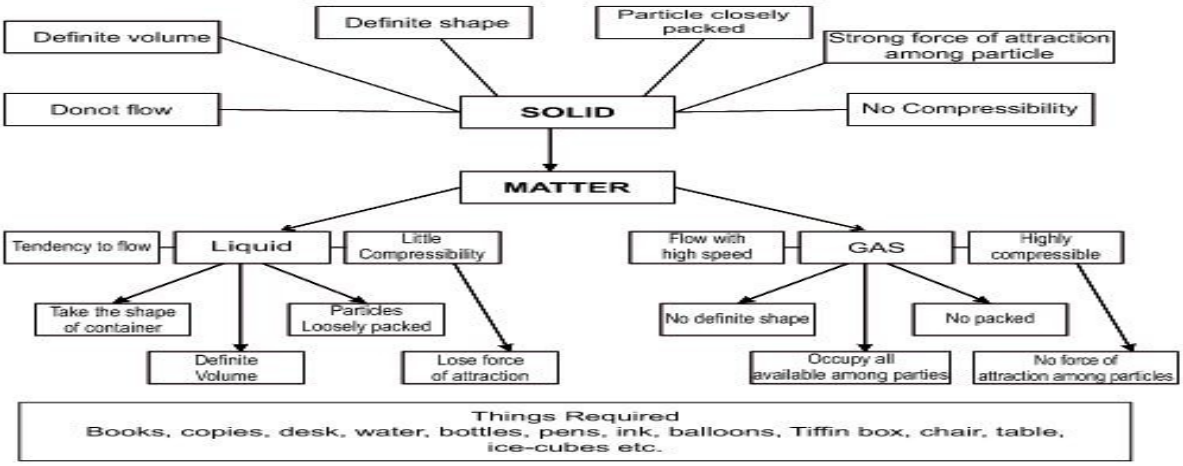
Unit-3
Class IX
1. Matter in Our Surroundings

1.1 INTRODUCTION

Things in our surrounding with different shapes, size and texture like air we breath, food we eat, desk on which are sitting, a drop of water, a pinch of sand, etc. are matter.

Anything that occupy space and have mass is matter.

1.2 Concept Map



1.3.1 **Activity:-** Introduce things

1.3.1.2 **Things required:** Book, chair, desk, table.

1.3.1.2 **Method:-**

CHIEF ADVISOR

Ms. Anita Satia
Director, SCERT, New Delhi

GUIDANCE

Dr. Pratibha Sharma
Joint Director, SCERT, New Delhi

COORDINATORS

Dr. Rajesh Kumar
Principal, DIET, Keshav Puram

Ms. Divya Mann

Lecturer, DIET, Keshav Puram

EDITORIAL AND REVIEW BOARD

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Ms. Neelam Batra (Lecturer, Physics, D C Arya School, Lodhi Colony, Delhi)

Publication Incharge SCERT

Sapna Yadav

Publication Team

Navin Kumar, Radha and Jai Bhagwan

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8710, Roshnara Road, Delhi-110007 011-23825373

Dr. RAJESH KUMAR

Principal
DIET Keshav Puram

Ms. DIVYA MANN

Lecturer

DIET Keshav Puram

Mr. JOHNSON DAVID

P.G.T. Biology (Retd.) DOE

Ms. GIRIJA SHANKAR

P.G.T. Physics
RSKV, No.1 Bhola Nath Nagar

Ms. NEELAM BATRA

Lecturer Physics
D C Arya School, Lodhi Colony, Delhi

Ms. HARPREET KAUR

P.G.T. Chemistry
GGSSS, No.2 Uttam Nagar

Mr. H. R. MODI

V. Principal
G CoEd. SSS, Shiv Puri, Delhi

Dr. N. P. DHAKA

Principal, (Retd.) DOE

Mr. LALIT GUPTA

P.G.T. Chemistry
GBSSS, Bindapur

Dr. HARI OM

P.G.T. Chemistry
GSBV, Vivek Vihar

Mr. R.P. SINGH

V. Principal
GSBV, Rana Pratap Bagh

Mr. V.S. MALIK

P.G.T. Biology
RPVV, Civil Line

Mr. R. K. VISHNOI

T.G.T. Biology
RPVV, Surajmal Vihar

Ms. A.B.T.SUNDARI AYYALA

Lecturer Physics
Andhra SS School, Prasad Nagar

Mr. R.C. SHARMA

P.G.T. Physics

GBSSS, D Block, Ashok Vihar

CONTRIBUTORS

Ms. IQBAL KAUR

P.G.T. Biology

SKV, C1, Yamuna Vihar

Ms. MANISHA

P.G.T. Physics

RPVV, Yamuna Vihar

Mr. ANIL VASHISTHA

E.O. Zone-1, DOE

Mr. R. N. CHAUHAN

V. Principal

RTRGSV, Surehra

Ms. MANJU KAPOOR

P.G.T. Physics

KHRMS, Ashok Vihar

Dr. M.M. ROY

Sr. Lecturer

DIET Ghummanhera

Dr. CHARU VERMA

Sr. Lecturer

DIET Keshav Puram

Dr. BANDITA B MOHANTY

Sr. Lecturer

DIET Keshav Puram

Ms. VEENA RANA

Lecturer DIET Keshav Puram

Dr. POONAM GAUR

Sr. Lecturer.

DIET Rajender Nagar

Dr. SUDHA

Sr. Lecturer DIET Pitam Pura

Dr. SUMAN

Lecturer DIET Pitam Pura

Dr. SHYAM SUNDAR

Sr. Lecturer DIET Karkardooma

Mr. BHARTENDU GUPTA

Lecturer DIET Darya Ganj

Ms. BINDU SAXENA

Lecturer SCERT, Delhi

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A WORD WITH A TEACHER

In NCERT textbook of class IX there are fifteen units whereas in class X there are sixteen units. All these units are supposed to be taught in schools with activities and other joyful methods to develop perfect understanding of concepts and processes among students. This manual is being prepared by a group of dedicated teachers, experts, educators and resource persons to facilitate the teachers in organizing activities in classroom with waste or low cost materials without much use of lab equipments. To facilitate the teachers in integration of content & processes with effective pedagogy each unit is presented in this manual in the following format--

1. Introduction
2. Concept Map
3. Concepts
4. Teaching Strategies
5. Material Required
6. Steps of Activity
7. Points of Discussion
8. Resources of Content from websites and Reference books
9. Exemplar questions in the form of value based and HOTS questions

The Teacher can make best use of this book by following ways ------

. Plan & orient students beforehand for activities and make them partner in collection of materials and improvisation by guiding them for effective use of various available resources.

. Utilizing improvised low cost materials and equipments effectively using various joyful strategies through conducting activities for whole class.

. To make concepts understandable, teacher can adopt number of teaching strategies like – activity, observation , slide preparation , project , role play , cross-word puzzle , jigsaw puzzle , discussion , quiz , hands on experiment , inquiry , tabulation , use of ICT , group work , research work , collection of information from T.V. channels , use of internet , books , magazines , work sheet , use of chart , field trip , data collection , debate , analysis and synthesis , drawing , demonstration , clay modeling , story telling , dialogue writing , case study , open space , survey and mind map etc. Every topic is being presented in the book using any of above strategies as an example but teachers are supposed to use many more of them as per their creativity and innovations as well as available resources in their immediate environment.

. Making aware and suggesting students of various references available in the form of books and websites as suggested in each unit. Teachers can facilitate students and themselves by use of these extra resources for upgrading respective knowledge .

We hope and desire that this manual will be helpful in our shared goal of – better & practical understanding of concepts and processes of science.

Unit-1

Pedagogies of Teaching Science

I hear, I forget, I see, I remember, I do, I understand.

Masters of a democratic nation are the people. Education with the mission of cultivating the masters worthy of its name therefore is to be regarded as the most important national enterprise.

Teacher performance is the most crucial input in the field of education. In order to teach a subject effectively the methods and techniques of teaching need to be as good as content .Technique is nothing but a scientific way of presenting a subject keeping in mind the psychological and physical needs of the students. The selection of the right technique depends upon many factors like the environment, the age group intellectual aptitude of the students. The precision regarding selection of resources, types of resources and procedures to identify possible resource may be taxing, but pays off well later. Since learner vary widely in their backgrounds and abilities, they do not make uniform use of those resources, hence the resources need to be varied too. Human resources, printed resources and audiovisual resources all contribute to learning.

According to 'Science Manpower Project', “Science is a cumulative and endless series of empirical observation which result in the formation of concepts & theories, with both concepts & theories being subject of modification in the light of further empirical observation. Science is both a body of knowledge & the process of acquiring & refining knowledge.”

Einstein defines science as “An attempt to make the chaotic diversity of our sense experience correspond to logically uniform systems of thought.”
Simply we can say that

1. Science is a study of natural phenomenon.
2. It is organized & systematized learning.
3. It is a body of cumulative & ordered observations.
4. It is the knowledge based on observations, experiments.
5. Science is a process as well as the product.

Keeping in mind the three major educational objectives the cognitive, the affective and the psychomotor, a new vision of science learning is emerging - one that calls for instructional strategies far different from most traditional conceptualizations. The new paradigm for science learning emphasizes engagement and meaning in ways that are not consistent with past practices. The anticipated outcome of this new approach to teaching is a higher level of student achievement in the sciences. This constructivist teaching and learning model calls for learning that is:

- ***Hands-On:*** Students are actually allowed to perform science as they construct meaning and acquire understanding.
- ***Minds-On:*** Activities focus on core concepts, allowing students to develop thinking processes and encouraging them to question and seek answers that enhance their

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knowledge and thereby acquire an understanding of the physical universe in which they live.

- ***Authentic:*** Students are presented with problem-solving activities that incorporate authentic, real-life questions and issues in a format that encourages collaborative effort, dialogue with informed expert sources, and generalization to broader ideas and application.

This approach to teaching and learning enables students to participate fully in a learning community where the teacher is not the only source of knowledge and information. It encourages full involvement in a community of learners that includes other students, parents, teachers, and outside experts. Technology becomes a tool, supporting the learning process as students seek new knowledge and understanding. The reforms in science education are necessary to improve and enhance the science learning for all students. Once these reforms are in place and implemented, the following goals should be realized.

- Students will be actively engaged in constructing their own understanding of science, technology, and the world in which they live.
- By practicing good habits of research, students will systematically learn the process skills needed to participate in meaningful scientific investigation of natural phenomena.

- All students will gain an understanding of the knowledge and concepts that enable students to pursue the continued study of science.
- Science programs will relate common learning skills and processes to all of the disciplines of science as well as to other disciplines.
- Teachers will use a variety of alternative assessment tools to allow students to demonstrate their understanding of science by solving authentic, real-life problems.
- An informed citizenry will grow in its understanding of the relationship between human actions and the principles of ecological balance in their environment.

Achieving long-term, systemic science education reform contains challenges for students, teachers, and policymakers. A teacher should-

- Commit to a professional development program that will enable you to change instructional strategies, adapting them to new methods for teaching. A thorough understanding of constructivist approaches to learning should be part of that program.

- Create more opportunities for students to engage in science learning that is authentic and patterned after the methods that scientists use.
- Understand the standards established for curriculum, instruction, and assessment, and use them as guidelines for making instructional decisions.
- Establish high achievement standards for all students and be certain that every effort is made to provide effective learning opportunities for each student.

- Model attitudes that foster inquiry, acquisition of new knowledge, and lifelong learning.
- Seek ways to relate the learning of science to other disciplines and use technology to enhance and extend classroom experiences.

Specific objectives are related to a particular topic in a particular period of time. These objectives

can be further divided into the following categories:-

1. Knowledge
2. Understanding
3. Application
4. Skills

1. **Knowledge:** -The pupil acquires knowledge of terms, concepts, symbols, definitions, principles, processes & formulae of science.

Specification:-

To demonstrate the achievement of above objectives, the pupil;

a. recalls or reproduces
b. recognizes

2. **Understanding: -**The pupil develops understanding of terms, concepts, symbols, definitions,

principles, process, formulae, reactions, mechanisms etc.

Specification:-

To demonstrate the achievement of above objectives, the pupil;

a. gives illustrations,
b. compares,
c. discriminates between closely related concepts,
d. classifies
e. identifies relationship
f. estimates
g. estimates the results
h. interprets
i. verifies

3. **Application: -** The pupil applies his knowledge & understanding of science to unfamiliar

situations (or new problem).

Specification:-

To demonstrate the achievement of above objectives, the pupil,

a. analyses a given problem
b. constructs hypothesis based on observations
c. arranges experiments for verification of hypothesis

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d. develops relation between reason & effect

e. be able to give logic in favour of events/happenings in science

f. draws conclusions from facts acquired from observations.

4. **Skills:-**The pupil acquires skill in experimentation, construction, observation, drawing & problem solving.

Specification:-

To demonstrate the achievement of above objectives, the pupil,

a. draws diagrams neatly, proportionately & methodically

b. keeps the apparatus / specimen systematically

c. handles apparatus properly.

d. improvises apparatus, models & experiments

e. locates errors & limitations in experimental set up & in procedures.

f. solves numerical problems concerning physical sciences

g. measures the objects & events in terms of physical quantities & units.

It is important to note that these objectives are determined before teaching starts. If these objectives are not clear for science teacher, he/she may be deviated from his/her path. Teacher will not be sure what suppose to teach why it is to be taught. How it is to be taught? Hence it is very essential for a science teacher to predetermine the objectives of science.

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Unit-2

Learning Resources in Science

Introduction : A planned educational environment consists of wide range of materials, natural and man-made objects and humans themselves. These resources make teaching learning easy and interesting. They support textual materials. It improves understanding and strengthen subject content. These resources are in the form of images, supplementary books, audio and visual aids, dictionaries, M C Q banks, natural sites like monuments, rivers, lakes, hills, gardens, crop fields, market place, laboratory, multimedia, computer, projector etc. Learning resources in teaching process leads to holistic approach especially in science subject. Improvisation of equipment also makes learning easy. Portable science kits become handy tool in the process. Resources serve either as aid or support that keeps the learner engaged. Resource is not the direct object of knowledge but a means to provide information. Some objectives must be achieved while using a resource, therefore it should fulfill the criteria –

Will the resource help students to understand science concept. The place where resources are available.
What the learner will achieve after using resource.

How much knowledge students have about the resource. Comparison between similar resources.
Impact difference , if resource is shown to student or manipulated by him.

Types of Resources :

(1) **Natural Resources :-**

Water bodies like river, ponds, ocean

Forest – biosphere, national park, sanctuary

Hills and mountain tops

Local sites

(2) **Man made Resources :-**

Laboratory

Museum Specimen

Audio Visual aids and multimedia Monuments
Teaching aids (charts, models, chalk) Zoological parks and gardens
Tank and wells Hospitals

Technical and higher education institutions

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Factories

Medical shops

Treatment plants (water, sewer, paper recycling, garbage etc.)

(3) **Human Resources :-**

Doctor Engineer Artisan

Farmer Teacher

Mentor

Senior citizen

Experts / Professionals

Use of Resources :

Resources can be used in the following ways –

By visiting the resource site (field trip, hospital, zoo, museum, factory, monument) By bringing the resource in the class.
By requesting the expert / professional to deliver talk.

Storing equipments and materials in the lab.

Specific Human Resources :

From the community, experts or professionals can be asked to deliver a talk of his expertise. These people feel pleasure and come to school and encourage budding scientists. These people may be doctors, engineers, farmers, technicians, scientists etc.

Students gain a lot from their experience.

Specific Man-made Resources :

(1) **Gardens , Fields , Zoological parks :-**

Know about wild animals, their food, habitat and other adaptations.

Gain information about herbs, shrubs, trees, climbers, flowering, weeds etc.

Effect of physical factors on plant growth and development i.e. light, water, soil, temperature, fertilizers, hormones etc.

Composting and manuring

Crop field preparation, sowing, irrigation, weed removal, harvesting and transplanting

Effect of seasonal changes on plant and animals – hibernation, aestivation, migration, dormancy, perenation etc.

Birds life on the trees / water – nesting, roosting, swimming Biodiversity in zoological park

Upkeep of animals in zoo.

Endangered animals and their conservation.

(2) **Poultry Farm:-**

Local and exotic breeds of fowl and ducks

Food, shelter and cleanliness of birds Egg laying frequency of birds
Unfertilized and fertilized eggs and their incubation

Veterinary services in poultry farm

(3) **Factory like Mother Dairy:-**

Milk containers from far off places Pasteurization
Cold storage tanks of milk

Bottling and pouching of milk Milk and its various products

(4) **Multimedia:-**

It is combined presentation of digital types, text, images, audio, video to convey message or information to the audience. They give the real impact of information. Message can be sent to far off places instantly. It can also be made interactive.

Audio : More message in very small space. Clarity of sound. Mood relaxing resource.

Video : Outside world in the classroom even live. Magnification of object is easy. More clarity through slow motion.

Animation : Moving objects can be changed as per will of the master. It attracts viewers.

Narration : Narration along with video and animation make the class very attentive.

Additional Science Teaching Resources:-

(a) **Science Corner :-** Some schools especially in rural areas do not have working lab. With on hand experience, science concepts are not difficult to adopt. A table with underneath shelves in the class room becomes science corner. Experiments and activities can be done on it. The articles can be used to make models and charts.

(b) **Science Bulletin board:-** This board can be put up in corridor or outside the class room. Science related clippings from magazines or newspaper or children made are displayed on it. It is good resource to generate awareness about environment.

(c) **Science Laboratory:-** It is storage and working place of students with equipments and science materials. Experiments are performed in it. A good science lab should be well equipped with the following conditions -

Big space for free movement to do experiment.

Physical infrastructure must be available like ventilation, gas pipeline fitting, furniture and water arrangement etc.
Equipments and materials are kept safely and categorically.

Lab. space which can also be used for group work, demonstration and discussion.
All precautionary arrangements must be kept ready i.e. first aid kit.

(d) **Science Kit:-** Science kit is a mini science laboratory with indigenous , improvised equipments and materials. It is small therefore portable and used in a limited scale. Its cost is always kept low. NCERT has developed science kits for primary, upper primary and secondary classes. It can be used for demonstration and experiments in small groups. Wastage is also reduced by the use of science kits.

Science Exhibition:- Creativity of children can be encouraged, if they are exposed to vast ocean of scientific mysteries through participation in science exhibition. These exhibitions are organized at Zonal, Centre, State and National level. It provides opportunity for creativity, imagination and freedom of expression. Deptt. of Science and Technology (DST) organizes INSPIRE exhibition. CBSE also organizes Science Exhibition for budding scientists. These exhibitions include competition for models, projects, quiz, science congress, debate, poster and sciencetoon etc. The talent of the students groom by participation in these exhibitions.

(f) **Field Trips :** Field trips provide opportunity to study nature and its activities first hand.

Trips can be arranged as local or outstation. Some places to be visited during field trip are -

Bird sanctuary

Botanical garden Zoological park Forest
Museum Lakes
Monuments

Science centre Recycling plant Factory

Health and sanitary department Sewer plant

Biodiversity park

Hurdles in Utilizing Resources :

Ethical reasons

Social challenges

Technical obstructions

Financial constraints

Unit-3

Class IX

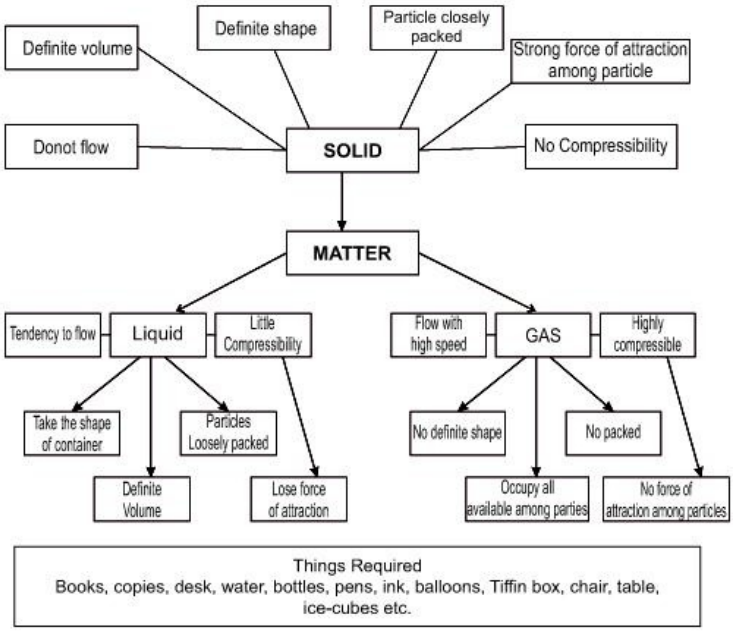
Unit-3
Class IX
1. Matter in Our Surroundings

1.1 INTRODUCTION

Things in our surrounding with different shapes, size and texture like air we breath, food we eat, desk on which are sitting, a drop of water, a pinch of sand, etc. are matter.

Anything that occupy space and have mass is matter.

1.2 Concept Map



Things Required
Books, copies, desk, water, bottles, pens, ink, balloons, Tiffin box, chair, table, ice-cubes etc.

1.3.1 **Activity:-** Introduce things

1.3.1.2 **Things required:** Book, chair, desk, table.

1.3.1.2 **Method:-**

(a) Book, desk, chair and table all have definite shape pick one by one, whether these articles retain their shape or not.

1.3.1.3 Discussion:

(a) Solids have definite shape.

(b) Pour some water from your water bottle in the bowl of your tiffin, at your palm, water take the shape of the container.

Liquid take the shape of the container.

(c) Ask the student to inflate balloon small or large has no definite shape.

1.3.2 **Packing of particles**

1.3.2.1 **Things required:-** Class room with students.

1.3.2.2 **Method**

a. Form three groups of students (4 each)

b. First group will hold each other from back and lock arms (tag them as solid)

c. Second group should hold arm to form chain (tag as liquid)

d. Third group of student by touching each other with finger (tag them as gas) One student will run through each group.

1.3.2.3 **Discussion**

a. Matter is made of particles like student.

b. Particles are closely packed in solid, loosely packed in liquid and not packed in gases.

