?

دون انٹرنیشنل اسکول، سرینگر

☆جماعت: نہم

☆ سبق: چڑیا گھر کی سیر

☆مفوضہ کام: حصہ دوم

تعارف :۔

اس سبق میں مختلف جانوروں کی بات کی گئی ہے۔ ہمیں اس بات کو جاننا چاہیے کہ جانوروں میں بھی آزادی کا جذبہ پایا جاتا ہے۔ جس طرح انسان قید میں نہیں رہنا چاہتا۔ اسی طرح جانور بھی آزادی چاہتے ہیں۔ انسان کی طرح جانوروں کو بھی صحت مند رہنے کے لیے مناسب غذا اور سردی اور گرمی سے بچنے کا انتظام ضروری ہے۔

مختصر جوابات لکھیے ۔

س۱: پانڈے کو گھنے بالوں سے کیا فائدہ ہے؟

س۲: پیٹ بھرنے کے بعد شیر کیا کرتا ہے؟

س۳: کنگارو کی غذا کیا ہے؟

س۴: چمپینزی کو گرمی کیوں ستاتی ہے؟

س۴: جانوروں کو بیماری سے بچانے کے لیے کیا کیا جاتا ہے؟

تفصیلی جوابات لکھیے ۔

س۱: اس سبق کو اپنے الفاظوں میں لکھیے ۔

س۲: ہمیں جانوروں کے ساتھ کس طرح کا سلوک کرنا چاہیے ۔

س۳: اس سبق سے پانچ مذکر اور مونث الفاظ چھانٹ کر لکھیے ۔

س۴: پرندے کی فریاد نظم میں پرندہ اپنی آزادی کے لیے کس طرح فریاد یں کرتا ہے؟

لفظوں کے متضاد لکھیے ۔

سردی ۔ پسند ۔ سفید ۔ خوش ۔ بیمار ۔ مناسب

جانوروں کی حفاظت کے لیے ہمیں کون سے اقدام اٹھانے چاہیے۔ مختصر جواب لکھیے ۔

The objective of this assignment is to make students acquainted with the basic, structural and fundamental unit of life, the cell.

- **Plasma membrane**

Every cell, prokaryotic as well as eukaryotic, is surrounded by a thin covering called plasma membrane. This membrane is also known as plasma lemma or cell membrane. It is visible only through electron microscope. It is semi-permeable as it does not allow everything to pass through it, only certain substances move across. It is a living elastic, flexible and dynamic membrane that is 6-8 nm in thickness. The plasma membrane and the sub-cellular membranes are together called as bio-membranes or biological membranes.

The most acceptable structural model of plasma membrane is fluid mosaic model. It is proposed by Singer and Nicolson (1972). According to this model, cell membrane consists of a highly viscous, fluid matrix of two layers of phospholipids having globular proteins associated within. Small carbohydrates (oligosaccharides) are attached at places to outer surface of proteins and lipids.
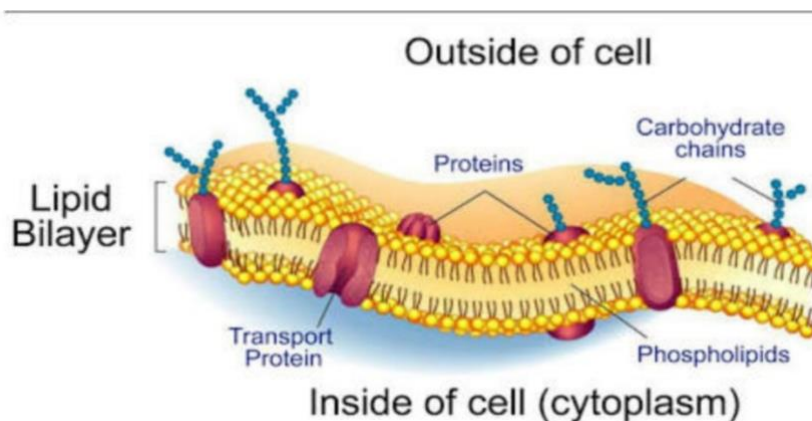
- **Functions of Plasma lemma**
i)   It protects the cell by acting as a barrier between the cell and the surrounding environment.
ii)   It maintains the individuality and form of the cell.
iii)   It regulates the transport of substances in and out of the cell.
iv)   Its oligosaccharides help in recognising self from non-self.
v)   Its infolds help in the intake of materials by endocytosis.
vi)   It permits exit of secretions and wastes by exocytosis