Activity 1.3.3 Space among particles

1.3.3.1 **Things required:-**

Tiffin, Sand, water and bottle.

1.3.3.2 **Method**

a. Take some sand in a tiffin bowl, add few drops of water into it, where it goes.

b. Take some water in glass or plastic empty bottle add a drop of ink in it, ink will intermix through the water.

1.3.3.3 **Discussion:-** Particles in the matter have space in between them solids have least space, liquids have larger space and gases have largest space in molecules.

Activity 1.3.4 Compressibility of Matter

1.3.4.1 **Method**

Compress you desk, chair, books, no why compress your in balloons, highly compressible.

1.3.4.2 **Discussion:-**

Solid cannot be compressed liquid little compressible while gas can be compressed very easily.

1.3.5 **Activity:-**Matter can flow.

1.3.5.1 **Method**

a. Try to run your pen on your desk, it is running or not why?

b. Pour some water on your desk, it running/flowing towards down side than to grow)

c. Open perfume bottle, smell is emanating in the whole room.

1.3.5.2 **Discussion:-**

(a) Solids do not flow, liquids have a tendency to flow and gases flow with high speed called diffusion.

(b) Why smell of food reaches to us from kitchen?

1.3.6 **Activity:-**Evaporation.

1.3.6.1 **Method**

Take water in three separate containers.

a. Open surfaces like a table.

b. Tiffin box

c. Water bottle

Which surface get dried up first?

Process of escaping of liquids from the surface at room temperature and pressure is known as evaporation.

1.3.6.2 **Discussion:-**

(a) Evaporation depends on:-

1. Surface area
2. Temperature
3. Humidity
4. Increase in wind.
5. evaporation causes cooling.

How wet clothes get dry?

Why we wear cotton clothes in summer?

Why water get cooled either pitchers(matka)?

1.3.7 **Activity:-**Latent heat of fusion

1.3.7.1 **Method**

Put some ice cubes in your Tiffin box(or already kept), observe some of the ice is converting into water measures the temperature of ice and water formed other ice.

1.3.7.2 Discussion:- Matter changes its shape.

Solid- liquid-Gas

Since temperature of solid ice and water changed from that ice measured as 0^0 c.

Since both ice(solid) and water(liquid) at same temperature but some heat is required for this change called Latent heat energy required to change one kg of solid to liquid at its melting Point known as **latent heat of fusion.**

1.3.7.3 **Steps:-**

Students are taken to Laboratory.

1. Take two beaker one with cold water and other with hot water. Put crystals of potassium permanganate in each beaker observer.

Discussion:- Purple color of potassium permanganate move through entire water in beaker.

2. Rate of movement of potassium permanganate is higher in hot water.

On rise in temperature kinetic energy of particles increases so movement of parties are more faster.

Repeat the experiment with blue crystals of copper sulphate.

3. Put some water in a beaker put on wire Gauze and heat till boiling. Put some blue

crystals of copper sulphate in it. The colour is coming to the surface measure at the temperature of the water.

Discussion:-

1. Boiling is bulk phenomenon while evaporation is surface phenomena.
2. Particles of the matter (solid, liquid, and gas) always remain in motion with different speed and kinetic energy.
3. Some solids can be compressed a little like water bottle, tiffin box etc. why?
4. Liquids are transparent.

Value Based Question

There are two types of dustbins blue color and green color in your school. Students are asked to put polythene bags and plastics in blue dustbin and either things like leaves, paper, unused food etc in green dustbins called biodegradable materials.

Polythene and plastics are collected and recycled as they are non-biodegradable and cause soil pollution blocking drains, piling in Yamuna etc.

After reading the above passage answer the following questions?

1. Why should we not use polythene bags for wrapping food etc.?
2. Where should we through the polythene in dustbins?
3. What is cause of pollution in Yamuna?
4. Name the value exhibited by above paragraph.

2. Is matter Around Us Pure:

2.1 **Introduction:**This Physical world is made of matter item as pure or impure

depending upon the absence or presence of adulterants in it. Scientifically speaking, the pure substance is the matter consisting of the same (one) type of constituent particles and the impure substance (=mixture) consists of two or more types of component particles. So we can say that most of matters present around us exits as mixture of two or more pure substances. Interestingly, we can exemplify the pure labeled milk or ghee as mixture of two or more components but not a pure substance.

EFFECTIVE METHODS OF TEACHING THIS CHAPTER:

- Concept Mapping Method.
- Activity – Based Learning Method.
- Lab-Education Method.
- Project-Based Learning Method.
- Group Quiz Method.
- Questioning Method.
- ICT Method (=Multimedia Method, = Computer – Supported collaborative Learning Method)

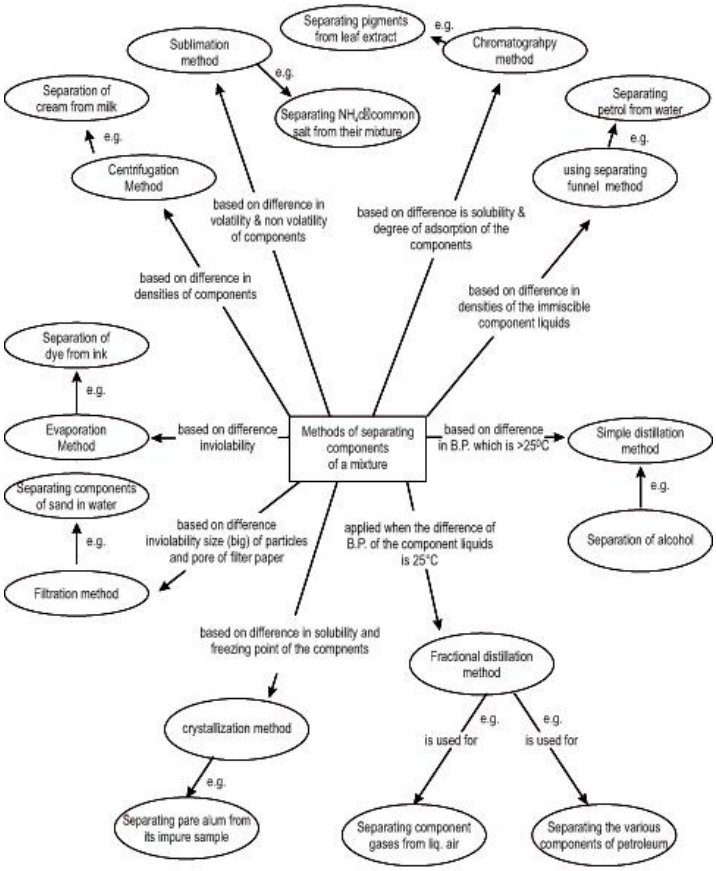
2.1 **CONCEPT MAPPING METHOD:-**

It is a very interesting method and takes short time to assimilate the concepts. The components of a concept map are:

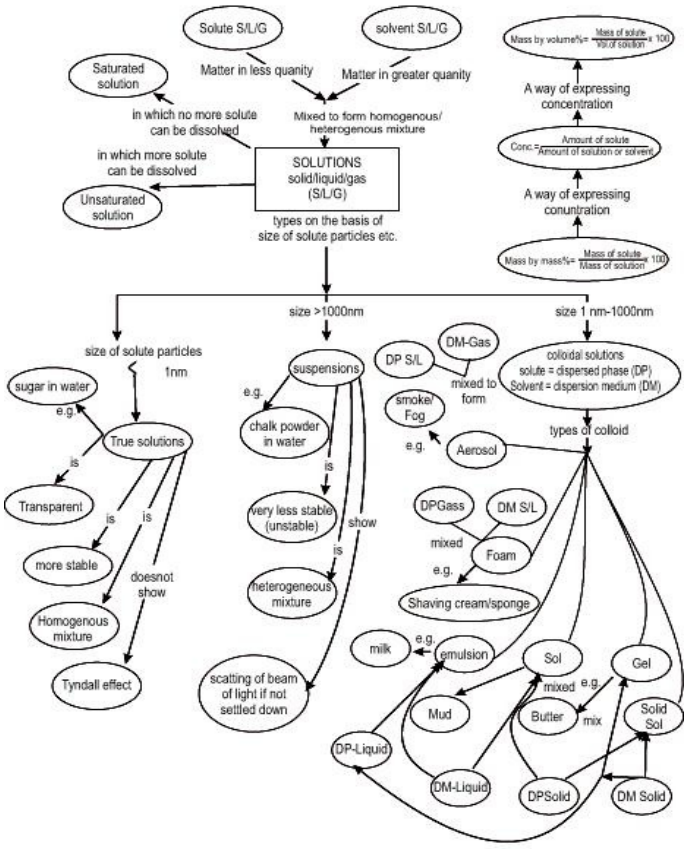
- Concepts: chemical terms and ideas.
- Propositions: a combination of two modes (concepts) and a labeled line.
- Hierarchy: concepts drawn from general (must important) to specific (least important).
- Cross-links: connections between one segment of concepts and another segment.

The following three concept maps almost cover the entire chapter.

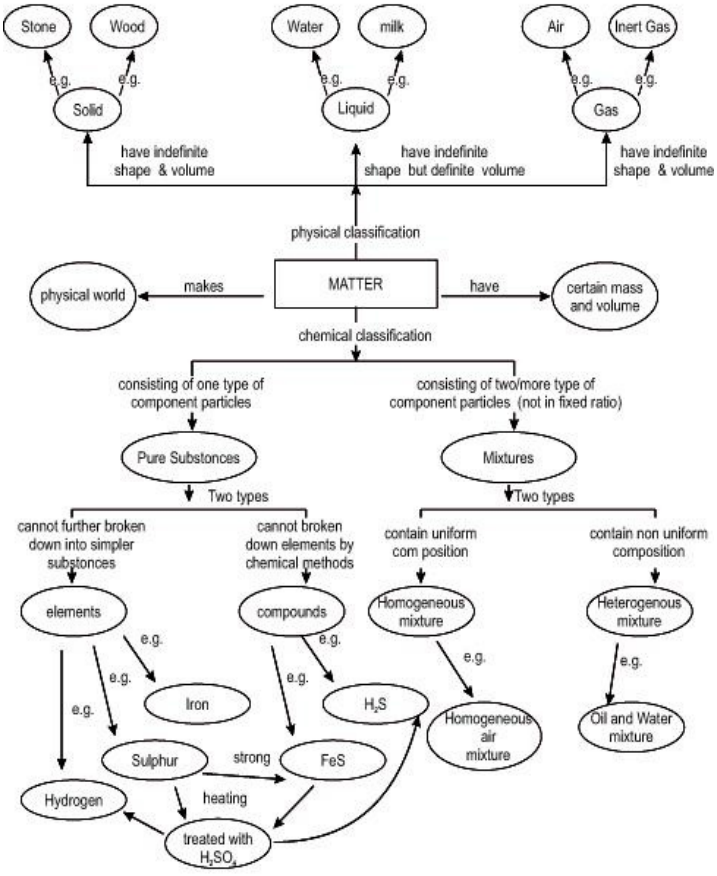
Concept Map for methods of Separating the components of A Mixture:



Concept Map for Types of Solutions



Concept Map of Types of Matter:



ACTIVITY– BASED LERANING METHOD-

It is very effective and interesting method. It is a practical method. It is based on the concept “Learning by doing”. This method is useful for clear-cut idea of the concept and also for long term retention of the knowledge thus acquired.

Here we can take an exemplary case as : (Guided by the facilitator)

Activity: It involves the following steps:

Step 1: Divide the whole class of students into groups A, B, C, D, E, F, G and H.

Step 2: Distribute to each group the following samples to be mixed completely.

- One spatula full of common salt (sodium chloride) to group A to be mixed in 50 ml of (distilled) water in a beaker.
- One spatula full of chalk powder to group B to be mixed in 50 ml of water (D.W) in a beaker.
- 50 ml of milk to group C to be mixed in 50 ml. of water (or D.W) in a beaker.

- 50 ml of petrol (or kerosene) to group D to be mixed in 50 ml of water (or D.W) in a beaker.
- 50 ml of acetone to group E to be mixed in 50 ml of water (or D.W) in a beaker.

- 10 g of alum (potash alum) to group F to be mixed in 50 ml of water (or D.W) in a beaker.
- 10 g of ammonium chloride (NH & 4ce) to group G to be mixed in 10 g of common salt (Nacl) solid in a china dish.
- 50 ml of diesel to group H to be mixed in 50 ml of petrol in a beaker or round bottom

flask.

Step 3: Direct each group of students to observe the properties like:

- Visibility (Tyndall Effect) : Whether transparent or opaque or translucent.

- Stability: whether stable or unstable mixture made by them using one of the following suitable method.
- Evaporation method

- Filtration method

- Centrifugation method

- Using separating funnel

- Simple distillation method

- Fractional distillation method

- Crystallisation method

- Sublimation method

- chromatography

Step 4: Discuss the observations, principles and methods of separating the components of a

mixture.

Lab Education Method-

Likewise previous discussion, consider an example of experiment which requires laboratory equipments and chemicals. (detail by you self). For example - fractional - distillation of petroleum or simple distillation method.

Project - Based Learning Method-

Divide the whole class students into many groups and a lot them different projects entitled as: (for example)

- To study the various types of colloidal solutions having different combinations of physical states of dispersion medium and dispersed phase. (8 types).

Group Quiz Method-

Divide the students of the class into 6 to 7 groups (viz A, B, C, D, E, F and H) and announce the guideline rules for marking. Teacher should act as anchor to facilitate the group and ask the valuable question related to the chapter. (for example)

- which method is suitable to separate camphor and chalk powder from their mixture?
- which method is suitable to obtain the various components of petroleum?
- which separation technique will you apply for the separation iron filings from sand?
- what is the formula to evaluate mass by mass percentage of a solution?
- what is a saturated solution?
- what is the effect rise of temperature on the solubility of common salt?

Questioning Method

This is a classical method but it is an effective method. This method is suitable to assess the level of learning. (Detail by yourself taking example from this chapter.)

Multimedia Method (ICT Method)

This modern method is becoming very popular due to its audio-visual and dynamic approach. This method involves the following aspects:

- Power point presentation (PPT) involving text & animation.
- Exchanges of e-mails among the teachers & students.
- Exchanges of messages among the teachers & students.
- Video conferencing
- On line teaching
- Telecast teaching (Gyandarshan program)
- visit of knowledge enrichment sites like www.knowledgeforrum etc.

3. Atoms and Molecules

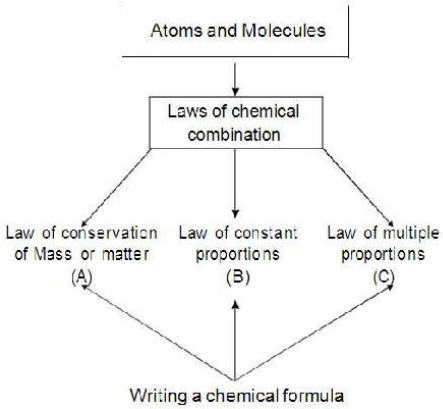
3.1 **Introduction:-**

John Dalton called small particles by the name of 'atom' the word 'atom' mean indivisible.

The particles of matter(Atom) normally exist in a combined form and various combinations of particles give us various kind of matter. This combined form of atoms is now called molecules.

The properties of matter depend on the properties of atoms and molecules form which it is made.

3.2 **Concept Map**



(A) **Activity 3.3.1**:-History of atoms and molecules teaching strategy- Quiz

3.3.1.1 **Materials Required:-**

Black board, chalk, question bank prepared by teacher, and stopwatch.

3.3.1.2 **Steps-**

This activity of Quiz is conducted in the class to recapitulates the chapter after its completion. Entire class is divided into teams a team may contain 10-12 students.

Rules- There may be two rounds of each team. If a team gives wrong answer or no answer then 1 mark will be deducted and bonus mark will be awarded to answering team.
- Teacher may draw a score board on the black board.

First round- one word answer,

4 question, half minutes.

Sample question- for team I- Who were wondered about the unknown and unseen form of matter?

2. When the Idea of divisibility of matter was considered?

Team 2- Who was the Indian philosopher who postulated that if we go on dividing matter we shall get smaller and smaller particles?

You may conduct further as above for other teams.

3.3.1.3 **Points of Discussion:-**

- While getting the answers from the student the teachers may make the weak point of the students for the chapter and may plan for their remedial teaching.

- The teacher will discuss with groups on the history of atoms and molecules. **Activity 3.3.2:-** Law of conservation of mass

3.3.2.0 **Methodology:-**Lab activity and games.

3.3.2.1 **Step 1-**

Teacher can prove the law of conservation of mass of Lab activity/experiment and game.

Experiment.

Verification of law of conservation of mass in chemical reaction.

Materials Required:-

Barium chloride crystals ($BaCl_2 . 2H_2O$)

Sodium Sulphate crystals ($Na_2SO_4 . 10H_2O$) Distilled Water.

Half cut plastic bottle

Small and Big.

- **Step-2** Verify this law by the following weighed set of chemical

$BaCl_2(aq)+Na_2SO_4(aq) \longrightarrow BaSO_4(s)+2NaCl(aq)$

Step 3- Teacher will perform activity 3.1 as given in NCERT text book of 9th class.

3.3.2.3 **Points of Discussion:-**

Mass of Barium Chloride $BaCl_2 . 2H_2O+Na_2SO_4.10H_2O$ is equal to the mass of

$BaSO_4+2NaCl$ Suggest that mass is not lost in a chemical reaction. It is conserved.

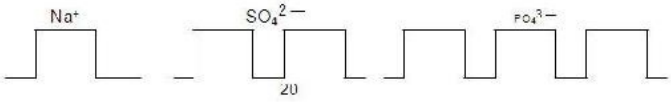
Activity 3.3.3:- Writing Formulae

3.3.3.1 **Methodology:-**A low cost model for writing formulae.

3.3.3.2 **Material Required:-** Empty blister packs of medicines.

3.3.3.3 **Steps:-**

1. Take empty blister packs of medicine
2. Cut them in groups according to the valenay of element.
3. Make the formulae by



3.3.3.4 **Points of Discussion.**

SO_4^{2-} (Sulphate) requires two positive charge combined eith 2 Na to form Na_2SO_4.

3.3.4 Activity:- Law of constant proportions

3.3.4.1 **Methodology:-**Experiment of discussion

3.3.4.2 **Material required:-** 100 of pure water taken from different sources (like river, sea, well etc)

3.3.4.3 **Step**

1- Take 100 g of pure water

2. Pass electricity through it

3. Repeat this thing with the pure water taken from other sources.

3.3.4.4 **Points of Discussion**

Will discuss that always consists of the same two elements, hydrogen and oxygen

combined together in the same constant proportion by mass.

3.3.5 Activity:- Writing a chemical formulae

3.3.5.1 Methodology:- by games

3.3.5.2 **Material required:-** Play cards with symbols and play card with valencies of elements.

3.3.5.3 **Step:-**

1. Make play card with symbol and valencies of the elements.
2. Each student hold two P(acards, one with the symbol) in the right hand.

- Another with the valency in the left hand.

- Keeping the symbols in place students should criss cross their valencies to form the formulae of a compound.

3.3.5.3 **Points of Discussion**

Will discuss an symbols and valencies of elements

- To form the formulae of a compound

Question Bank

A- High order thinking Question(HOTS)

1. Magnesium and Oxygen combines in the ratio of 3:2 by mass to form magnesium oxide. What mass of oxygen gas would be required to react completely with 12g of magnesium?
2. Calculate the no of aluminium ions present in 0.05/g of aluminium oxide.
3. Calculate the number of moles?

   (i) 1.20 g of water

   (ii) 2.22 g of CO_2

3. Calculate the no of molecules in 8g of O_2 molecules.

(B) **Examples**

1. Write the names of element s present in: a- Slaked Lime

   b- Quick Lime

2. Write the formulae of Aluminium Oxide

   Element: Aluminium Oxide

   Symbol: Al O

   Valency: 3 2

Formulae: A_2O_3

If one mole of sodium atoms weighs 23g, what is the mass(in g) of one atom sodium

C. **<u>Value based question</u>**

Two class 9^{th} students, Kaveri and Nalin, were asked to take 5.3 g of sodium carbonate and 6g of ethanoic acid to make2.2 g of CO_2, 0.9 of H_2O and 8.2g sodium ethanoate. Kaveri followed the instruction but Nalin took the chemicals without measuring their amounts.

1. Who's activity do you think will be in agreement with the law of conservation of Mass?
2. State the Law of conservation of Mass?
3. Who's method do you like and why?

Resources:-

Science Lab skills(by S.K. Jain and Rajan Dhingra)

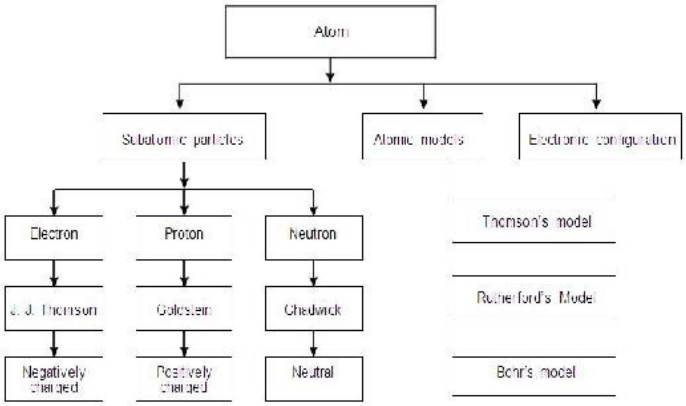
- Chemisty 9^{th} class(By Lakhkmir Singh)
- Chemistry about.com
- School.aglasem.com
- Science 9th class(NCERT)
- www.boundless.com

4. Structure of the Atom

4.1 **Introduction:-**

Dalton stated that the smallest and the ultimate particle of matter is atom. Atoms of the same elements are alike and they differ from the atoms of the other elements. Atom is made up of a number of sub-atomic particles and of which the most important are electrons, protons and neutrons.

4.2 **Concept Map**



4.3.1 **Activity**

To give the students a basic idea about the structure of an atom; which comprises of a dense and heavy mass at the centre, known as nucleus.

4.3.1.1 **Method:**Demonstration.

4.3.1.2 **Material Required:** 2 sheets of white paper, carbon paper, compass, tape, dart,

board, poster board and pencil.

4.3.1.3 **Steps:**

- Guide the students to prepare a dart board.
- Stand over the target paper and drop a dart 100 times form chest height, attempting to hit the center mark.
- Ask the students, what is the probability that a dart(representing an electron) will hit the centre of the target(representing the nucleus of the atom)?

4.3.1.4 **Points of discussion**

Make them draw conclusions. Relate the findings to the model of an atom.

4.3.2 **Activity**

To summarize the concept terms of structure of atoms.

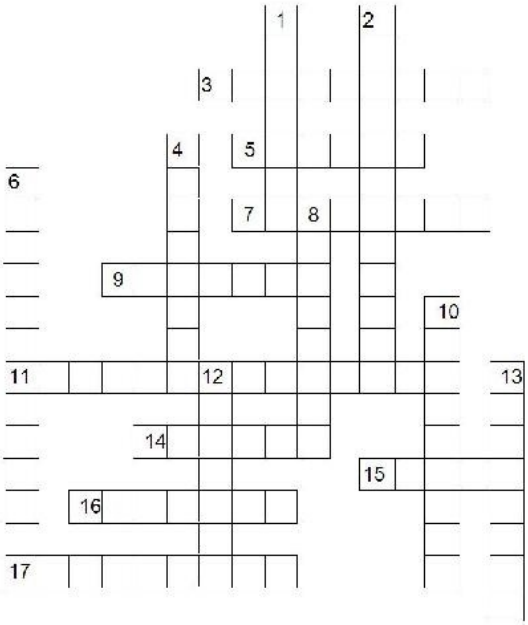
4.3.2.1 **Method:**Activity-puzzle/crossword

4.3.2.2 **Material Required:** Crossword sheet

4.3.2.3 **Steps**

- Students are asked to revise the terms by crossword.
- Fill the crossword according to statements.

Atomic Structure



Down

1. Particle with no charge.
2. The most common isotope of carbon

4. The lightest element.

6. The lightest element.

8. Negatively charged particle.

10. An element that borrow electrons in chemical reactions.

12. A nuclear reaction in which an atom's nucleus splits to form two new atoms.

13. The center of an atom.

Across

3. Isotope of hydrogen with one neutron.

5. Positively charged particle in the nucleus.

7. Helium, neon, argon, or krypton.

9. An atom of an element with a different number of neutrons in the nucleus.

11. The isotope of carbon that is used for dating things in archaeology.

14. A nuclear reaction in which the nucleus of two atoms combine to form one nucleus.

15. An element that lends electrons in chemical reactions.

16. Isotope of hydrogen with two neutrons .

17. When two atoms of different element s combine chemically, what it produce?

4.3.3 **Activity :-**

Electronic configuration of hydrogen atom.

4.3.3.1 Strategy:- Game

4.3.3.2 **Materials Required:-**

Pamphlets/Cards,(One Card on which nucleus written) and another card on which electron is written)

4.3.3.3 **Steps-**

Teacher will form a small circle another big circle on the floor of class room have a card of nucleus to teacher will ask the student stand on the small circle and another student will draw an another big circle with having a card of electron.

This will be the structure of hydrogen atom.

4.3.3.3 **Points of Discussion:-**

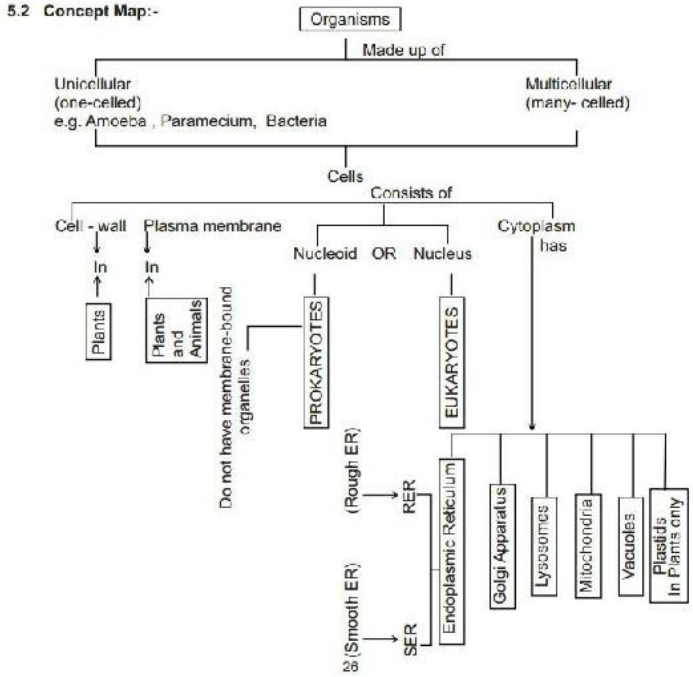
One Teacher will explain the structure of hydrogen atom that one electron is moving around the nucleus and nuclear consist of one proton without any neutron. Similarly the structure of next element can be discovered all the Bohr and Burry suggestion.

5. The Fundamental Unit of Life

5.1 **Introduction: -** The topic cell as a fundamental unit of life enables the student to have a micro view of living things along with the macro-view around them. The topic connects lenses/optics of physics with biology-how Robert Hooke made a chance discovery of box like structures in a piece of cork under a self designed microscope.

- In the 17th century glasses were grouped to make lenses and lenses were arranged to make optical instruments like microscope.
- They observed and became aware about unicellular and multicellular organisms.

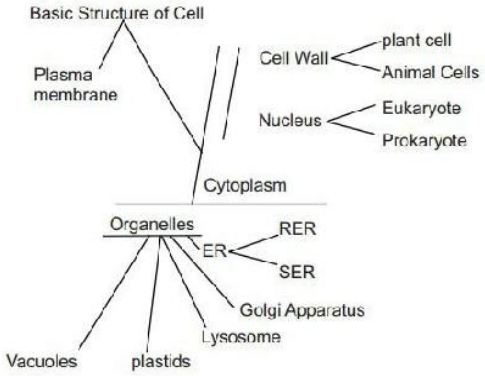
5.2 Concept Map:-



5.2.1

Cell Shape - Nerve Cells - branched

Cell Size - Egg Cell



5.3 **Activity**

5.3.1 **Concept:-**Magnification by hand lens and compound microscope.

5.3:1:1 Teaching Strategies:- Observation and activity

5.3.1.2 Materials Required:- Hand lens, compound microscope/improvised microscope.

Compare it with the 2 lenses in compound microscope, estimate the magnification of the compound microscope and check it with the magnification written in the lenses.

5.3.1.3 Steps:-

Students will observe hand lens in groups and guess(estimate)how many times a letter under it appears big compared to the actual size-that is the magnification say 10x/15x.

5.3:1:4 Point of Discussion :- 10 × 10 = 100 magnification

10 × 45 = 450 magnification

5.3.2 Concept:- The basic building unit-cell

5.3.2:1Teaching Strategy:- Slide preparation activity

5.3.2.2 Materials Required:-

Onion, blade, glass slide, cover slip, compound microscope, saffranin stain.

5.3.2.3 **Steps:-**

Peel the thin layer of the onion(from the concave/inner layer). Cut a small piece and place on the slide. Put a drop of saffranin solution on the peel and place the cover slip and observe under the compound microscope. Draw the structure observed under the microscope.

5.3.2.4 **Points of Discussion :-**

Different groups must have made slide from different sizes of onions. Do the structures look alike or different?

They are cells. Cell-basic building units of the onion bulb and all organisms are made up of cells. Cell from Latin word cellular - meaning a little room.

5.3:3 Concept:- Cell as fundamental unit of life.

5.3.3.1 Teaching Strategy:- Activity by observation

5.3.3.2 **Materials Required:-**Compound microscope, watch glass, pond water

5.3.3.3 **Steps:-**

Observe a drop of water taken from a stagnant pond, put on a slide under the microscope.

5.3.3.4 Points of Discussion :-

Many unicellular organisms will be visible.

Unicellular Organisms:- (Uni=Single)

Images of Amoeba, Paramecium and Bacteria.

Single cell performs all activities like movement, feeding, excretion, reproduction.

Multicelullar Organisms :- (multi=many)

Images of Hydra, Sponge, Root T.S. etc.

5.3.4 **Concept:-** Slide preparation of plant

5.3.4.1 **Teaching Strategy:-** Activity of slide preparation

5.3.4.2 **Materials required:-** Leaf, onion root tip

5.3.4.3 **Steps:-**

Groups of students will prepare temporary slides of leaf peels/tip of onion roots.

Points of Discussion :-

Many cells in organisms perform functions and different body parts are formed by many cells. e.g. cells of our eye help us to see. We move because of muscles and bones.

Cells of the digestive system in our body help to perform steps of digestion.

5.3.5 Concept:- Shape of Cells

5.3.5.1 **Teaching strategy:-**Observation of image and discussion

5.3.5.2 **Materials required:-**Images of nerve cell, blood cell, muscle cell.

5.3.5.3 **Steps:-**

Images of monophylla cells, epidermal cells in plants.

Each group will select one image, observe and discuss with other group.

5.3.5.4 Points of Discussion:-

You move your leg quickly if you accidentally step on a thorn/sharp object. The nerve cells transmit message from body parts to brain/spinal cord and back. Does the shape of nerve cells match with its function.

5.3.6 Concept:- Size of cells- Egg cell of Ostrich, human, hen etc.

5.3.6.1 Teaching strategy:- Discussion method

5.3.6.2 Materials required:- Diagram of different eggs- Ostrich, hen, human

5.3.6.3 Steps:- Observe and compare size of different eggs.

5.3.6.4 Points of Discussion:-

Smallest cells:- Mycoplasmas- 0.3 m in length.

Bacteria- 3 to 5 m

Human R.B.C= 7 m in diameter.

5.3.7 Concept:- Cellular structure and function

5.3.7.1 **Teaching Strategy:-**Activity and discussion method

5.3.7.2 **Materials required:-**Compound microscope, permanent slide of Amoeba.

5.3.7.3 Steps:- Observe slide under microscope.

5.3.7.4 Points of Discussion:- Cell as structural Unit:-

Brick- Wall-Room-Building

Cells- Tissues-Organs-Organism

Cell as Functional Unit

Organism Perform- Different functions like Feeding, Digesting, Moving, Removing Waste, Reproducing etc.

(Even cell of unicellular organism like Amoeba performs some functions.

5.3.8 Concept:- Structure of cell

5.3.8.1 Teaching Strategy:- Activity method

5.3.8.2 Materials required:- Compound microscope and permanent slide of onion peel.

5.3.8.3 Steps:- Observe slide under microscope and see nucleus, cell wall etc.

5.3.8.4 Points of Discussion:- Structural Organization of a cell:-

Almost every cell has
- Plasma membrane
- Nucleus
- Cytoplasm

Plasma membrane/cell membrane-

It is an outermost covering of the cell that separates contents of the cell from its external

environment. It allows the entry and exit of some materials in and out of cell- so it is called selectively permeable membrane.

5.3.9 Concept:- Movement across the Membrane (Diffusion and Osmosis)

5.3.9.1 Teaching Strategy:- Experiment of diffusion

5.3.9.2 Materials required:- Ink, glass

5.3.9.3 Steps:- Put a drop of ink/tea in clear water and students will observe movement of ink/tea drop molecules in water.

5.3.9.4 Points of Discussion:-

Diffusion Spontaneous movement of a substance from a region of high concentration to a region of low concentration.

CO_2 (as waste). From cell- Outside.

The movement of ink particles is towards which direction?

Diffusion- Higher concentration to Lower concentration

Osmosis:-

- Osmosis with egg membrane
- Osmosis with raw and boiled potato
- Plasmolysis with raisins.

5.3 **Value based Questions & /Hots:-**

Q.1. What is the nature of lenses used in a compound microscope?

Q2. Which of the following statements about living cells is false?

a. Most are microscopic
b. They are found in all animals but not in plants.
c. They are the smallest basic units that carry out all the functions of living.

Q3. Which of the following statements is not true about cells?

a. The nucleus is within the cell membrane which is surrounded by the nuclear membrane.
b. The nucleus is within the nuclear membrane which is surrounded by the cytoplasm.
c. The cytoplasm is within the nuclear membrane.

Q4. Which of the following statements is correct?

a. Animal and fungal cells contain chloroplasts.

b. Animal and plant cells do not contain mitochondria.

c. Plant, animal and fungal cells possess mitochondria.

d. All plant cells contain chloroplast.

Q 5. Which of the following are not found in plant cells ?

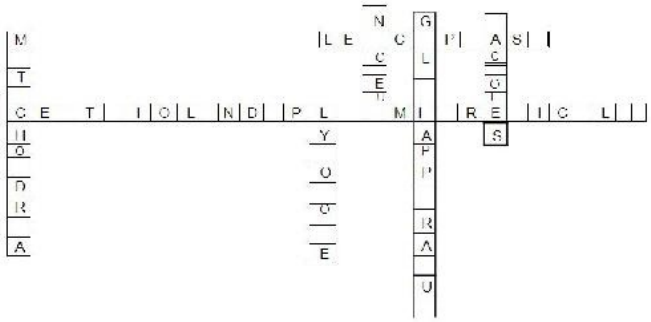
a. Mitochondria

b. Endoplasmic reticulum

c. Centrosomes

d) Golgi apparatus.

Fill in the following puzzle with names of organelles according to the names given below



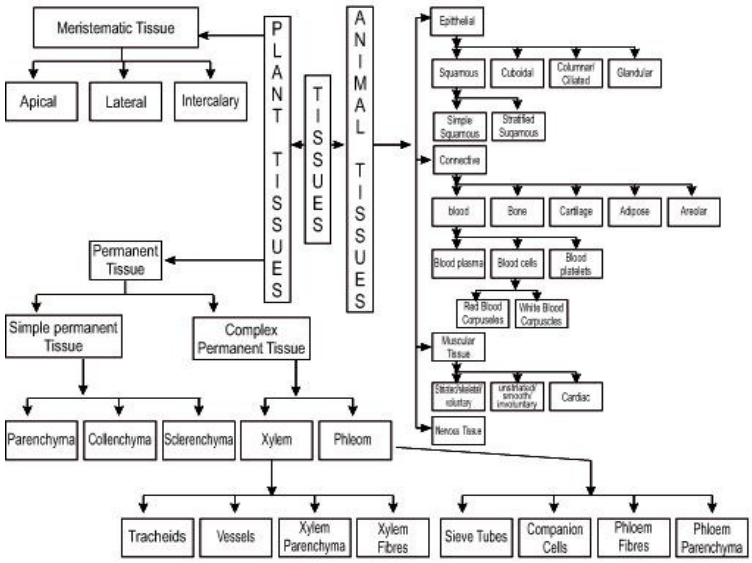
1. (Down)- Power House of the cell/organelle releases energy required by the cell.
2. (Across-L to R) Organelle seen in animal cell which is helpful in cell division.
3. (Across L to R) Network of membrane-bound tubes responsible for enzymes and proteins.
4. (Down) Contains Chromosomes
5. (Down) System of membrane-bound vesicles which store enzymes
6. (Down) Storage sacs of the cell which are small in animal cells and big in plant cells.
7. (Down) Contain power full digestive enzymes.
8. (Across L to R) Store food in plant cells and are colourless.

6. Tissues

6.1 Introduction:-

- The basic structural and functional unit of our body is cell. A number of cells form a group and work in unison to perform similar functions, such group of cells which are similar in origin and structure and perform the same function are called tissues.
- This chapter will help the teachers to
  - classify the concepts related to plants and animal tissues
  - apply appropriate teaching strategy for teaching tissues
  - teach various types of tissues by performing activities in/outside the classroom
  - utilize various resources for the better understanding of the concepts of tissues

6.2 Concept Map:-



6.3 Activities:-

6.3.1 Concept :- Meristematic tissue-To study the function of apical and lateral meristem (to be started before 15 days of explaining the concept)

6.3.1.1 **Teaching Strategies:-**Observation, inquiry, tabulation

6.3.1.2 **Materials Required:-**Potted plant, pointer to make the mark, inch tape, notebook and pencil

6.3.1.3 Steps:-

Guide students to follow following steps:

- Take a potted plant and put a mark with the pointer on the stem of the plant.
- Measure the height of the mark from the base.
- Also measure the girth of the plant at that point.
- Repeat the observations after 15 days
- Discuss the observations in the class and explain the concept of apical and lateral meristem

6.3.1.3 **Points of Discussion :-** Apical meristem, lateral meristem

6.3.2 Concept :- Permanent tissue. To study the xylem vessels

6.3.2.1 Teaching Strategies:- Observation, recognizing patterns, interpretation, inquiry, hands-on experiences

6.3.2.2 Materials Required:- Food colours (red), Sharp blade, water, dropper, slide, cover slip, microscope

6.3.2.3 **Steps:-**

- Fill the beaker with water
- Add red dye in water
- Soak the stem in water for 1 hour.
- Cut thin sections of the stem and keep it on the slide.
- Put coverslip and look under the microscope.
- Xylem vessels are observed under the microscope.

6.3.2.4 Points of Discussion:- Xylem vessels

6.3.3 Concept:- Phloem. To study the phloem tissue

6.3.3.1 **Teaching Strategies:-**Observation, interpretation.

6.3.3.2 **Materials Required:-**Slide of phloem tissue, microscope, chart of phloem tissue

6.3.3.3 **Steps:-**

- Set the slide of phloem tissue under the microscope
- Instruct students to observe the slide and study it

- Show the elements of phloem in the chart
- Discuss the functions of different elements of phloem

6.3.3.3 **Points of Discussion:-**

Phloem, sieve tube, companion cells, phloem fibres, phloem parenchyma

6.3.4 Concept: Epithelial Tissue. To show different epithelial tissues

6.3.4.1 Teaching Strategies:- Observation, recognizing patterns, interpretation, inquiry

NOTE: This activity can be done for all kinds of animal tissues

6.3.4.2 Materials Required:- Slides and charts of squamous, columnar, cuboidal and glandular epithelium , microscope

6.3.4.3 **Steps:-**

- Show unlabeled slides of squamous, columnar, cuboidal and glandular epithelium to the students
- Tell the students to observe each slide carefully and draw the diagram of each cell.
- Note the differences and similarities among the four slides
- Discuss it in the class
- Let the students come on the right conclusion
- Then explain the four types of tissues and their presence in the human body.

6.3.4.4 **Points of Discussion:-**

Squamous, columnar, cuboidal , glandular epithelium

6.3.5 Concept :- Connective tissue. Observe blood under the microscope

6.3.5.1 **Teaching Strategies:**Observation, handling microscope, hands-on experience

6.3.5.2 **Materials Required:**Needle, slide, dropper, cover slip, microscope

6.3.5.3 **Steps:-**

- Prick the tip of the finger with a sterile needle.
- With the help of dropper, place the drop of blood on the slide.
- Cover it with a cover slip.
- Observe under the microscope.
- Tell students to note the observations.
- Explain the presence of RBC and WBC in the blood and also explain their functions

6.3.5.4 Points of Discussion:- RBC, WBC

6.3.6 Concept:- Muscular tissue, skeletal, smooth and cardiac tissue.

6.3.6.1 **Teaching Strategies:-**Use of ICT, problem-solving, analytical approach

6.3.6.2 **Materials Required:-**Slides/CD of skeletal, smooth and cardiac muscle fibres, slide projector/LCD projector

6.3.6.3 **Steps:-**

- Project the slides on the screen one by one.

- Allow the students to observe carefully and draw the diagrams.
- Tell the students to find some peculiar thing in the slide related to the name of the muscle fibre.
- Students will identify it. Then explain the details of all the three muscle fibres and their presence in the human body.

6.3.6.3 **Points of Discussion:-** Skeletal, smooth and cardiac tissue

6.3.7 Concept :- Nervous Tissue. Neuron

6.3.7.1 **Teaching Strategies:-**Use of ICT, problem-solving, analytical approach

6.3.7.2 **Materials Required:-**Slide/CD of neuron, slide projector/LCD projector

6.3.7.3 **Steps:-**

- Project the slide of neuron on the screen.
- Allow the students to observe carefully and draw the diagrams.
- Tell the students to observe some differences in both the ends of the figure.
- Explain the structure and function of the neuron.

6.3.7.4 **Points of Discussion:-**

neuron, axon, dendrite, electric impulse

6.4 **Resources:-**

- www.meritnation.com
- www.slideshare.net
- classroom.hiddenvilla.org
- serc.carleton.edu
- education-portal.com

6.4. **References:-**

- M.P. Kaushik -Modern Botany
- Ramesh Gupta – Modern Zoology Raven Johnson – Biology
- Roblyer M.D.- Integrating Educational Technology into Teaching
- Sharma,S.(ed.) -Constructivist Approach to teaching and learning Handbook forteachers of Secondary Stage
- Tortora, G.J. & Grabowski, S.- (2006) Principles of Anatomy & Physiology

6.6 **Exemplar Questions / HOTS:-**

- When a mosquito bites us, we tend to react immediately. Which tissue is responsible for this reaction?
- There are few cells in our body which protect us from diseases. Name the cell and also name the tissue in which these cells are found.
- Find out the chemical composition of bone.
- Why do animal tissues require more energy as compared to plant tissues?
- Which tissue is responsible for easy bending of various parts of plants?
- Elaborate the role of epidermis in desert plants.
- While building the balcony of his house, Robin found that a tree was hindering the projection of balcony. He decided to cut the tree from the top so that the balcony could be built without any hindrance.

Now answer these questions:

  - What harm will be done to the tree if he cuts the tree from the top?
  - Is it justified to cut a tree
  - If you were in Robin's place, then what would you have done?