- **Active and passive transportation through cell membrane**

Active transport	Passive transport
It uses energy of ATP (Adenosine Tri Phosphate)	Does not use energy
It is a rapid process.	It is a slow process
Takes place in one direction only	Takes place in both directions
It needs carrier proteins to occur.	It occurs without any carrier proteins.
It usually occurs against the concentration gradient.	It occurs down the concentration gradient.

- **Cell wall**

It is a rigid, semi-elastic, supportive and protective but permeable covering present outside the plasma membrane in plant cells, fungi, some protists and prokaryotes. In plants cell wall is made up of cellulose, in fungi-chitin and in prokaryotes it is made up of peptidoglycans (NAM----N-acetylmuramic acid and NAG----N-acetylglucosamine).

The plant cell wall is generally arranged in 3 layers and is composed of carbohydrates like cellulose, pectin, hemi-cellulose and other smaller amounts of minerals. Cellulose is a fibrous carbohydrate which is most abundant and cannot be digested by the human beings. The three major layers of plant cell wall are,

    i)   Middle lamella
    ii)   Primary cell wall
    iii)   Secondary cell wall

Two adjacent plant cells are connected to each other through plasmodesmata—a narrow channel of cytoplasm that passes through the cell wall.

Functions:

    i)   It provides definite shape and strength to the cells.
    ii)   It also provides protection against pathogens, mechanical stress and physical shocks.
    iii)   It helps to control cell expansion due to the intake of water.
    iv)   Apart from acting as a barrier between cell interior and external environment it is also responsible for transportation across the cell.
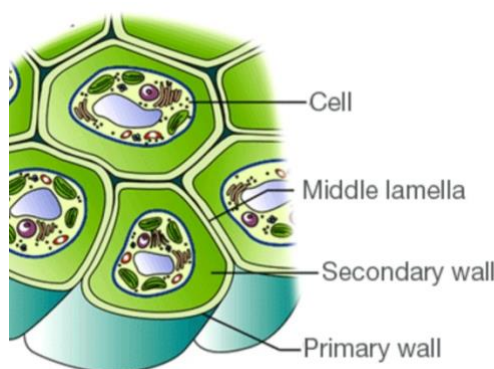
- **Nucleus**

It is the most integral and largest organelle of a cell (eukaryotic). The term is derived from a latin word *karyon* which means *kernel of a nut.* It may be defined as a double membraned eukaryotic cell organelle that contains the genetic material.

Nucleus was discovered by a Scotch botanist, Robert Brown (1831).

Nucleus lies in the centre of animal cells and towards the periphery in case of a plant cell. This cell organelle consists of following parts;

i) Nuclear envelope: it is a double membrane covering which separates the nucleus from the cytoplasm. It is highly perforated and the pores, called as nuclear pores, allow exchange of materials between the nucleus and cytoplasm. The outer membrane of nuclear envelope is continuous with rough endoplasmic reticulum.

ii) Nucleoplasm: also called as nuclear sap or karyolymph. It is a dense, colourless fluidic material present inside the nucleus with chromatin and nucleolus suspended into it.

iii) Nucleolus: it was discovered by Fontana (1781) and the term was coined by Bowman (1840). It is a membrane less, rounded, dark staining structure found inside the nucleus. It is rich in RNA and protein and is the site of ribosome synthesis.

iv) Chromatin material: it is a crisscrossed mass of thread like structures made of DNA and proteins. It may also be called as chromatin reticulum because of its intertwined nature. During cell division, the chromatin material starts to condense and coil tightly to form short, thick, rod-like structures called chromosomes.