7. Diversity in Living Organisms

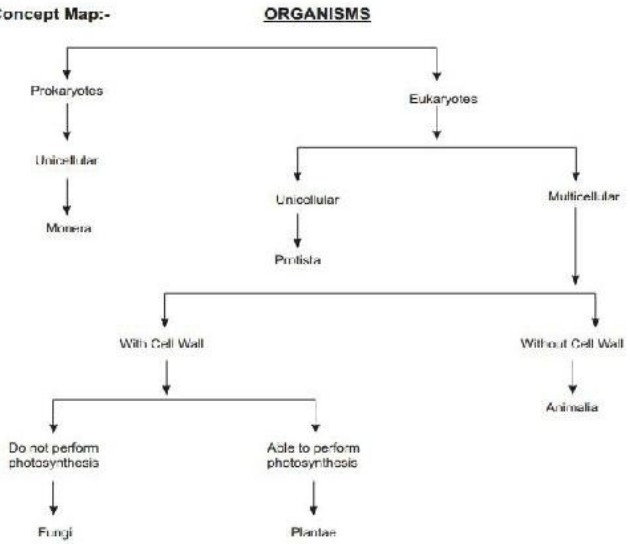
7.1 **Introduction:-**

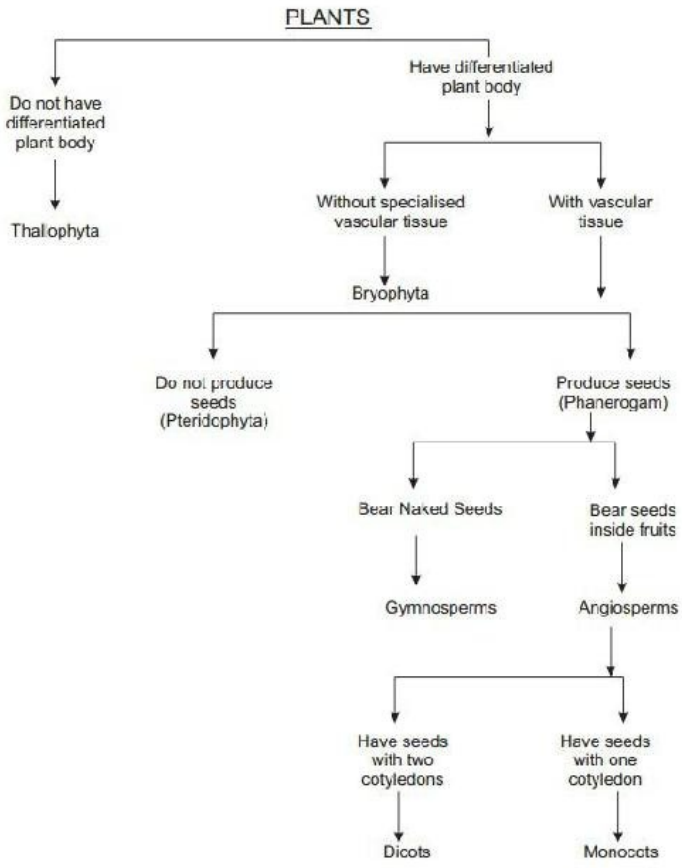
Throughout human history various attempts have been made to organize the million of organisms found on this Earth. Such is the diversity that they range in size from microscopic bacteria to large blue whales. Thus, there is a wide diversity in the flora (plants) and fauna (animals). During the course of organic evolution several species have become extinct. It is very difficult to study such a vast number of organisms (both living and extinct) individually and hence it was thought that if these organisms were arranged in an orderly manner, the study would become easy. All living organisms are grouped on the basis of their similarities and increasing complexities into categories such as:

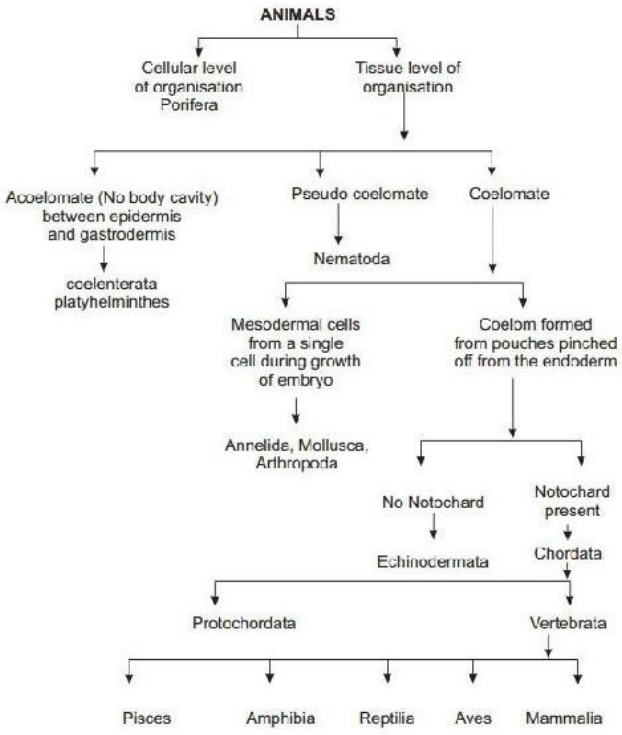
Kingdom, phylum, class, order, family, genus, species

Each organism has been given a scientific name to ensure uniformity and hence has two parts: genus and species. The science dealing with identification, naming and classification of organisms is called taxonomy.

7.2 Concept Map:-




PLANTS
Do not have differentiated plant body
Have differentiated plant body
Thallophyta
Without specialised vascular tissue
With vascular tissue
Bryophyta
Do not produce seeds (Pteridophyta)
Produce seeds (Phanerogam)
Bear Naked Seeds
Bear seeds inside fruits
Gymnosperms
Angiosperms
Have seeds with two cotyledons
Have seeds with one cotyledon
Dicots
Monocots


ANIMALS
Cellular level of organisation Porifera
Tissue level of organisation
Acoelomate (No body cavity) between epidermis and gastrodermis
Pseudo coelomate
Coelomate
coelenterata platyhelminthes
Nematoda
Mesodermal cells from a single cell during growth of embryo
Coelom formed from pouches pinched off from the endoderm
Annelide, Mollusca, Arthropoda
No Notochard
Notochard present
Echinodermata
Chordata
Protochordata
Vertebrata
Pisces
Amphibia
Reptilia
Aves
Mammalia

7.3 Activities:-

7.3.1 Concept:- Classification of organisms.

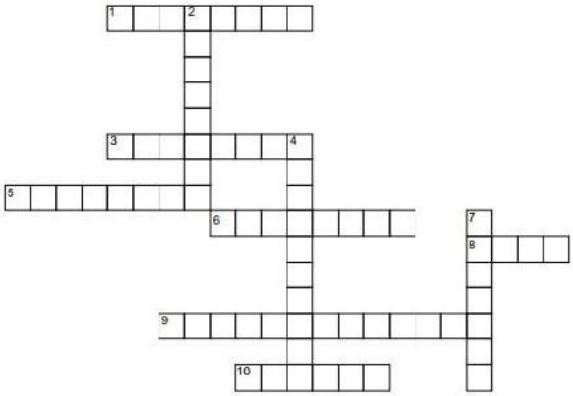
7.3.1.1 Teaching Strategy:- Crossword puzzle.

7.3.1.2 **Materials Required:-**Paper, pen/pencil, photocopies of the puzzle worksheet

7.3.1.3 **Steps:-**

The students may be given a worksheet that has a crossword puzzle and clues to complete the crossword.

The students may be asked to read the given clues carefully and fill up the blocks with appropriate word / term.



ACROSS	DOWN
1. Parasitic worms are one of these	2. Bilaterally symmetrical organisms having a true body cavity
3. This group includes animals with holes (pores) on their body wall.	4. These have jointed legs and have open circulatory system.
5. These have open circulatory system and have a foot that is used for moving around	7. A true vertebral column and internal skeleton, four chambered heart and presence of hair are the main features of this group
6. These have three chambered heart and respire either through gills or lungs	
8. Warm blooded animals that lay eggs, have a four chambered heart and are covered with feathers	
9 Spiny skinned animals having a coelomic cavity, have peculiar water driven tube system to move around.	
10. Cold blooded animals having scales and breathe through gills	

ACROSS

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DOWN

2. Bilaterally symmetrical organisms having a true body cavity

4. These have jointed legs and have open circulatory system.

7. A true vertebral column and internal skeleton, four chambered heart and presence of hair are the main features of this group

7.3.1.4 Points of Discussion:-

Mark for each correct word in the puzzle = ½ (Total Marks: ½ X 10 = 5)

This is a simple activity to inculcate confidence in learner. This activity is to be carried out in class as a part of formative assessment. The teacher will come to know about what the learner has finally learned or does it require any remediation on part of teacher.

7.3.2 Concept:- Classification of animals

7.3.2.1 **Teaching Strategy :-**The activity will be executed by means of a quiz.

7.3.2.2 **Materials Required:-**Used chart paper, used rubber bands, threads, paper sheets,

pen, pencil, sketch pens, stop watch.

7.3.2.3 Steps:-

1. The question bank of about 20 questions may be prepared. Each question is written on a card (use pastel sheet or discarded visiting cards to mark the cards).
2. The class is divided into groups according to class size.
3. Now color code the various groups, use colored chalks on board (or use colored sticks).
4. Draw the building on board or before class such an activity assigned for a chart to be made.

So this can be drawn on chart and time saved.

5. The game is to be conducted by the teacher. A stop watch may be used to limit/record the time for response.

6. One by one the questions related to various diseases can be asked to each team, each team answers after consulting other members of group (10 questions to each team).
7. A correct answer takes the team 1 floor up on building.
8. At the end of quiz whichever team reaches/scales highest floors wins.
9. The teacher may prepare a number of questions (question bank) and the game can be continued till all the floors scaled.
10. Efforts should be made that every student gets the answer.

TEAM RED	TEAM GREEN	TEAM BLUE	TEAM ORANGE

7.3.2.4 Points of Discussion:-

The teacher may give 1 point for each correct answer. The question unanswered can be answered by teacher so the total points remain 10 in activity. Each point can be converted to mark that will be common for all students belonging to a group. However, the individual viva based questions can also be added to include an individual level of assessment.

Suggestion:- Some students may not participate actively in this process. The teacher can guide such students by giving them some remedial work in the form of additional worksheets.

7.3.3 Concept:- Five Kingdom Classification

7.3.3.1 Teaching Strategy:- The concept of classification of organisms based on five kingdom classification can be executed by means of a group activity culminating in presentation.

7.3.3.2 Materials Required:- Used chart papers, threads or rubber bands, colored sheets, sketch pens, pen and ruled papers.

7.3.3.3 Steps:-

This is one task which can be performed as a group activity. Finally the group gives presentation.

This activity can be performed taking in account the time factor. The class can be divided into number of groups.

For a small class size let's say 35, we can divide the class in 7 groups of 5 each

TABLE 1

For a class size of 60 students, let's extend the activity further and include the next level of classification of plants.

GROUP NUMBER	GROUP SIZE	TOPIC
1	5	PROKARYOTES
2	5	EUKARYOTES
3	5	MONERA
4	5	PROTISTA
5	5	FUNGI
6	5	PLANTAE
7	5	ANIMALIA

TABLE 2

GROUP NUMBER	GROUP SIZE	TOPIC
1	5	PROKARYOTES
2	5	EUKARYOTES
3	5	MONERA
4	5	PROTISTA
5	5	FUNGI
6	5	PLANTAE
7	5	ANIMALIA

The same group activity may be further carried out to include different levels of classification of Animalia. Animalia is further classified into 10 subgroups. Here Vertebrates are grouped in five classes. If we organize the class in group size of 3 students each then the Animalia activity itself would involve 48 students. So faced with a BIG class size a teacher can involve 98 students (include table 1 and 2 above) in this group activity.

This is one group activity which can be executed in parts or whole depending on will of the teacher involved. The time allocated can also be controlled based on execution.

Execution:- The students will be asked to make and wear headgears of the level/Group/Class of organisms they represent. This is to help better identification and form association. Here the students can use the used charts to prepare these. Broken rubber bands can be used to tie these masks. The group can prepare a three page presentation. Page 1 listing the characteristic of the sub group. Page 2 including diagrams. Page 3 which lists the viva questions.

Each group will come on the stage and give presentation . Post these students and teacher can ask questions from them. In return the group giving presentation can ask viva questions from class.

7.3.3.4 Points of Discussion:- This is an inclusive activity as it includes everyone with different talent. The student good at drawing can draw diagrams, the thinker can frame questions, the shy child can write the content and the orator can give key point presentation. Bringing everyone on stage helps them face their fears and to give answers to viva questions all students need to come prepared. This activity fosters creative thinking in terms of making headgears and novelty in presentation. Further enhances scientific thinking if the teacher can ask questions related to evolution of organisms. The teacher must design proper rubric to assess the activity so that students have prior knowledge of basis of assessment.

ASSESSMENT POINTS	ASSESSMENT CRITERIA	POINTS
HEADGEARS	Legible, novelty in making	2
CONTENT IN WRITEUP	All features well listed	2
DIAGRAMS	Well labeled, accuracy	2
PRESENTATION	Confidence,execution,how the group responds to audience questions	2
TEACHER VIVA	Individual questions to members of group	2
		10

Thus we see that a 10 point activity is successfully executed in class.

7.4 Resources:- We can use U Tube videos, shows on National Geographic or Discovery channel to show diversity in living organisms. On the same hand students to be encouraged to visit National museum, Zoo, Botanical garden etc.

7.5 **References:-** NCERT CLASS IX SCIENCE; CBSE MANUAL ON FORMATIVE ASSESSMENT.

7.6 **HOTS / Examplar Questions with Hints:-**

1. If you are given Leech, Nereis, Scolopendra, prawn and Scorpian and all have segmented body organization. Will you classify them in one group? If no, give reason. (Hint: list all the important characters to separate these organisms in different groups)
2. Which organism is more complex and evolved among bacteria, mushroom and mango tree?
3. Endoskeleton of fishes is made up of cartilage and bone. Classify the following fishes as cartilaginous or bony: Torpedo. Sting Ray, Dog fish, Rohu, Angel fish, Exocoetus.
4. Thallophtya, Bryophyta and Pteridophyta are called “Cryptogams”. Gymnosperms and angiosperms are called” Phanerogams”.Discuss why?

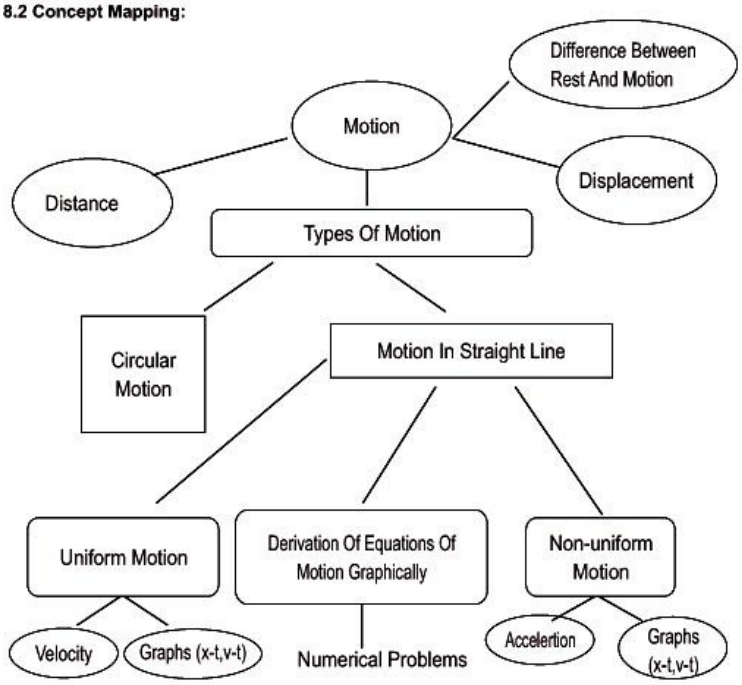
8. MOTION

8.1 Introduction

We see various examples of motion around us – people and vehicles moving on roads, trains moving on railway tracks, birds and airplanes flying, falling of leaves from trees, the sun appearing to move from east to west and there are countless other examples of motion. These examples of motion appear to be very different but they all follow the same set of rules – laws of motion.

Importance of teaching science is to encourage students to do So the first step to make them is to develop their curiosity, and make them aware of their potential and any incentive a teacher could give. Most students are interested in cars, cricket matches, so we could ask them to collect data and hence develop the various concepts and objectives, they need to learn about different types of motion and use of graphs to interpret the motion of objects .

8.2 Concept Mapping:



8Activity

8.3.1 **Concept:-**Body is at rest or in motion

8.3.1.1 **Teaching Strategy:-** Collecting and Reading of templates of bodies at rest and motion.

8.3.1.2 **Material required:** Templates /photographs/pictures of bodies at rest and in motion

8.3.1.3 **Steps:**

1. Students bring various pictures of bodies in motion and at rest
2. Students see each picture and classify.
3. Teacher shows lot of templates as given below and lets student write whether body is at rest or in motion.


8.3.1.4 **Points of Discussion:** Discusses the various situation and defines when a body is at rest and when in motion giving special reference to the picture of the man in the bus.

Activity:

8.3.2. Concept:- Types of motion.

8.3.2.1 **Teaching of Strategy:-** Collecting and Reading of templates of bodies in motion.

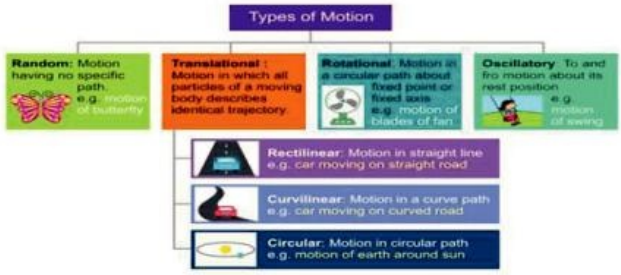
8.3.2.2 **Material required:** Templates /photographs/pictures of bodies in motion

8.3.2.3 **Steps**:

1. Students bring various pictures of bodies in motion
2. Students see each picture and classify them as shown below
3. Teacher shows lot of templates as given below and let students write. What type of motion the body has?

(a) (b) (c) (d) (e)

8.3.2.4 **Points of Discussion:** Teacher can then define the various types of motion and draw a table.



Activity

8.3.3 **Concept:-** To differentiate between distance and displacement.

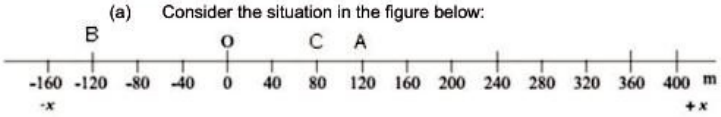
8.3.3.1 **Teaching Strategy:-** Mapping and numerical

8.3.3.2 **Material required:-** Maps, black board ,chalk.

8.3.3.3 **Steps:**

1. Teacher gives one example to highlight the difference and defines these Quantities give their units.
2. Teacher to show map s and students to mark distance and displacement
3. Students see the map and give the value of displacement and distance.
4. Teacher to give a numerical.

(a) Consider the situation in the figure below:



(1) What is the position of the particle when it is at A & B?

(2) Are the two positions same?

(3) Is the distance of the particle same from origin in both cases?

(4) What is the distance travelled by the particle when it moves from O to A and A to C?

(5) What is the displacement of the particle when it moves from O to A and A to C?

Solution

(1) A is at + 120 m and B is at – 120 m

(2) No

(3) Yes

(4) 120 m + 40 m = 160 m

(5) 80 m

8.3.3.4 **Points of Discussion:** Teacher discuss the answers given whether right or wrong and helps the students to do more such numericals.

Activity

8.3.4 To define and differentiate between speed and velocity

8.3.4.1 **Teaching Strategy:-** Field trip And Numerical questions

8.3.4.2 **Material required:-** paper pencil/pen ,black board, chalk

8.3.4.3 **Steps:**

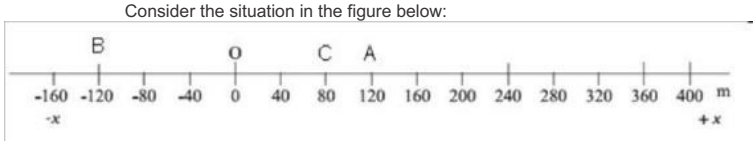
1. Students are taken out and are asked to write a note on all the moving bodies, type of motion ,fast slow
2. Discuss the data collected by students by mapping them on the board.
3. Teacher gives the following examples
   a. A baby and man walk for same time then distance covered is different.
   b. In a race both people run same distance but one is declared the winner because he takes less time.

8.3.4.4 **Points of Discussion**: Teacher gives definition, unit of speed and velocity and their

Difference.

8.3.4.5 Follow up: Numerical

Consider the situation in the figure below:



(1) If the particle takes 20 seconds to go from O to A and 30 seconds to go from A to B, then what is its (i) average speed and (ii) average velocity?

(2) Calculate the (i) average speed and (ii) average velocity of the particle when it goes from O to A and back to O again, taking a total time of 30 seconds to do this?

Solution

(1) Average Speed = Total distance / Total time = 360/50 = 7.2 m/s Average Velocity = Total displacement / Total time = 120/50 = 2.4 m/s

(2) Average Speed = Total distance / Total time = 240/30 = 8 m/s Average Velocity = Total displacement / Total time = 0/30 = 0 m/s

Activity

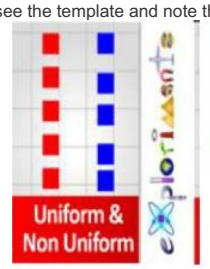
8.3.5 Concept:- To differentiate between uniform and non uniform motion.

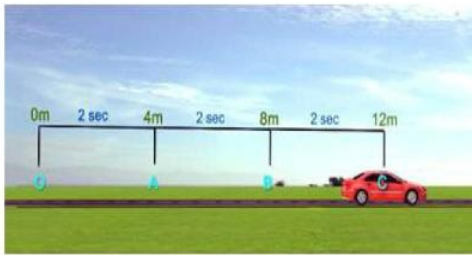
8.3.5.1 Teaching Strategy:- Field trip/Classroom

8.3.5.2 **Material required:** Paper pencil, black board ,chalk.