Some cells lack nuclei (plural of nucleus) at their maturity e.g mammalian RBCs and sieve elements in plants. But cells without nuclei cannot survive for long.

A Nucleus
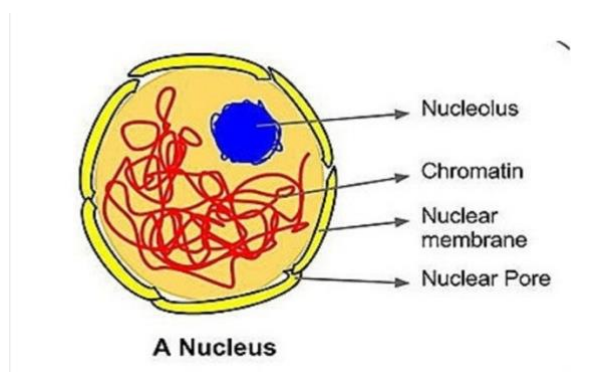
Functions:
i) It contains all the genetic information for cell and the organism.
ii) It controls the heredity characteristics of an organism.
iii) It controls the cell metabolism and cell activities.
iv) It is responsible for protein synthesis, cell division, growth and differentiation.
v) Nucleolus produces ribosomes (also called as protein factories).

- **Cytoplasm**

The term was coined by a Swiss biologist named Rudolf von Kölliker (1863). The cytoplasm is one of the basic components of the cell where cell organelles are embedded. It is a semi-liquid jelly like element which attaches the nucleus and the cell membrane. The fluid part is called as cytosol. Other cell organelles such as mitochondria, ribosomes, vacuoles, endoplasmic reticulum, etc, are all suspended in it. It can easily be examined under a microscope through the staining technique.
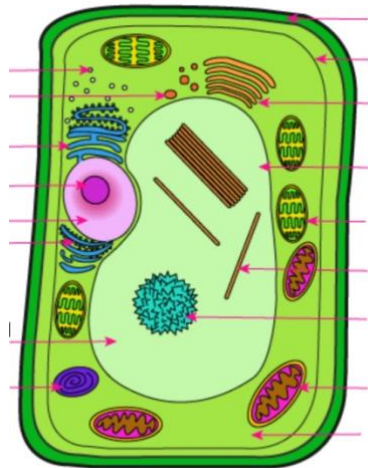
Functions:
- i) It enables the cell to maintain its turgidity, thereby helping the cell to maintain its shape.
- ii) It assists in many metabolic activities of the cell.

The cytoplasm, nucleus and all other living components of the cell together make up the protoplasm of a cell.

- **ASSIGNMENT**

1.

Identify the diagram and label it properly

2. Do you know the longest cell of human body?
3. Differentiate between plant cells and animal cells.
4. Briefly discuss the difference between chromosomes and chromatin material.
5. Give some functions of cytoplasm.

DOON INTERNATIONAL SCHOOL, SRINAGAR
SUBJECT: MATHEMATICS
Assignment:II
Grade:IX
Chapter: linear equations in two variables

Instructions:

The objective of this assignment is to make students acquainted with the following:

➢ Identify if a given equation is a linear equation in two variables

➢ Find solutions for the given linear equations.

➢ Represent a linear equation in two variables on the Cartesian plane.

➢ Represent the solutions of an equation on a number line and the Cartesian plane.

INTRODUCTION:

In earlier classes, you have studied linear equations in one variable. If someone asks you write down a linear equation in one variable. You might write $2x - 3 = 2$ or $2y + 5 = 6$ are examples of linear equations in one variable. You also know that such equations have a unique (i.e., one and only one) solution**.** You may also remember how to represent the solution on a number line. In this chapter, the knowledge of linear equations in one variable shall be recalled and extended to that of two variables. You will be considering questions like: Does a linear equation in two variables have a solution? If yes, is it unique? What does the solution look like on the Cartesian plane?

LINEAR EQUATIONS IN TWO VARIABLES

Let us now consider the following situation: In a cricket match between class 9th and 10th played in school ground, two class 9th batsmen together scored 106 runs. If are supposed to express this information in the form of an equation. Here, you can see that the score of neither of them is known, i.e., there are two unknown quantities. Let us use x and y to denote them. So, the number of runs scored by one of the batsmen is x, and the number of runs scored by the other is y. since the total runs scored by both are 106. So we can put the given situation in the form of an equation as *x + y = 176*. Such an equation is called linear equation two variables.

Thus, any equation which can be put in the form ax + by + c = 0, where a, b and c are real numbers, and a and b are not both zero, is called a linear equation in two variables. It is customary to denote the variables in such equations by x and y, but other letters may also be used.

Solution of a Linear Equation

We know that every linear equation in one variable has a unique solution. What can you say about the solution of a linear equation involving two variables? As there are two variables in the equation, a solution means a pair of values, one for x and one for y which satisfy the given equation. Let us consider the equation x + 2y = 5. Here, x =1 and y = 2 is a solution because when you substitute x = 1 and y = 2 in the equation above, you find that,

$$x + 2y = (1) + (2 \times 2) = 5$$

This solution is written as an ordered pair (1, 2)**,** first writing the value for x and then the value for y. Similarly, (3, 1) is also a solution for the equation above.

On the other hand, *(1, 4)* is not a solution of *x + 2y = 5*, because on putting x = 1 and y = 4 we get x + 2y = 9, which is not 5. Note that (3, 1) is a solution but not *(1, 3)*.

You have seen at least two solutions for *x + 2y = 5,* i.e., *(1, 2)* and (3, 1)**.** In fact, we can get many solutions in the following way. Pick a value of your choice for x (say *x = 2*) in *x + 2y = 5*. Then the equation reduces to *2 + 2y = 5*, which is a linear equation in one variable. On solving this, we get *y = 3/2.* So (2, 3/2) is another solution of *x + 2y = 5*.similarly choosing any other value of x we get value of y and hence a solution of the given equation. So there is no end to different solutions of a linear equation in two variables. That is, **a *linear equation in two variables has infinitely many solutions*.** If we plot all the solutions of a linear equation in two variables on a graph paper and join these point we will get a straight line. It in other words means that the linear equation in two variables geometrically represents a straight line and conversely.

REMARKS:

- An equation of the form ax + by + c = 0, where a, b and c are real numbers, such that a and b are not both zero, is called a linear equation in two variables.
- Here a and b are called coefficients of x and y respectively and c is called constant term.
- The equation is called linear because the equation is of the first degree.
- A solution is an ordered pair of real numbers which satisfies the equation.
- A linear equation in two variables has infinitely many solutions.

Question / Answer

Q. The cost of a notebook is twice the cost of pen. write a linear equation in two variables to represent this statement.

Solution: Let the cost of a notebook be ₹ x and cost of pen be ₹ y

Given that cost of a notebook = 2 × cost of a pen

$\Rightarrow$ x = 2y

$\Rightarrow$ x − 2y = 0

Hence, x − 2y = 0 is the representation of the given statement.

Q. Write four solutions for each of the following equations

(i) 2x + y = 7   (ii) πx + y = 9   (iii) x = 4y

Solution: (i) 2x + y = 7

y = 7 − 2x

For x = 0

$\Rightarrow$ y = 7 − 2(0) = 7

∴ (0,7) is a solution.

For x = 1

$\Rightarrow$ y = 7 − 2(1) = 5

∴ (1,5) is a solution.

For x = 2

$\Rightarrow$ y = 7 − 2 (2) = 3

∴ (2,3) is a solution.