8.3.5.3 **Steps:**

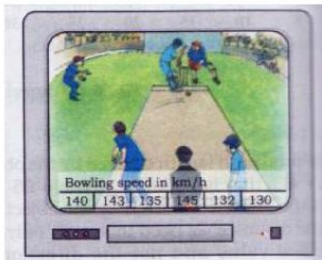
1. Ask the students to collect data of a particular body in motion like a bus, a car, a cycle etc.
2. Students to note when it started what was its speed at various times like in the traffic ,on clear road,
3. Students see the template and note the difference between uniform and non uniform motion

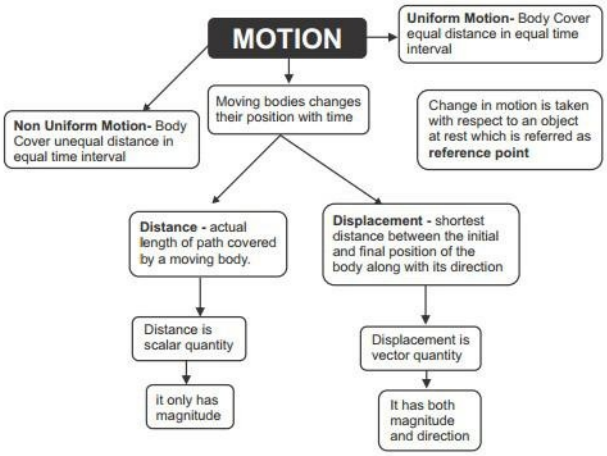




8.3.5.4 **Points of Discussion**: Teacher gives definition, uniform and non uniform motion

8.3.5.5 **Follow up:**Draw the overall map with students participation and do numericals





Activity

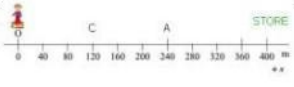
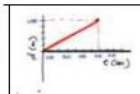
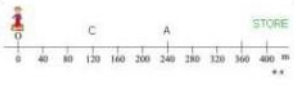
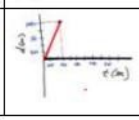
8.3.6.1 Concept:- To plot position time graph

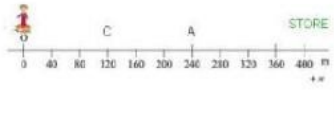
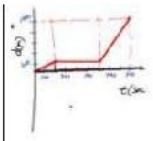
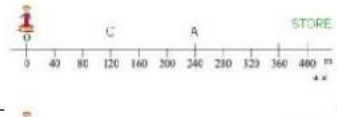
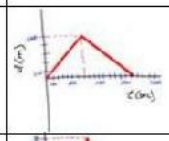
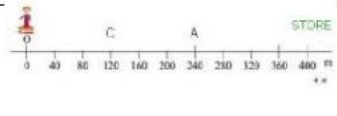
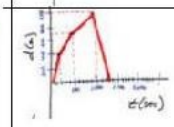
8.3.6.1 Teaching Strategy:- Case study

8.3.6.2 **Material Required**: Graph paper pencil, black board, chalk

8.3.6.3 **Steps:**

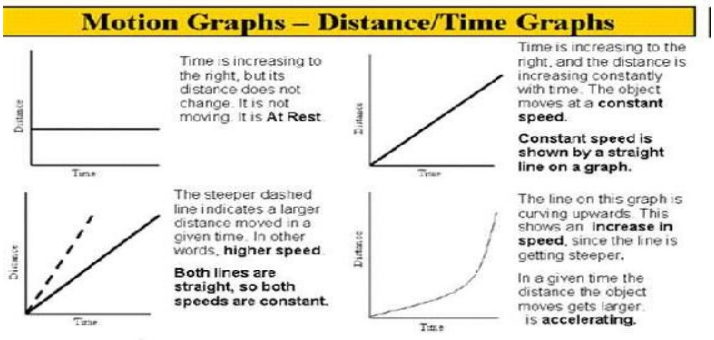
1. Teacher introduces the concept of position time graph using the example in NCERT book.
2. Students are given the various cases in the table below and are encouraged to draw position time graph

1. Tony walks to the store at the same pace in400s.		
2. Tony runs to the store at same pace and reaches in 200s.		

3. Tony walks to C in 300s gets tired and rests for 200s . and then runs and reaches the store in 100s as the store was closing.		
4.Tony walks to the store in 400s and walks back home in 600s.		
5.Tony forgot to buy munches so went back to the store with changing speed.He goes to C in100s then toA in200s and to the store in 150s. He takes a lift in his cycle and is back home in300s.		

8.3.6..4 Points of Discussion:

1. Teacher to discuss and correct the graphs of students.



it

2. Use of position time graph to calculte speed that is slope of graph
3. Give follow up work.

Activity

8.3.7.1 Concept:- To plot position-time and velocity-time graph

8.3.7.1 Teaching Strategy:- Case study

8.3.7.2 **Material required**: Graph paper pencil, black board, chalk

8.3.7.3 **Steps:**

1. Teacher introduces the concept of velocity time graph using the example from NCERT book.
2. Students are given the various cases in the table above activity 1.3.6 and are encouraged to draw velocity time graph for uniform motion.
3. Students are given the various cases in the table below and are encouraged to draw velocity time graph

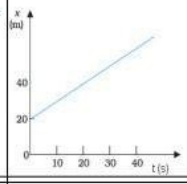
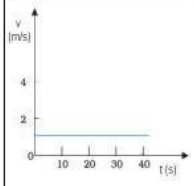
3.1 Plot, displacement – time graph, velocity – time graph for:

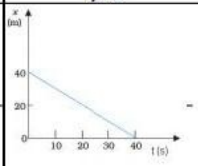
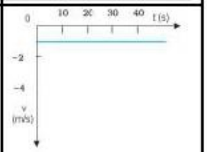
Body in uniform motion (a) starting from x = 20 m with velocity 1 m/s

(b) starting from x = 40 m with velocity – 1 m/s

Solution : Table for (a) have been given below. It should be made before plotting graph. Table for (b) have been given below. It should be made before plotting graph.

(a)

Time (s)	10	20	30	40	graph
$x = ut + x_0$	X=1x10+20= 30m	X=1x20+20= 40m	X=1x30+20= 50m	X=1x40+20= 60m	
$v = u + at$: a = o v = u	1m/s	1m/s	1m/s	1m/s	

Time (s)	10 s	ČĆ s	ĊĆ s	ÇĆ s	NộMO
$x = ut + x_0$	x= (-1)x10+40 =30m	x= (-1)x20+40 =20m	x= (-1)x30+40 =10m	x= (-1)x40+30 = -10	
v = u +at : a = o v = u	-1m/s	-1m/s	-1m/s	-1m/s	

3.2 Plot displacement – time graph, velocity – time graph and acceleration – time graph for: Body with uniform acceleratio

a. starting from x = 0 m and initial velocity of 0 m/s and acceleration 1 m/s

b. starting from x = 10 m and initial velocity of 0 m/s and acceleration – 1 m/s^2

Solution

Table for (a) and (b) have been given below. They should be made before plotting graph.

Time (s)	0	1	2	3	4	5
$x = x_0 + ut + (1/2)at^2$	0	0.5	2.0	4.5	8.0	12.5
v = u +at	0	1	2	3	4	5

Time (s)	0	1	2	3	4	5
$x = x_0 + ut + (1/2)at^2$	0	0.5	2.0	4.5	8.0	12.5
v = u +at	0	1	2	3	4	5

Plot all graphs as per the table above.

8.3.7.4 **Points of Discussion:-** Inferences of graphs obtained:

Acceleration and Non-Uniform Motion

Non-uniform motion occurs when the velocity or speed of an object changes over time. It means that the object is accelerating.

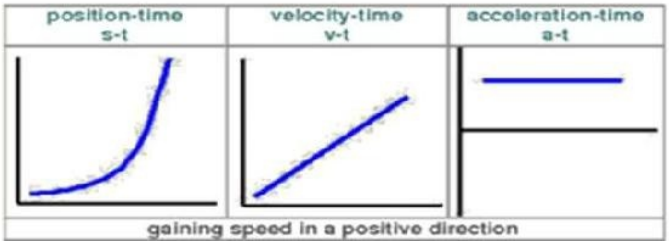
The change in speed or velocity during a specific time interval is called acceleration.

Acceleration can be positive or negative.

Positive Acceleration occurs in two ways:

(1) when the change in both the magnitude of the velocity and the direction are positive.

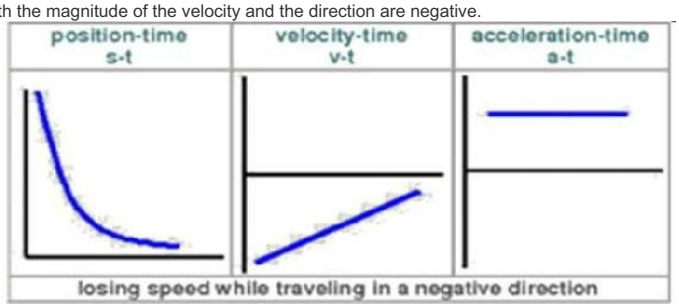
(2) when the change in both the magnitude of the velocity and the direction are negative.



Negative Acceleration also occurs in two ways:

(1) when the change in both the magnitude of the velocity and the direction are positive.

(2) when the change in both the magnitude of the velocity and the direction are negative.



Activity

8.3.8.8 Concept:- Importance of velocity time graph

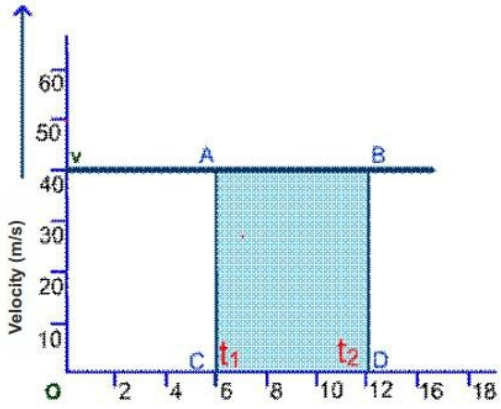
8.3.8.1 **Teaching Strategy:-** Mind Map and mathematical

8.3.8.2 **Material required**: Graph paper pencil, black board, chalk

8.3.8.3 **Steps:**

1. Use a numerical or practical situation of a moving bus draw velocity time graph for uniform motion
2. Students to calculate the area enclosed in the graph and compare the value of distance travelled by formula

1. **Uniform motion**



Time in second

Velocity - Time Graph of an object moving with constant velocity

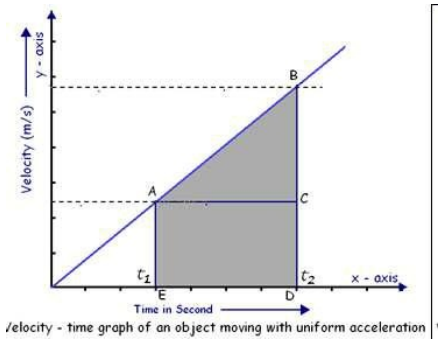
The area under the curve = ACxCD

= velocityxtime

= displacement of body in uniform motion.

2. Students to calculate the area enclosed in the graph and compare the value of distance travelled by formula for uniform acceleration.

2. **Uniform acceleration:**



Velocity - time graph of an object moving with uniform acceleration

O

The area of trapezium, EABDE

= Distance (s) = Area of DACB + Area of ACDE

Þ S = $\frac{1}{2}$ x AC x CB + (AC x CD)

Þ S = $\frac{1}{2}$ x DE x CB + (u x t) [Since, AC = DE = t]

Þ S = $\frac{1}{2}$ x at x t + ut [Since, a= change in velocity]

$$\frac{BC}{AC} = \frac{CB}{ED}, \quad a = \frac{CB}{t} \text{ or } CB = at$$

Þ $S = \frac{1}{2} x at + ut$

Þ $S = ut + \frac{1}{2} at^2$

Slope of the curve gives the value of acceleration. Students to do numericals based on this.

8.3.8.4 **Points of Discussion:** Teacher can take up numericals to highlight the importance of velocity time graph

Activity

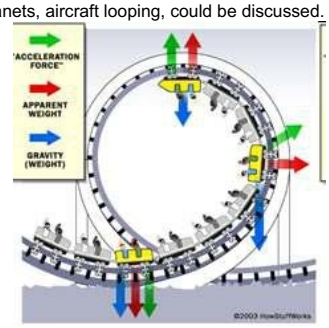
8.3.9 Concept:- Circular Motion

8.3.9.1 Teaching Strategy:- Project Method

8.3.9.2 **Material required:-**Thread. Cardboard. Ball,bottle with water

8.3.9.3 **Steps:**

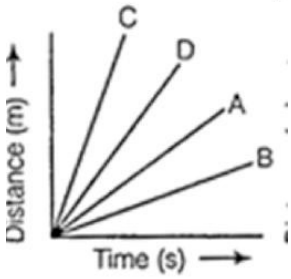
1. Using the thread demonstrate the number of ways a circular motion can be produced
2. Students to relate the various situations in life and nature.
3. Importance of circular motion pf planets, aircraft looping, could be discussed.



8.3.9.4 **Points of Discussion:-** A body that travels an equal distances in equal span of time along a circular path has a constant **speed** but not constant velocity. This is because velocity is a vector and thus it has magnitude as well as direction.

8.4 **HOTS**

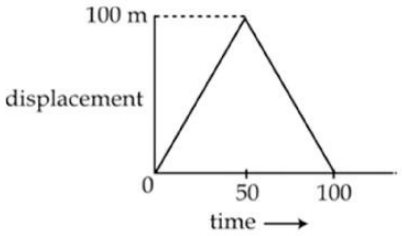
1. Four cars A, B, C, D are moving on a leveled road. Their distances versus time graphs are shown in Figure. Which car is the slowest.



Hint: Slope of distance-time graph. The smaller the slope, the lower is the speed.

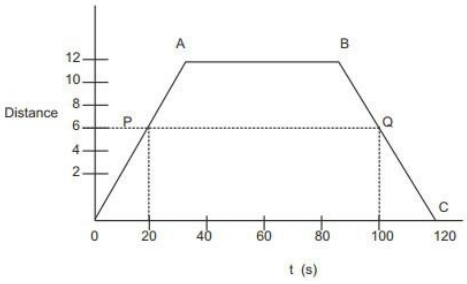
2. A girl walks along a straight path to drop a letter in the letterbox and comes back to her initial position. Her displacement-time graph is shown in Figure. Plot a velocity-time graph for the same.

Graph-1



3. Suppose a squirrel is moving at a steady speed from the base of a tree towards some nuts. It then stays in the same position for a while, eating the nuts, before returning to the tree at the same speed. A graph can be plotted with distance on the y-axis and the time on the x-axis. observe following the graph carefully and answer the questions.

Graph-2



I. Which part of the graph shows the squirrel moving away from the tree?

AI. Name the point on the graph which is 6m away from the base of the tree

BI. Which part of the graph shows the squirrel is not moving?

IV. Which part of the graph shows that the squirrel is returning to the tree?

V. Calculate the speed of the squirrel from the graph during its journey

4. The table given below shows distance (in cm) travelled by bodies A, B and C. Read this data carefully and answer the following questions.

Distance (in cm) covered by different bodies			
Time (in s)	Body A	Body B	Body C
1st Second	20	20	20
2nd Second	20	36	60
3rd Second	20	24	100
4th Second	20	30	140
5th Second	20	48	180

I. Which of the bodies is moving with

a) Constant speed?

b) Constant acceleration?

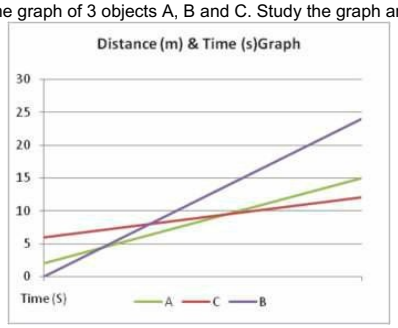
c) Non-uniform acceleration?

IIWhich of the following bodies covers

a) Maximum distance in 3rd second?

b) Minimum distance in 3rd second?

5. The given figure shows the distance time graph of 3 objects A, B and C. Study the graph and answer the following questions.



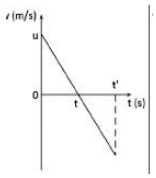
I. Which of the three is travelling the fastest

AI. Are all three ever at the same point on the road

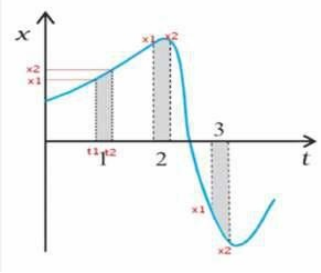
BI. How far has C travelled, when B passes A

IV. How far has B travelled by the time it passes C

6. Give a practical situation for the graph given below



7. Name region where speed is maximum and minimum:



8. An insect moves along a circular path of radius 20 cm. with constant speed. If it takes 1 minute to move from a point on the path to the diametrically opposite point, find (a) distance covered (b) speed (c) displacement (d) average velocity

Solution: Distance moved in 1 minute = πr = 3.14 * 20 = 62.8 cm = 0.628 m

Speed = Distance / Time = 0.628 m/ 60 s = 0.0105 m/s

Displacement = 2r = 0.40 m

Average velocity = Total displacement / Total time = 0.40 m / 60 s = 0.0067 m/s

8.5 References:

[1] Physics Gilbert Rowell and Sydney Herbert, Cambridge University Press

[2] Science textbook for Class IX, NCERT

[3] Science textbook for Class XI, NCERT

[4] Foundation Science, Physics, Class IX, H.C.Verma

[5] http://www.stmarysacademy.mb.ca/resource/File/Physics_ Fundamentals Physics_Fundamentals_-_Chapter_2.pdf

[6] Http://www.zahniser.net/~physics/index. Php?title= Linear %20 Motion

%20 Problems

[7] http://www.efm.leeds.ac.uk /CIVE/CIVE1140/ section01/ linear_motion

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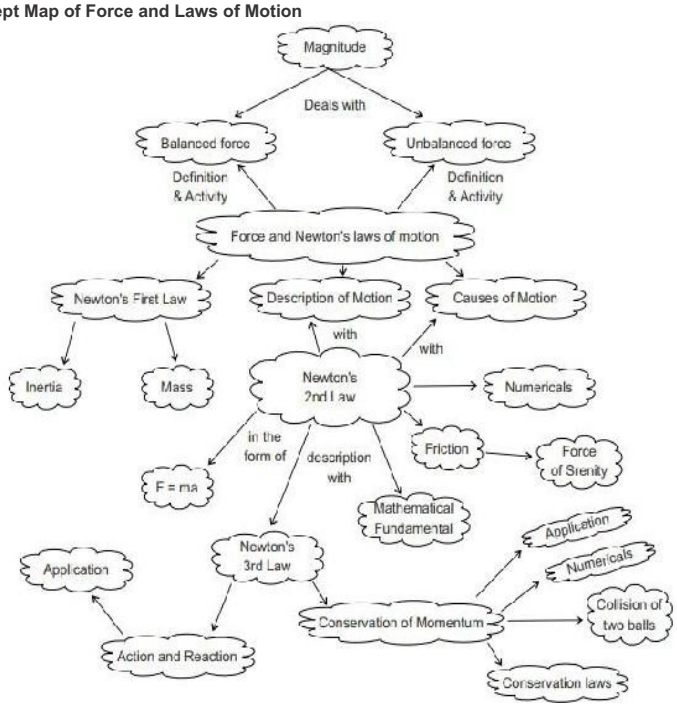
9. Force & Laws of Motion

9.1 **Introduction:-**

The problem of motion and its causes had been a topic of great concern for scientists. A ball on the ground, when given a small hit does not move forever but comes to rest after sometime.

Galileo Galilei suggested the idea that unbalanced force is required to change the motion of a ball but no not force is needed to sustain the uniform motion of the ball. The idea of Galileo on force and motion helped newton to state three fundamental laws that govern the motion of objects : In an isolated system the total momentum is conserved. All conservation laws such as conservation momentum, change etc. are considered as fundamental laws in physics and are deduced from large no. of observations and experiments.

9.2 Concept Map:- Concept Map of Force and Laws of Motion



9.3 **Activities:-**

9.3.1 **Concept :-** Force

9.3.1.1 **Teaching Strategy:-** Inside the class room

9.3.1.2 **Material required:-**

Desk in the class, dough of Hour & tennis ball

9.3.1.3 **Steps:-**

Do the following in groups of 4 each:-

(i) Push the desk

(ii) Push the tennis ball

(iii) Roll the ball in one deviation and hit with scale

(iv) Kick the ball

(v) Push the dough of flour.

Observe & Record the changes in tabular form

Desk

Tennis ball

Ball

Ball

dough

9.3.1.4 **Points of Discussion**

One Can always see or feel the effect of force. Pulling, hitting & pushing or some of

the ways of bringing objects in motion, force can change the magnitude of velocity

as well as change the direction of motion of an object.

9.3.2 **Concept:-** Balanced & Unbalanced Force

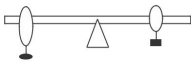
9.3.2.1 **Strategy:-** Inside the class room

9.3.2.2 **Material required:-** Meter Rod, wedge, thread & weights methodology

9.3.2.3 **Methodology:-Steps:-**
Take a meter rod (1 metre) and a wedge. Balance the rod at its centre of gravity.

Hang weights on the rod vertically using a thread loop at equal distances from c.g.

The rod will be balanced when the forces on both sides are equal.



150g wt 150g wt

Keeping the distance same when the weight on the right side is made double say

300gwt.

9.3.2.4 **Points of Discussion**

When the distance of weights from c.g. is same but the weight on right side is made double then there is unbalanced force towards right and the beam will tilt. If the resultant of all the forces acting on the system of a body is not zero then forces acting on a system or a body are called as unbalanced forces.

9.3.3 **Activity 2**

Concept:- Tug of War

9.3.3.1 Teaching Strategy:- In the field

9.3.3.2 **Material Required:-**

A Rope, Marker pen

9.3.3.3 **Steps:-** Suggestions for teachers perform this activity to explain the concept of balanced & unbalanced force.