For x = 3

$\Rightarrow$ y = 7 − 2 (3) = 1

∴ (3,1) is a solution.

(ii) $\pi x + y = 9$

$\Rightarrow y = 9 - \pi x$

For $x = 1/\pi$

$\Rightarrow y = 9 - \pi \cdot 1/\pi = 8$

∴ (1/π, 8) is a solution.

For $x = 2/\pi$

$\Rightarrow y = 9 - \pi \cdot 2/\pi = 7$

∴(2/π,7) is a solution.

For $x = 3/\pi$

$\Rightarrow y = 9 - \pi \cdot 3/\pi = 6$

∴(3/π,6) is a solution.

For $x = 0$

$\Rightarrow y = 9 - \pi(0) = 9$

∴ (0,9) is a solution

(iii) try yourself.

Q. Check which of the following are solutions of the equation x−2y= 4 and which are not.

(i) (0, 2)   (ii) (2, 0)   (III) (4, 0)

SOLUTION:

(i) L.H.S = x−2y

Given point (0, 2)

$\Rightarrow$ x−2y = 0−2(2) = −4

Since,   −4 ≠ 4

∴ L.H.S ≠ R.H.S

Hence, (0, 2) is not a solution of x−2y = 4.

(ii) L.H.S = x−2y

Given point (2, 0)

$$\Rightarrow \quad x{-}2y = 2{-}2(0) = 2$$

$$\text{Since,} \quad 2 \neq 4$$

∴ L.H.S ≠ R.H.S

Hence, (2, 0) is not a solution of x−2y = 4.

(iii) L.H.S = x−2y

Given point (4, 0)

$$\Rightarrow \quad x - 2y = 4{-}2(0) = 4$$

$$\text{Since,} \quad 4 = 4$$

Therefore,   L.H.S = R.H.S

Hence, (4,0) is a solution of x−2y = 4

Q. Draw the graph of each of the following linear equations in two variables:

(i) x + y = 4   (ii) x − y = 2

SOLUTION:

(i) Given equation, x + y = 4

$$\Rightarrow \quad y = 4 - x$$

At x = 0 and x = 4 we get y = 4 and y = 0 respectively.

∴   (0, 4) and (4, 0) are solutions of x + y = 4

Now plot the points (0, 4) and (4, 0) on the graph.

(ii) Given equation, x − y = 2

$\Rightarrow$ x = y + 2

At y = 0 and y = 2 we get x = 2 and x = 0 respectively.

∴(2, 0) and (0, −2) are solutions of x − y = 2

Now plot the points (2, 0) and (0, -2) on the graph.

Q. Give the equations of two lines passing through (2,14). How many more such lines are there, and why?

Solution: Given point (2, 14)

Let x = 2 and y = 14

We can write 14 = 7 × 2

$\Rightarrow$ y = 7 x is a line passing through (2, 14).

Similarly, 14 = 2 + 12

$\Rightarrow$ y = x + 12 is a line passing through (2, 14).

∴ y = 7 x and y = x + 12 are two lines passing through (2, 14).

From above process we can say that there are different possible combinations of lines which passing through (2, 14).

Therefore, from a given point (2, 14), there are infinite lines passing through it.

Assignment

- Express the following linear equations in the form ax +by + c = 0 and indicate the values of a, b and c in each case:

  (i) 2x + 3y = 9.35   (ii) x – y = 12   (iii) −2x + 3y = 6

- Write four solutions for each of the following equations:

    1. 2x – 3y = 9
    2.   3x + 5y = 15

- Give the equations of two lines passing through (1, 10). How many more such lines are there, and why?
- If the point (3, 4) lies on the graph of the equation 3y = ax + 7, find the value of a.
- The taxi fare in a city is as follows: For the first kilometer, the fare is ₹ 3and for the subsequent distance it is ₹ 2 per km. Taking the distance covered as x km and total fare as ₹ y. write a linear equation for this information and draw its graph.