9.3.3.4 **Points of Discussion:-** Balanced and unbalanced force

9.3.4 Concept:- Newton's first law of motion

9.3.4.1 Teaching Strategy:- Inside the class room

9.3.4.2 **Material Required:-**

Empty plastic bottle, a plastic ring and a small weight (say 1gm)

9.3.4.3 **Steps:-**

Take an empty plastic bottle and a plastic ring. Balance the plastic ring on top of the bottle and place 1gm. wt on top of the ring. Move the ring using your index finger applying force from centre outwards.

9.3.4.4 **Points of Discussion**

When the ring is suddenly removed from top of the bottle the weight (1gm) falls vertically into the bottle due to inertia of rest. The property of a body to appose any change in its state of rest is known as inertia of rest.

9.3.5 **Activity 2**

Concept:- Mass and inertia

9.3.5.1 Teaching Strategy:- Inside classroom activity

9.3.5.2 **Material Required:-**

1 Rupee, 5 Rupee and 10 Rupee coin stiff cards of different materials

(Playing card Methodology (Glossy), sand paper & card board

9.3.5.3 **Steps:-**

Take a card of particular material and put 1 Rupee, 5 Rupee and 10 Rupee coin on top in turn; Record the observation in tabular form. Take a stiff card of same dimension but another material say sand paper card with

Card of material A	Card of material B
1 rupee coin	
5 rupee coin	
10 rupee coin	

To elaborate the concept of mass & inertia the teacher will help the students in drawing theconclusion.

9.3.6 Activity-1Concept:- Inertia of Motion

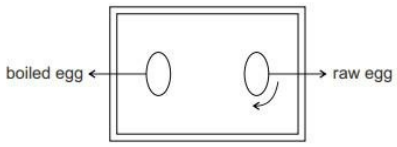
9.3.6.1 Teaching Strategy:- Inside the class room

9.3.6.2 **Material Required:-**

Wooden board, Chart paper, Raw egg & boiled egg

9.3.6.3 **Methodology/Steps:-**

Take a wooden board and paste the surface 13 smooth spin each egg at a time. Both the raw egg and boiled eggs are given a spin say in clockwise direction one by one stop the motion of each egg & observe.



9.3.6.4 **Points of Discussion**

The raw egg continues to spin after being stopped due to inertia of motion. The yolk inside the raw egg continues to spin due to 'Inertia of motion'. The same thing is not observed in case of boiled egg as the material inside the boiled egg is in solid form.

9.3.7 **Activity 2**

9.3.7.1 Teaching Strategy:- Inside the classroom

9.3.7.2 Material Required:- Wooden board, Chart paper Carrom Coins, Sticker and Ball bearings.

9.3.7.3 **Methodology/Steps:-**

Take a wooden board and cover it with chart paper. Take a striker of carrom board and two carrom coins. Strike the carrom coins with striker and observe. Put small ball bearings on the surface and again strike them with striker find the difference in two situation.

9.3.7.4 **Points of Discussion:-**

Lesser the force of friction greater is the inertia of motion

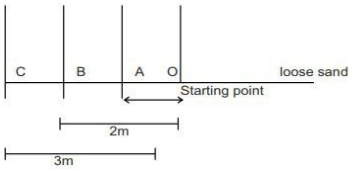
9.3.8 Concept:- Newton's 2nd law of motion

9.3.8.1 Teaching Strategy:- In the field

9.3.8.2 Material Required:- Loose sand, Clay powder

9.3.8.3 **Methodology/Steps:-**

Lines are drawn in the field with clay powder



Three students one at A,B & C can be asked to run for 1m, 2m and 3 metre respectively and perform long jump on loose sand. The rest of the class will observe the depth to which child will penetrate more into the loose sand.

9.3.8.4 **Points of Discussion:-**

The child who comes running from 3 metre will penetrate more as the rate of charge of momentum is equal to the impressed force. Greater the rate of change of momentum greater is the force exerted in the loose sand

$$\vec{F} \propto \frac{d\vec{p}}{dt}$$

9.3.9 Concept:- Momentum

9.3.9.1 **Teaching Strategy:-**

Activity Inside the classroom

9.3.9.2 **Material required**:- Pencil cells, inclined plane or wooden board resting on books

9.3.9.3 **Methodology/Steps:-**

(a) Keeping the angle of inclination same allow cells of different masses to roll down the plane observe the distance travelled by each cell.

(b) Take a pencil cell and change the inclination of the board i.e. either by increasing or decreasing the no. of books on which is resting observe the distance to which pencil cell rolls at different angles of board.

9.3.9.4 **Points of Discussion:-**

The momentum of an object is the product of its mass and velocity and has the same direction as that of velocity.

9.3.10 **Concept:-** Third law of motion

9.3.10.1 Third law of motion

Arrange Activity as given in NCERT page 122

9.3.10.2 (a) fig. 9.10

9.3.11 & 9.3.12 (b) Activity 9.5 & 9.6

Writing formats

DO ▫ Observe ▫ Discuss▫ Draw conclusion

9.4.1 **Activity:-**

9.4.1.1 **Teaching Strategy:-** Inside the class

9.4.1.2 **Material required -** A plastic tub, Water balloons

9.4.1.3 **Steps/Methodology:-**Blow air in balloon and push it on the surface of water in the tub. Withdraw your hand quickly. The balloon will fly off due to reaction.

9.4.1.4 **Points of Discussion:-** The teacher and students will discuss another examples based on third law of motion.

9.5 **Value based question/HOTS**

Q. A student travelling in a bus asked the driver to stop the bus on the next stop. The driver though unwilling to stop the bus slowed the speed and two student was able to get down. He ran a distance in the direction of motion of the bus.

(a) Why did the student run a short distance.

(b) State the law that describes this

(c) Which value did the driver lacks in ?

Ans (a) & (b)As per newton's first law of motion a body at rest will remain at rest and a body in uniform motion will continue in motion in a straight line until an external force is applied on it. If the student did not run a short distance in the direction of motion of bus he would fall down and get hurt.

10. In Uncorned for passenger's for passenger's safety and Adherence to the law.

Fill in the blanks

(a) When the branch of a tree is shaken, its fruits fall down due to_____.

(b) The squeezing of a gum tube to extract the gum is an example of_____.

(c) An electric fan continue to rotate for sometime even after the electric fan is switched

of due to _____

(d) A car and a truck are running at the same speed out of the two _____has greater momentum.

(e) Walking on the ground is an example of _____

(f) Splinters of an exploded cracker spread in different directions due to

_____

(g) Action and reaction acts on two _____

(h) The net force on a kite skill fully held stationary in the sky is _____

(i) Water sprinkler used to sprinkle water on grass is based on

_____

Answer key

(a) Inertia of rest

(b) Change in shape on applying force

(c) Inertia of motion

(d) Truck

(e) Third law of motion

(f) Conservation of momentum

(g) Different bodies

(h) Zero

(i) Third law of motion

Reference:-

[1] Physics Gilbert Rowell and Sydney Herbert, Cambridge University Press

[2] Science textbook for Class IX, NCERT

[3] Science textbook for Class XI, NCERT

[4] Foundation Science, Physics, Class IX, H.C.Verma

[5] http://www.stmarysacademy.mb.ca/resource/File/Physics_ Fundamentals Physics_Fundamentals_-_Chapter_2.pdf

[6] Http://www.zahniser.net/~physics/index. Php?title= Linear %20 Motion %20 Problems

[7] http://www.efm.leeds.ac.uk /CIVE/CIVE1140/ section01/ linear_motion

.html#top

10. GRAVITATION

10.1 **Introduction:-**

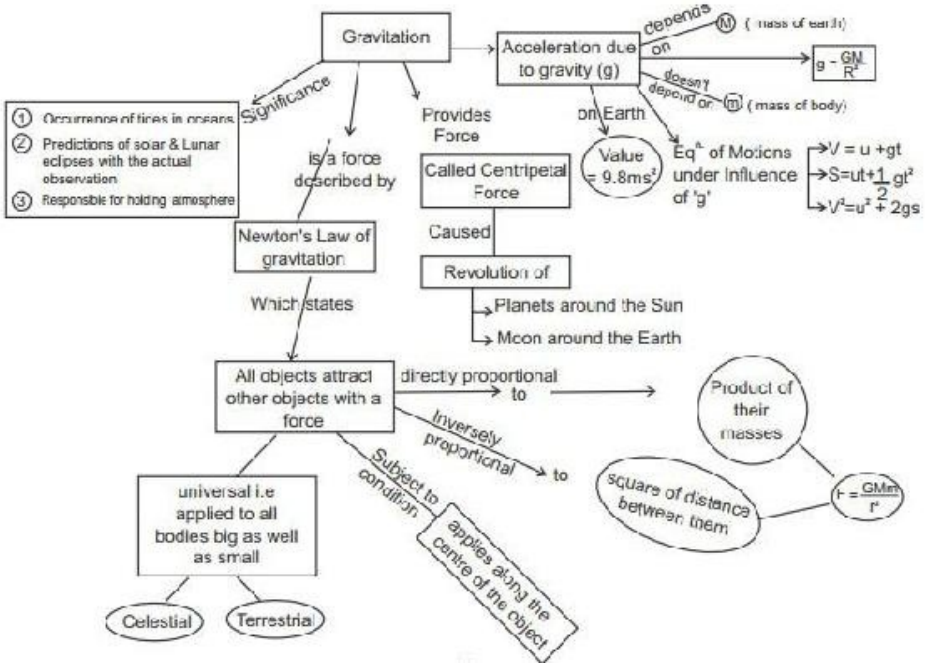
Early in our lives, we become aware of the tendency of raw material objects to be attracted toward the earth, and all bodies irrespective of their masses are accelerated towards the earth with a constant acceleration. All the planets revolving around the sun also moon goes around the earth. The gravitational force is responsible for all these happenings. the weight of the body varies from place to place.

Mass - Mass of an object is the measure of its inertia. Greater the mass, greater the inertia. Mass of an object is constant and doesn't change from place to place. While the force of attraction of the earth on an object is known as the weight of object. The weight is a force acting vertically downwards. Weight varies and depends on the location of the object.

An object experience a force of buoyancy when they are inversed in a fluid. Its value depends on the density of fluid.

On a smaller area exerts a layer presses a smaller pressure on a large area.

10.2 Concept Map:-



10.3 **Activities**:-

10.3.1 **Concept:-**Gravitational Acceleration

10.3.1.1 **Teaching Strategy / Method Adopted:-** use of material available in the class room for effective teaching learning process.

10.3.1.2 **Material Required:-** Students are asked to drop the pen & book from the same height in class room

10.3.1.3 **Steps:-** Both the pen & book have different masses when they are allowed to fall freely in the absence of air they will reach the earth simultaneously.

10.3.1.4 **Points of Discussion:-**

1.Both book & Pen have the same acceleration

2. The value of 'g' is free from the mass of book or mass of pen.

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

Where Gravitational Const.

G = Const.

Me = Mass of earth

R = Radius of earth

g = Gravitational accn.

10.3.1 **Activity Concept:-** Retardation

10.3.2.1 **Teaching Strategy:-** The teacher will demonstrate this activity subject to that it is done in presence of air.

10.3.2.2 Material Required:- Paper and a book

10.3.2.3 **Steps:-** The teacher will drop paper and a book from same height.

10.3.2.4 **Points of Discussion:-**

1. The students observe the activity
2. The book will reach the earth earlier than paper.
3. The buoyancy effect and viscose drag will cause different acceleration in the book and piece of paper.

10.3.3 **Reference Activity-Concept:-** Centripetal Force

10.1 (NCERT Science Text Book Class IX Page 131)

10.3.3.1 Teaching Strategy:- Activity

10.3.3.2 Material Required:- Stone thread

10.3.3.3 **Steps:-** By whirling stone, the stone covers in circular path, change its direction at every movement house change its velocity and acceleration.

- The centripetal (centre - seeking) force keeps the stone moving along the circular path acting towards centre of the circle.

10.3.3.4 **Points of Discussion:-** The students will discuss about the path of stone if the string is left.

10.3.1 Activity:- Concept:- Universal Law of Gravitation

10.3.4.1 **Teaching Strategy:-** Demonstration method

10.3.4.2 **Material Required:-** Snow apple and objects

10.3.4.3 **Steps:-** Teacher will demonstrate the falling of snow / apple / object & ask the following question on the basis of student observation. Is falling apple attracts towards the earth.

10.3.4.4 **Points of discussion:-**

The mass of an apple is negligible as compared to huge mass of earth (n apple << w earth).

and we don't see the apple moving towards the earth. The force of attraction between the objects is called Gravitation force.

Significance of universal law of Gravitational

1. Occurring of raindrops from the clouds towards the earth maintaining earth atmosphere.
2. Coulomb's law and gravitational force follows the inverse square law.

10.3.5 **Activity:-**Throwing of Cosco Ball in the upward direction.

10.3.5.1 **Concept:-** Gravitational acceleration

10.3.5.2 **Material Required:-**

10 tennis balls.

10.3.5.3 **Steps:-**

1. Ten students selected randomly and they are allowed to collect one tennis ball.
2. They are asked to throw their tennis balls in the upward direction.

Observation:-

The balls reaches at certain heights and then they falling down.

10.3.5.4 **Points of discussion:-**

Whenever, these balls fall towards the earth under only the influence of gravitational force (rest of the forces acting on tennis balls are zero)

We say the tennis balls are in free fall.

When the tennis ball fall towards the earth their velocity and acceleration changes.

3. The acceleration is due to Earth's gravitational force is called acceleration due to gravity 'g'.

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

$$g = 9.8 \text{ m/s}^2$$ (on the surface of earth)

Numerical

If the mass of the object is 70 kg then.

a) What will be the weight of object on earth?

b) What will be the weight of object on surface of Moon.

Hint : Weight on Earth = $9.8 \frac{m}{s^2} \times 70\ kg = 686N$

Weight on Moon = $\frac{1}{6} \times 686\ N = 114N$

10.4 **Thrust and Pressure**

10.4.1 **Activity:-**

To fix small poster on a

or 686 Kgm

sec^2

a) Bulletin board

b) To pierce the drawing pin on the drawing board.

10.4.1.1 **Concept:-** Pressure

10.4.1.2 **Material Required:-**

Poster Bulletin board, drawing board and drawing pins.

10.4.1.3 **Steps:-**The students press drawing pins with their thumbs.

They replace the pins with blunt & broken pins by sharp ends of the pin.

Observation:-

By pushing larger area end with their thumb are able to pierce a hard board. They feel difficulty to pierce pins having blunt or broken ends.

10.4.1.4 **Points of Discussion:-**

The effect of forces of the same magnitude on different area are different.

Use- The strips of students bag are made wider.

Numerical-: Two small pillars of gross section area $10cm^2$, supports a load of 40 kg mass. Calculate the pressure sustained by pillars. ($g= 10\ m/s^2$)

Hint:-Total Cross - section area of pillar

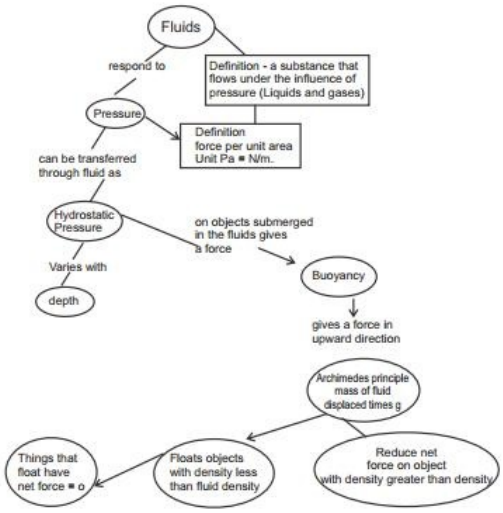
$A = 20 \times 10^{-4}\ m^2$

$F = = 40$ kg wt $= 400N$

$$P = \frac{F}{A} \quad (\text{Ans} = -2 \times 10^{5}\ \text{Nm}^{2})$$

10.4.2. **Concept Map**

Pressure In Fluids



10.4.3 **Pressure In Fluids / (Liquids & Gases)**

Activity:- To show fluids have weight and they also exert pressure on the base and the walls of the pressure in which they are enclosed.

10.4.3.1 **Methods / Strategy-**

Activity- The teacher will demonstrate this activity in the laboratory.

Laboratory method / demonstration.

10.4.3.2 Material required:- A thin can air tight lid, water a burner.

10.4.3.3 **Steps:-**

1. Open the lid and put some water in the car.
2. Heat the can on the flame fill water boils for some time.
3. Take the can away from the flame and quickly close it Tightly with the lid
4. Leave the can for cooling down.

Observation

The can is down from all sides and its shape is completely deformed.

10.4.3.4 **Point of discussion**

Before heating the air pressure insides and outside the can was equal but after cooling the can the inside air pressure in the can was negligible and outside and deformed. Its shape lungs exerts pressure.

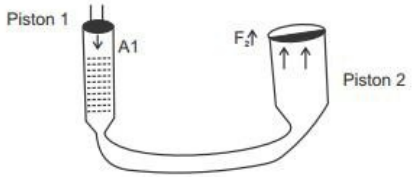
10.4.4 **Activity:- Fluid Pressure is transmitted Undiminished in all direction**

10.4.4.1 **Teaching Strategy:-**

Utilization of low cost / waste science teaching material for students. They are asked to bring the material from their homes.

10.4.4.2 **Material Required:-**

Two doctor syringes of 5ml & 10ml having different cross sectional areas, plastic pipe, water and a weight of 50gm



10.4.4.3 **Steps:-**

1. Fit the plastic pipe in the two narrow ends of the syringes (area of cross section of piston 1 is A1 and Piston 2 is A2)
2. Both the syringes are completely filled with water. Put weight of 50gm on the syringe piston 2.

Precautions-

1. Syringes are to be air tight.
2. Plastic pipe should be horizontal.

Observation:-

When a small force F1 is applied to the piston of small syringe the load (50 gm) placed on the piston of large syringe is lifted up for a certain height.

10.4.4.4 **Points of discussion:-**

The pressure of is transmitted unchanged to the large cross section area A_2.

Piston 1. Pressure (P)= $\frac{F_1}{A_1}$

the force transmitted on the piston 2 of the syringe $F_2 = P \times A_2$

$$= \frac{F_1}{A_1} \times A_2$$

Significance:-

This principle is used in hydraulic machine, hydraulic lifts and hydraulic breaks.

Archimedes Principle:-

10.4.5 Concept:- Buoyant Force

10.4.5.1 **Teaching Strategy:-** To observe that when a body is immersed fully or partially in a liquid it experiences an upward force. This force is equal to the weight of the fluid displaced by it.

10.4.5.2 **Material Required:-Activity - 10.7 Page - 141**

NCERT Science Text book Class IX

10.4.5.3 **Steps:-**

When the stone is immersed in water some force act on stone in upward direction called buoyant force. Which is equal to weight of the stone displayed by it.

Significance:-

This principle is used in designing ships & submarines.

$$\text{Reactive Density} = \frac{\text{Density of Substance}}{\text{Density of water}}$$

(It has no unit)

10.4.5.4 **Points of Discussion:-**

Explore various examples in this regard from daily life.

10.5 **HOTS Questions**

Q1. Name two factors which determine whether a planet would have atmosphere or not. Q2. A body of mass 5 kg as taken to centre of earth. What will be its?

a) mass

b) weight there

Q3. Gravitational force on the surface of the moon is only 1/6 as gravitational force on earth. What is the weight in newborns of 10kg object on the moon and on the Earth.

Q4. Why does a block plastic released under water comes up to the surface?

Q5. Calculate the force of gravitation between the earth and the sun, given that the mass of earth = $6x10^{24}$ kg and sun = $2x10^{30}$ kg The long distance between two is $1.5x10^{11}$m

Q6. What is acceleration due to gravity. Obtain relations to show how the value of 'g' changes with

i) Altitude

ii) Depth

References:-

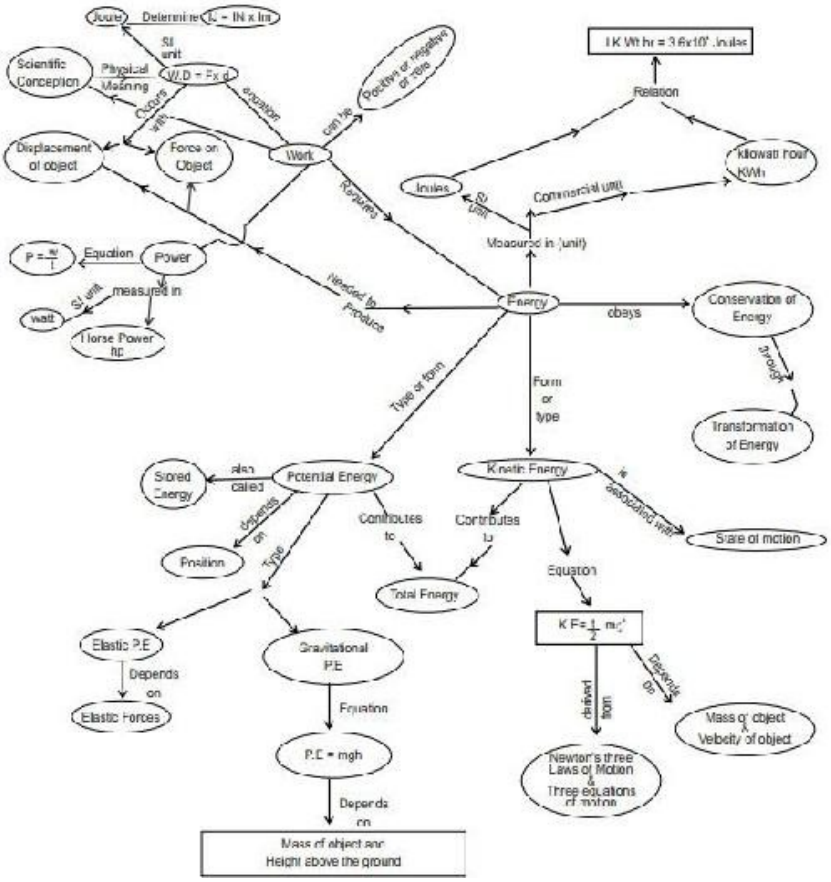
1. Supporting material class IX , X 2014 Directorate education.
2. Science Text Book for Class IX Published by NCERT New Delhi.
3. Physics Text Book for class XI & XII Published by NCERT New Delhi.
4. In-service teacher profession module developed by dept. of education in science and RMSA Project Cell Govt. of NCT of Delhi.
5. Wikipedia websites
6. Khanacadmey.com websites

11.Work & Energy

11.1 **Introduction**

In our day to day life any useful physical or mental work is taken as work but in science this concept is considered wrong. In mechanics work is said to be done when an object moves through a certain distance in the direction of force. When work is done the energy that is transferred may appear as kinetic energy. The change in P.E. between two given points simply depends on the difference in vertical heights of initial and final position of the object and is independent of path followed.

11.2 Concept Map:- Work & Energy



11.3 **ACTIVITIES**

11.3.1. **Concept Activity:- Scientific / Physical Meaning of Work**

11.3.1.2 **Methodology Strategy:-**

Discussion with Class

OR

Discussion within the group.

11.3.1.3 **Steps:-**

1. Divide class into groups of appropriate size.
2. Ask them to discuss following :

a) Does Reading, Writing, eating or holding a rubber band stretched get you tired?
b) If we use stick or pencil to hold the rubber band stretched, does the stick get tired?
c) Does you get tired when you bring a book/bag from home to school?

d) Does you get tired when you push your desk or paddle bicycle to move to market place?

11.3.1.4 **Points of Discussion:-**

1. Allow them to discuss for 5-10 min.
2. Ask each group to list their discussion result in the following table w.r.t. above cases in (2).

S.No.	Case in which	Case in which	Case in which

	only force is applied with no displacement	object is only displaced with not force	both are present/absent

3. Summarise the observation of each group to bring out the concept of work as the conditions needed for work is to be done :

   (a) A force should act on an object and

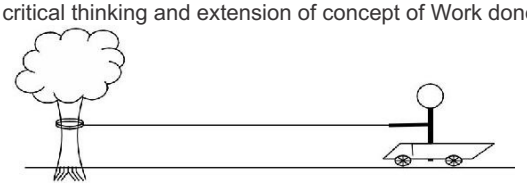
   (b) An object must be displaced

   (c) Work done depends on magnitude of force applied on the object and distance moved. W.D. = F*d.

   (d) SI unit of W.D is Joule 1 Joule = 1Nx1m

11.3.2

Concept Activity : For critical thinking and extension of concept of Work done (W.D.)



(a) Give the situation for discussion among the group.

(b) If your friend hold the cart, in which he/she is sitting, still and you tied the cord around a tree and pulled it tight, the tree could exert the same force as you did. Do you think the tree would get tired? The tree can exert a force but can't the tree do work?

11.3.3 **Activity :**

11.3.3.1 **Concept of Positive & Negative work done (W.D)**

11.3.3.2 Material Required. A Book

11.3.3.3 **Steps:-**

1. Teacher will lift raise a book from the table to a certain height.

OR

Divide class into group and ask them to lift/raise a book above the desk to certain height.

2. Observe, Discuss and fill the table.

	S.No.	Situation	
(A)	1.	Direction in which force is exerted	up ward or Downward
(B)	1.	Direction in which gravitational force is exerted	up ward or Downward
(A)	2.	Direction in which Book is displaced when is applied by you.	up ward or Downward
(B)	2.	Direction in which Book is displaced	up ward or Downward

11.3.3.4 **Points of Discussion:-** Teacher will conclude the activity with the following observation.

(a) In case (A) both are in same direction, thus, W.D. is positive.

(b) In case (B) g:force and displacement are in opposite direction thus W.D is negative.

11.3.4. **CONCEPT OF ENERGY**

11.3.4.1 **Teaching Strategy:-** Demonstration method

11.3.4.1 **Material Required**:- Toy car with key for winding.

11.3.4.2 **Steps:-**

1. Teacher will wind the spring of toy car by giving 1-2 turns.
2. Release the car and ask students to focus the distance moved by the toy car.
3. Now wind the spring of toy car by giving 5-6 turns.
4. Repeat Step 2
5. Wind the spring of toy car it the maximum.
6. Repeat Step 2.
7. After observation ask the students to

   (a) list the case in which toy car moves to quarter distance.

   (b) Allow the students in group to discuss what could be the reason(s) for the observation?
8. Relate the distance travelled with the more or less work done in the different cases.

11.3.4.3 **Points of Discussion:-**

(a) Why W.D is more in one case than the other?

(b) What is the source of doing work?

(c) What is the ultimate source of doing work in this situation.

10. Conclude the activity with

More work is done where more energy was stored in spring. So capacity to do work is energy.

Note : Same activity can be shown with toy car running with electric cell like 1.5V, 3V, av. In this case electric energy will be the source.

11.3.5 **Activity:-**

11.3.5. **Concept:-** Energy in relation to activity Work done.

11.3.5.1 **Teaching Strategy:-** Demonstration

11.3.5.2 **Material Required:-** A Balloon

11.3.5.3 **Step:-**

1. Inflate the balloon slightly.
2. Release it and ask the students to focus on height up to which it reaches or the trajectory of balloon.
3. Now inflate the same balloon by blowing more air into it compare to case. (1
4. Repeat step. (2)

5. Now inflate the same balloon fully and release it.
6. Repeat step. (2)

11.3.5.4 **Points of Discussion:-**Ask the students to discuss in groups.

(a) What they observed?

(b) What is the difference in three cases?

(c) What could be the reason(s) for their observation?

(d) In which case balloon remain in air for greater time? and why?

7. Allow the students to distress for 5-10 min.
8. Teacher will conclude the reflections of students by correlating in with W.D. and energy stored in balloon in different cases.
9. Concept formed : Capacity to do work by the body is energy stored in the body.

11.3.6. **Activity:-**III law of motion, W.D & energy

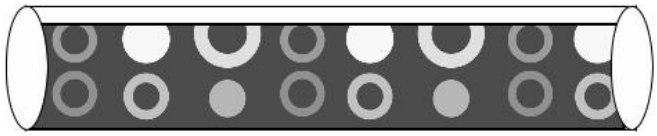
(a) Teacher can ask the students to reflect on activity 2 above with respect to activity no. 9.5 on page no. 124 of NCERT Text book Class IX related to Newton's III law of motion.

(b) Student's can.....recording the observation w.r.t. work and energy.

11.3.7. Concept:- Forms of Energy Kinetic Energy (K.E.)

11.3.7.1. Teaching Strategy:- Demonstration method

11.3.7.2 **Material required:-** Horizontally cylindrically shaped hollow pipe/bamboo/card board roll and like, three balls/grass marbles one should be heavier than other two.



A B

11.3.7.3 **Steps:-**

1. Place a ball each mean end A&B and mark their position.
2. Push Ball mean A with your finger so as to strike ball B.
3. Ask students about what have they observed? in step 2.
4. Lead the answer to concept of

11.3.7.4 **Points of Discussion:-**

(a) W.D. by Ball at A on the Ball at B. or displacement.

(b) Movement or displacement of Ball B shows that Ball B has aimed energy due to motion of Ball A.

5. Conclude : Energy due to state of motion is K.E ie; K.E. is an energy possessed by an object due to its motion.

11.3.8. **Activity:-** K.E. depends on mass & velocity with above set up ask the students to observe by performing following :

(a) Replace Ball A with heavier ball where as Ball B, their positions and push on ball A remain same.

(b) Both the balls are of same mass but the push on ball A is more so as to increase the velocity of Ball A.

(c) Discuss their observation conclude :

(d) Energy due to motion depends directly on mass and velocity.

11.3.9 **Activity:-**

11.3.9.1 **Concept:-**Form of Energy (Potential Energy)

11.3.9.2 Material Required:- Mug/bottle, Bucket, Water wheel, Table

Step:-

1. Pour water on the water wheel from a height.
2. Ask the students to observe the motion of water wheel.
3. Now raise the height of souring water on the water wheel.
4. Repeat step (2).
5. Now further raise the height of pouring water on the water wheel.
6. Repeat Step (2).

11.3.9.4 **Points of Discussion & Conclusion**

1. Discuss following :

   (a) In which case the motion of water wheel was more?

2. Allow students to discuss within group about the reason(s) of their observation.

Conclude :

Greater the height of pouring water greater is the motion of water wheel.

Work is done by the pouring water on the water wheel. Greater work is due to greater energy stored called P.E. Potential energy by the object is the energy present in it due to its position or configuration.

11.3.10 **Activity:-**Concept of Potential energy teacher may refer and perform activity no.

11.6 on page no. 150 of NCERT Book.

11.3.11 **Activity**:-Relate the concept of P.E. with activity no. 11.9 to 11.12 on page no.

152.

11.3.12 **Activity:-** Critical thinking by students in which of the case, whether the P.E. stored will be more/less/same?

(a) When you climb a rope.

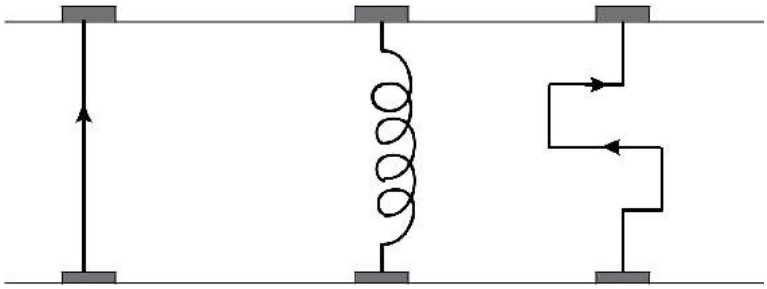
(b) When you run up a flight of stairs equal to the vertical height you climb.

Based on their answer conclude.

P.E. gained by the body depends on the difference in vertical heights of the initial and final position of the body and not on path along which is moves.

11.3.13 **Activity:-** Relation of P.E. & height above ground give the following situation to students to reflect on w.r.t. P.E.

B



A

(a) (b) ©

11.3.14 **Activity:-** Transformation of energy give various situations to the class divided into small groups and ask each group to identify various forms of energy from one point to another like.

(a) Hydropower station

(b) Nuclear power plant

(c) Thermal Power station

(d) Hammering Nail into wall

(e) Winding the clock

11.3.15 **Activity:-** Conservation & Transformation of energy ask the class divided into small groups to list the use of following and where are they used and which form of energy transformation is taking place?

(a) Electric Cell

(b) Battery

(c) D.C. Motor

(d) Generator

(e) Plant

(f) Electric Meater/iron

(g) Forsil fuels

(h) Mobile

Conclude : Transformation of energy from one form to another is obeying law of conservation of energy.

11.3.16 **Activity:-**Concept of Power

Material Required

11.3.16.2 :- A Bag, Stop Watch or mobile for stop watch.

11.3.16.1 Methodology/Teaching Strategy:- Play ground

11.3.16.3 **Steps:**

(1) Take the students/class in playground

(2) Select 5-6 students from the class

(3) Ask selected students to run one by one carrying same bag in their hand from one point to another.

(4) Ask students to note time taken by each student to reach to other end using mobile lock.

11.3.16.4 **Points of Discussion:-**

(1) Take them back to class and ask them to discuss for 5 min.

(a) why one student has taken more time than other?

(b) Is the amount of W.D. by each of the running student is same?

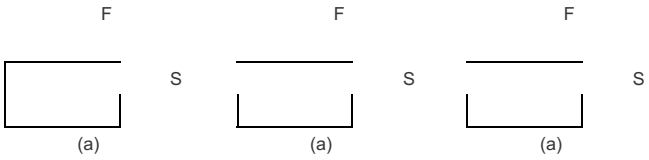
(c) What the difference in the time taken reflect?

(6) Conclude the discuss in with : The rate of doing mark is called power. Same work, more time means less power.

11.4 **HOTS/VBQs**

Q.A freely falling dyed eventually stops on reaching the ground, what happen to its K.E.

Q.



In above cases a,b,c state whether the work done is the, -w, or zero

Q. Can K.E of (i) water (ii) air be used to produce electrical energy? if yes them how.

Q. Give one example of each of the following energy transformation.

(i) Heat energy to mechanical energy.

(ii) Mechanical into electrical

(iii) Chemical to light and heat energy.

Q. Electricity transmission done has fitted in a town. A girl read in her text book that traditional filament type electric bulb and waste a lot of electricity in the farm of heat and consumes sufficient electric energy : 50 she suggested her friends and relatives,

to use CFLs and LEDs as they consumes much less energy to produce as they consumes much less energy to produce same amount of light as traditional sales.

Answer following questions bared on above information :

(a) Which efficient measures do you suggest for saving the electric energy?

(b) Which values are displayed by girl?

(c) Suggest the school activity to promote such values in school students.

P. Ravi went to railway platform no.1 at a railway station to board. But he came to know that train will depart from platform no.8 with his bag in his hand, he used the overbridge and reached platform no.8 and boarded the train. What work has he done on his bag and why.

Q. An educational tour to Mumbai was organised while visiting the sea shore, Vyom, one of the student observed that direction of wind changed during the day time and night. He asked his science teacher who accompanied them, the science teacher who accompanied them, the possible reasons for his observation.

(a) What possible reason teacher gave to the student.

(b) Name two other factors which influence winds. © Comment on the value shown by students.

Q. Due to heavy rains and speedy winds a tree broke and fell on the road. 2 persons from local shops came and begin to remove that broken part of tree but in rain as the log was too heavy a passer by came to their help with two heavy sticks. Consequently the heavy log was put aside and the commutation on the road begin as usual.

(a) Comment upon the value displayed by passer by.

(b) Name the energy stored when the heavy log of the tree was lifted to some height.

Q. Mr. Shah's family was worried about heavy electricity bills to be paid. Their neighbour Mr. Sen suggested some easy and effective steps to reduce the same. Next months bill came as a relief to Mr. Shah as a consumption of electricity has reduced upto 50 units and so had the bills.

(a) What is the unit of power?

(b) What is it a measure of energy or power?

(c) Write any 3 steps that you think Mr. Sen might have suggested to Mr. Shah.

Q. Amit and Nitin were observing a building having two different staircase. One slanting and other vertically spiral. Amit was of the opinion that a person using slanting staricase will be doing more work against gravity but Nitin thought otherwise. They started quarreling. Asif their friend explain and gave entirely different view and pacified them.

(a) What according to you was the explanation given by Asif.

(b) What appreciable value do you see in Asif?

VIDEO OF WORK AND ENERGY

WIND ENERGY

Install a wind mill on a tall stand on the Pivot of wind mill put a machine shuttle. Tie thread on the shuttle. Take a given weight and using the thread of shuttle having it as shown : The vertical height of stand s around 2.5m. Find the work done using w=mgh. For finding the power spent in lifting the given mass switch on the stop watch as soon as the given weight is lifted up use p=w/t to find power. The video is f 9.5 min. showing the concept of wind energy, work done, power calculations as mentioned above link : **www.sciencekids.co.nz**

Videos

Physics
Wind energy

12. SOUND

12.1 **Introduction**

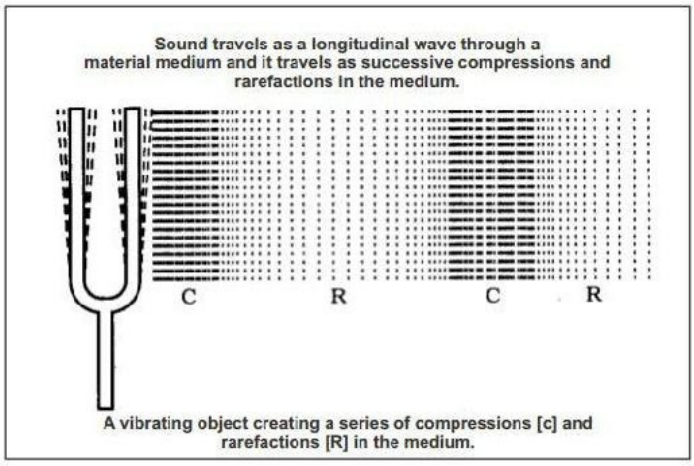
Sound is a type of energy made by the vibrations of any object that causes the movement of air particles / molecules which pump that energy to other particles near them until they lose the energy.

Sound is any disturbance that travels through an elastic medium such as air, ground or water to be heard by the human ear. When a body vibrates or moves back and forth, the oscillation causes a periodic disturbance of the surrounding air or other medium that radiates outward in straight lines in the form of a pressure wave. The effect these waves produce up on the ear is perceived as sound. It is considered to be the waves of vibratory motion whether or not they are heard by the human ear.

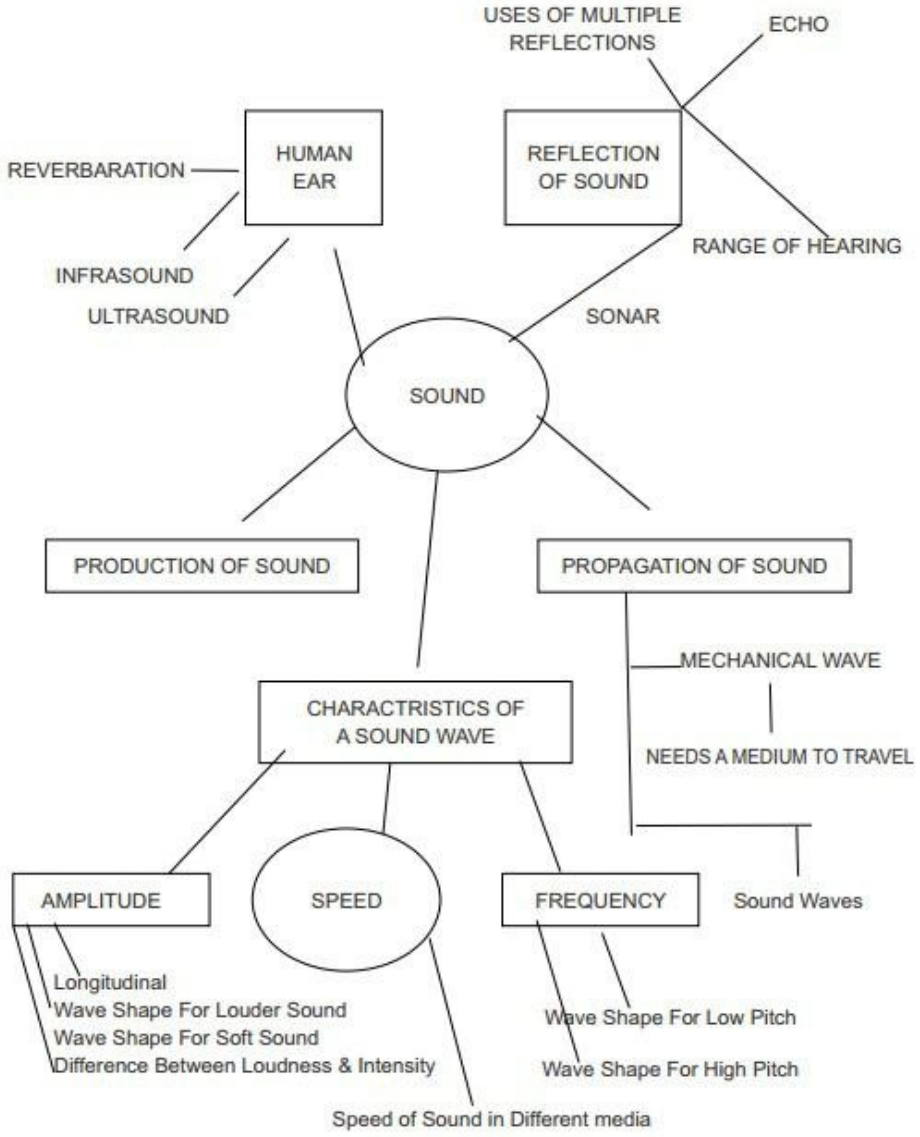
In the process of studying this chapter, a child distinguishes how and where the different phenomenon of sound is applied and the proper function of human ear.

In this chapter we are going to learn about the types of waves based on the medium required, how waves are propagated, characteristics of sound , range of hearing , infra sonic and ultra sound, laws of reflection, uses of multiple reflections, uses of ultra sound SONAR and Human ear.

The teacher introduces the word sound by saying that the class today is very noisy, very silent, one of the student is too talkative , appreciates one's voice is very sweet or melodious etc.



12.2 CONCEPT MAP



12.3 **Activities**

1.3.1 **Title: introduction To Sound**

12.3.1.1 Teaching Strategy :- Demonstration Method

12.3.1.2 **Materials Required:**

A spoon struck to a plate, banana leaf piece bent in the shape of a cone, tuning fork, jaltarang (cups of same size but water at different heights in them when struck with a rod), mouth organ, flute, whistle with mouth, a whip in the air etc.

12.3.1.3 **Steps:**

1) Make the students differentiate the sounds produced by each item brought to the class.

2) Hear the sound carefully and classify the sound according to your knowledge .

12.3.1.4 **Points Of Discussions.**

1) The above sounds can be classified into pleasant/unpleasant, shrill/coarse, high pitch / low pitch etc.

2) let the teacher give some other examples related to the sound .

12.3.2 **Title:-** To show sound requires a material medium to travel.

12.3.2.1 Teaching Strategy:- Practical

12.3.2.2 **Materials Required:-**

Take a bell jar, electric bell, vacuum pump.

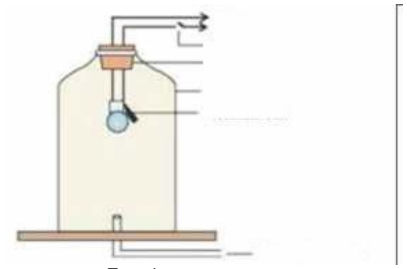
12.3.2.3 **Steps:-**

1Place the electric bell inside the closed bell jar. Can we hear the sound?

2. Connect the bell jar to a vacuum pump and start pumping out the air inside.
3. Can you hear the sound of the electric bell when there is no air. Why /why not.

12.3.2.4 **Points of Discussions:**

1. we can classify waves based on the requirement of medium.
2. Sound requires a material medium to travel. Such waves are called mechanical waves.
3. Those waves which do not require a material medium to travel are called electromagnetic waves. Eg: light waves



12.3.3 **Title:** longitudinal and transverse waves.

12.3.3.1 Teaching Strategy:- Demonstration Method

12.3.3.2 **Materials Required**

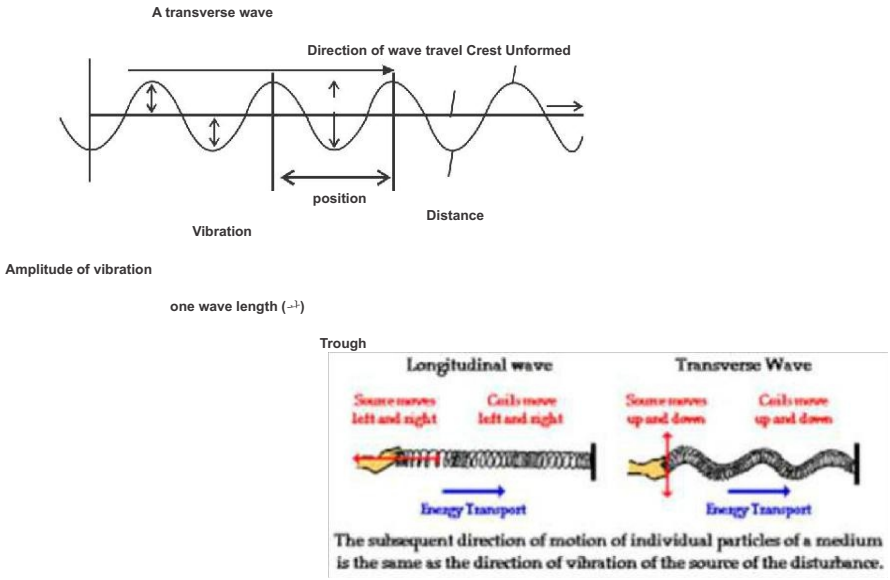
A slinky, a rope.

12.3.3.3 **Steps:**

1. Ask two students to hold a rope . Fix one end of the rope and move it up and down from the other end. Show the formation of transverse waves which move in the form of crests and troughs.
2. Similarly fix one end of the slinky , stretch and push along the horizontal axis to show longitudinal waves and explain how compressions and rarefactions are formed.
3. Explain the differences between the two waves with their characteristics.

12.3.3.4 **Points of Discussion.**

1. Discuss and explain with the SI units the following terms : Amplitude, wavelength, time period, frequency, velocity.
2. Also discuss the physical quantities like density, pressure differ in different regions during the wave formation.
3. Make the students draw their own the waves they observed during the demonstration.
4. In this context only the teacher can explain pitch, loudness, intensity of sound with examples.
5. The teacher should also explain what is a tone.
6. Form different wave patterns and explain which wave has highest pitch, highest loudness



12.3.4 **Concept:-**Range of frequencies

12.3.4.1 **Teaching Strategy:** ICT method (search from net, books)

12.3.4.2 **Material Required:-** Different sounds observation/Listening

12.3.4.3 **Steps:-** The teacher asks the students whether they can hear all frequencies of sound. Did they hear dogs howling at night? Home work must be given to find through net, books and answer the following.

12.3.4.4 **Points of Discussion:-**

1. Which range of frequencies they can hear and which they can't hear.
2. Name the frequencies which we cannot hear and the animals which can hear those.
3. Write the uses of those frequencies which we cannot hear.
4. Which type of sound is given by bats and how do they catch their prey.

12.3.5 Concept:- To Demonstrate The Reflection Of Sound

12.3.5.1 **Teaching Strategy:-** Demonstration Method

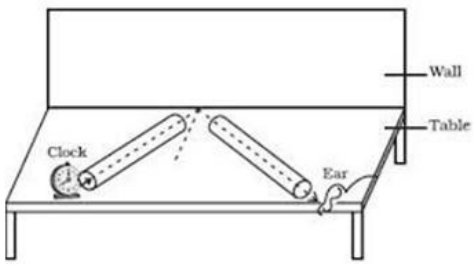
12.3.5.2 **Materials Required:** Two identical long pipes using chart paper, and a clock

12.3.5.3 **Steps:-**

1. Arrange the long pipes on a table near a wall as shown in below figure.
2. Keep the clock on one of the open end of one pipe.
3. Hear the sound of the clock from the other pipe end.
4. Adjust the pipes in such a way that we hear max sound of the clock at a particular position.
5. Measure the angle of incidence and angle of reflection.

12.3.5.3 **Points of Discussion**

1. What do you observe?
2. Repeat the above steps for different angles of incidence and find the angle of reflection.
3. What do you observe?
4. What do you conclude from it?



GRAPHICAL ASSESSMENT OF A CHILD

Objectives : To enable the students to:

Read the graphical representation of sound waves correctly.

i Learn the relationship between time period, frequency, wavelength of a sound wave

ii Solve simple numerical based on the relation between velocity, frequency and time period.

Procedure: The teacher may:

i Explain the terms frequency, time period and wavelength of the sound wave along with the SI units

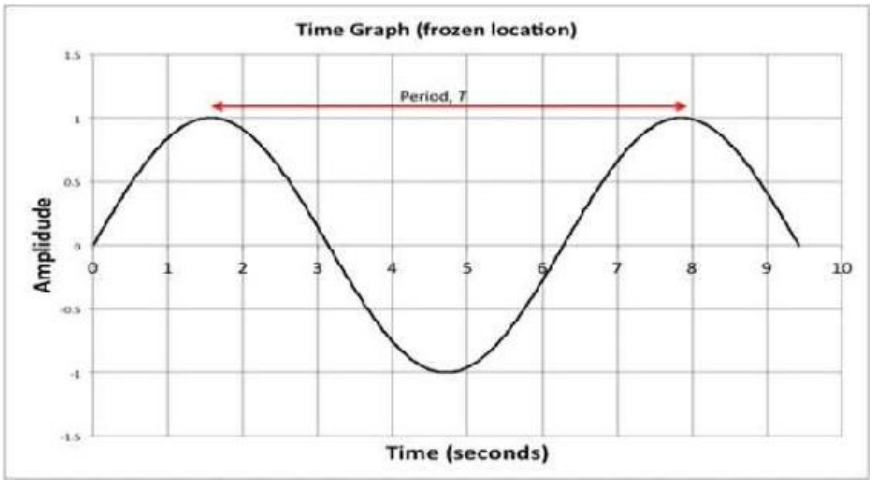
ii Give graphical representation of sound waves.

iii Explain the relation , formula to solve the numerical.

Assessment Parameters: One Mark for Each Question.

Maximum Time: 20 minutes **Maximum Marks:** 15.

Q1. The given graph shows the displacement versus time relation for a disturbance travelling with a velocity of 1500m/s.

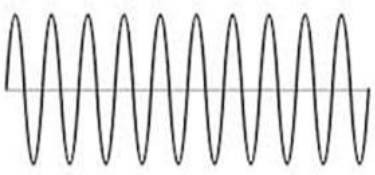


a) Calculate i) time period ii) frequency iii) wavelength .

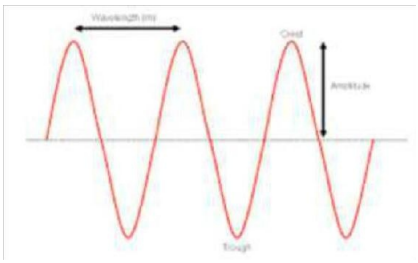
b) The velocity of sound in air is 340m/s .Compute i) its wavelength when frequency is 250 Hz ii) its frequency when the wavelength is 85 cm.

Q2. Which of the following wave have high pitch .

Fig: A Fig: B



Wave length



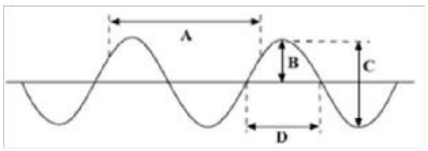
Crest

Amplitude

trough

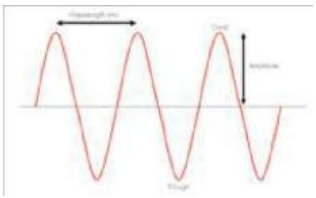
Q3. Which of the following wave low loudness.

Fig: A Fig: B



Wave length Crest

Amplitude



trough

Q5. Is pressure high or low for a compression.

Q6. How does density vary for a rarefaction.

Q7. Define wavelength. Write SI units.

12.4 ACTIVITY FOR FIELD TRIP

12.4.1 OBJECTIVES FOR THE FIELD TRIP : To enable the students to:

v Develop interest in out-of-school activities and learning

v Broaden their understanding of the science concepts and principles.

v Enhance knowledge through extended learning.

v Appreciate interrelation between classroom learning and every day life applications.

v Connect class room learning to life outside the school.

12.4.2 **Concept Learnt:** Echo, Multiple Reflection, Reverberation.

12.4.3 **Places Suggested:**

Cinema hall, auditorium, concert halls, hilly areas

12.4.4 **Objectives Of Learning The Concept:**

To enable the students to :

v Learn the meaning of reverberation.

v Understand why excessive reverberation is undesirable

v Know about the materials that can be used to reduce reverberation.

v Make a first hand survey of auditoriums before learning the topic

12.4.5 Procedure:

v Explain the meaning of the term “reverberation”

v Make the student understand the kind of disturbance/problems that are likely to be caused by excessive reverberation.

v Explain echo, multiple reflections .

v Calculate the time taken to hear echo.

12.5 **ASSESSMENT PARAMETERS:**

Maximum Time : 30 minutes **Maximum Marks:** 2

After the visit, make the student answer the following questions.

1. How do repeated reflection of sound lead to reverberation?
2. Did you find any ways to reduce reverberation. If so how?
3. Did you find the ceiling of cinema hall curved? Why?
4. Find out the different materials used on their seats, walls, ceilings and reasons for the same.
5. Do they have curtains, any fibre board? What type of materials did you find?
6. Why is excessive reverberation undesirable?
7. What is that reflected sound called?
8. How much time did you take to hear reflected sound.
9. Calculate the distance from the object if velocity is given and time is noted.
10. What is the difference between echo and reverberation.

12.6 **References:** NCERT of Class IX, and a complete movie (video) prepared for sound chapter which includes all activities , concepts and explanation.

12.7 **Value based questions:/HOTS**

1. Why do we have stages of auditorium, curved, background, curtains, carpets, and false ceilings?

2. Draw a density-distance graph in case of longitudinal wave and indicate the position of compression and rarefaction.
3. If you place some small blades on a drum, what will you observe when you beat this drum with a drum stick? Explain?
4. What is vibrating in the following musical instruments producing by a musical sound? A) violin b) drum c) saxophone d) flute e) guitar f) dholak g) table .
5. Ocean waves of time period of 10 sec have a speed of 15 m/s. what is the wavelength of these waves.
6. What will happen to the loudness of the sound if: a) amplitude of a wave is tripled b) surface area of a vibrating body is decreased c) the distance between the source and the observer is doubled) the density of the medium decrease e) the wind is blowing in the direction of propagation of sound.
7. A sound wave of frequency 640 Hz travels 800 m in 2.5 s. calculate a) speed of sound

   b) wavelength of sound wave.
8. Why is the velocity of sound more than that in water or air?
9. Name any three devices based on reflection of sound.
10. Give reasons:

    a) Lightening is seen much earlier than the thunder is heard.

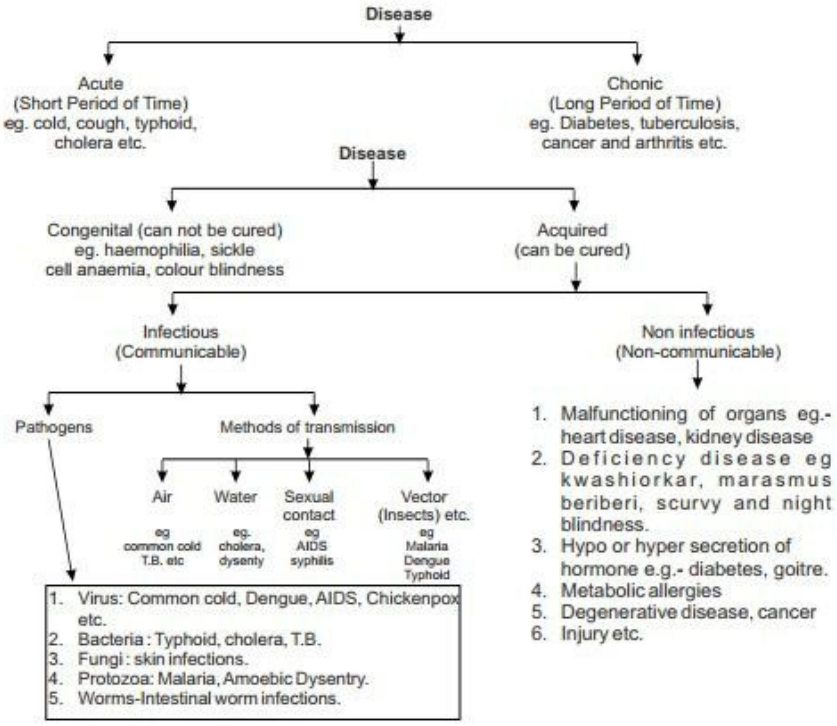
    b) Sound travels faster in a rainy day than on dry a day.

    c) How flying supersonic aircraft shatters glasses of the window panes of houses.

13. Why do we fall ill

13.1 **Introduction:-** Health is the level of functional or metabolic efficiency of a living organism. In human it is the general condition of a person's mind and body, usually meaning to be free from illness, injury or pain. According to WHO,(1998) Health is “A state of complete physical, mental and social well-being and not merely an absence of disease or infirmity”. A disease can be defined as an impairment of the normal state of the living organism that disturbs or modifies the performance of the vital functions and is a response to environmental factors to specific agents to inherent defects of the organisms or combination of these factors. Disease may be of different types i.e. acute or chronic, infectious or non-infectious and congenital or acquired etc. Disease may be caused by pathogens, poor health and under nutrition, environmental pollution or malfunctioning of body parts. Public hygiene, healthy and nutritious food, clean air and water etc. are some measures to prevent the disease. To kill the microbes and measures to reduce the effect of disease are some basic principles of treatment.

13.2 Concept Map:-



* **Note for the teacher:** Colour blindness is a congenital disease, night blindness is a deficiency disease caused by deficiency of vitamin A in the diet.

13.3. Activities:-

13.3.1 Concept:- Common diseases and their causes.

13.3.1.1. Teaching Strategy: - Group activity by answering the questions based on the content.

13.3.1.2. Materials Required:- Colored chalk, question bank of about 30-40 questions based on the common diseases and their causes,

- Colored pastal sheet, stop watch.

13.3.1.3 **Steps:-**

1. Divide the class into 4 or 5 groups of uniform number of students.
2. Give name of the team with the name of group leader, any colour or any leader.
3. Draw a chart on the board like following way –

5.				
4.				
3.				
2.				
1.				
	Group 1	Group-2	Group-3	Group-4

4. The teacher will ask the questions related to various diseases from each team and to give answer in stipulated time with the consultation of other members of group.
5. The correct answer takes the team one step up in the chart.
6. At the end of quiz, the team reaching the highest level wins.
7. The game may be continued till all the boxes in the charts are called.

Note for the teacher- The teacher should make effort that each student is involved to give the answer.

13.3.1.4. Points of Discussion:-

To evaluate the particular student some viva based questions may be included. It may be helpful for individual level assessment.

Each point must be covered and the group should contain a mixed level of students. The teacher should give a standard answer to a question if all the groups fail to answer any question.

13.3.2. Concept:- To compare the difference between communicable and non communicable diseases.

13.3.2.1. **Teaching Strategy:-** Research from different sources like news papers, magazines, internet sites, discovery and national geographic channels on T.V, Books from library etc.

13.3.2.2. **Materials Required:-** Multimedia projection, chart stand

13.3.2.3. Steps:-

1. The whole class is divided into smaller groups.
2. Each group is assigned to prepare a presentation on the concept following these points:-
   - ¬ Disease name.
   - ¬ Whether communicable or non communicable
   - ¬ Causative agent.
   - ¬ Mode of spreading
   - ¬ Symptoms
   - ¬ Prevention
   - ¬ Treatment
3. At the end of report (presentation) each group will acknowledge the referred material book, website or other source of information. There should be at least 4 such references.
4. The teacher should evaluate each group on the basis of 100 points- A suggestive distribution of points may be-
   - ¬ Name of disease and its cause-(10 points)
   - ¬ Symptoms (10 points)
   - ¬ Mode of transmission (spread)- (10 points)
   - ¬ Prevention- (10 points)
   - ¬ Treatment- (10 points)
   - ¬ Diagrams/Charts/Posters/Photographs/Power Point presentation.(20 points)
   - ¬ References (10 points)
   - ¬ Oral questions 4(5x4=20 points) at the end of presentation from each group.

Note for teacher:- The teacher should give at least a week time to student for preparation of the content.

13.3.3. Concept:- To know various organisms which cause different diseases.

13.3.3.1. **Teaching Strategy:-**The assignment may be given as a project.

13.3.3.2. **Materials Required:-** The teacher can give outline for preparing the project.

- ¬ Selection of disease
- ¬ Classification i.e. communicable or non communicable
- ¬ The causative agent and mode of transmission.
- ¬ Symptoms of disease.
- ¬ Prevention of disease.
- ¬ Treatment of disease.
- ¬ Diagrams/Images related to the disease.

13.3.3.3. **Steps:-**

1. At least one week time should be given to each student to work and prepare the project.

2. The project is individual based and collected from each student on the date and time already informed.
    - ¬ The project is evaluated on the basis of following parameters.
    - ¬ Correct Identification of causative agent- 1 mark
    - ¬ Symptoms- 2 marks.
    - ¬ Proper treatment – 2 marks
    - ¬ Proper prevention- 2 marks
    - ¬ Use of Images and presentation- 2 marks
    - ¬ Bibliography- 1 mark

Total - 10 marks.

Note for Teacher:- The teacher can guide the students for reading certain books on the topic and internet websites like www.microbe.org etc.

13.3.4. Concept:- To recognize the common methods of transmission of diseases.

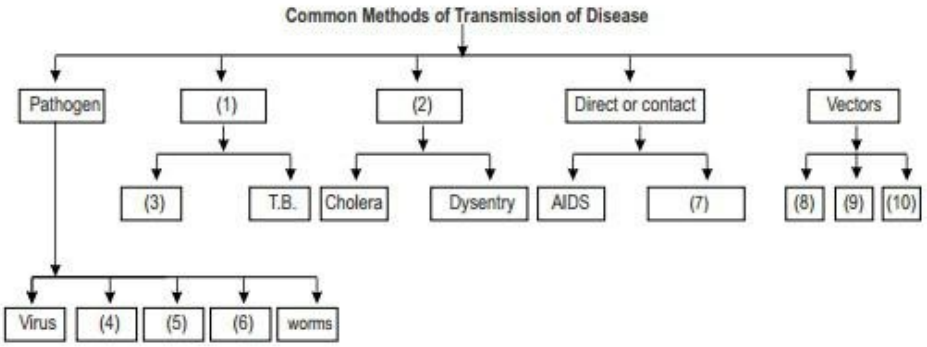
13.3.4.1. Teaching Strategy:-

The assignment may be given in the form of a work sheet containing a flow chart or set of certain questions.

13.3.4.2. **Materials Required: -** Work-Sheet containing flow chart.

13.3.4.3. **Steps:-**

1. The worksheet will contain a flow chart on common methods of transmission of diseases. Some boxes are left blank. The students will be asked to complete the flow chart with suitable terms where required.
2. Common methods of Transmission of Diseases



3. There should be 1 mark for each correct answer 1 to 10 (1x10=10 marks)

Note for the teacher:- The students who are unable to complete the flow chart may be given an alternate choice of questions like match the following etc.

13.5 Resources:- Internet site- www.slideshare.net.

13.6 References:- CCE in science-class IX. SCERT, U-TUBE, Truman publications- Elementary

Biology- Class XII, NCERT book, Science Class IX, Pradeep's – Science Part III (Pardeep Publications)

13.7. **Exemplar HOTS Questions:-**

1. Name one disease spread by Anopheles, Culex and Aides species of mosquitoes. (Hints) Anopheles- Malaria

Culex- Filariasis Aedis- Dengue

2. AIDS is a viral disease which spreads by blood transfusion from infected person. Is there any other way in which this disease can spread?

(Hint)- Yes, by sexual contact with an infected person.

3. Name two diseases which are caused by bacteria and spread by sexual contact. (Hints)- Syphilis and gonorrhea.
4. What are antibiotics? Name the scientist who discovered the first antibiotic, also name the antibiotic.

(Hints) Antibiotics are chemicals which are secreted from one kind of micro organism and used to check the growth or kill the specific micro-organisms.

Sir Alexander Flaming discovered penicillin antibiotic for the first time.

5. Explain why the acute diseases are severe but still less harmful than chronic diseases.

(Hints)- The acute disease last for short duration and do not cause long terms bad effects on our health. The chronic diseases, are long lasting and have drastic long term effects on our health.

6. Mr. Rohit, an English teacher in a school was explaining about the burden of work and was very exhausted and weak. Mr. Rakesh was Biology teacher and suggested for his blood testing. Mr Rohit annoyed and replied that his 80 year old father is hale and hearty and not suffering from any disorder. After a few days Mr Rohit got fainted and Mr Rakesh Carried him to hospital. The doctors diagnosed diabetes and started the treatment. Now Mr Rohit is living a good life.

Q a. What sense of responsibility did the Biology teacher exhibit?

Q b. Why did Mr Rakesh advised him for testing the blood?

Qc. Write the cause of diabetes.

Qd. Is the disease curable? What precautions must be taken?

Hints:- 1. Humanity and social responsibility. 2. The symptoms resembled with diabetes. 3. May occur due to stress or untimely food intake or failure of secretions of

Insulin hormone. 4. No, but can be controlled by healthy life style.

14. Natural Resources

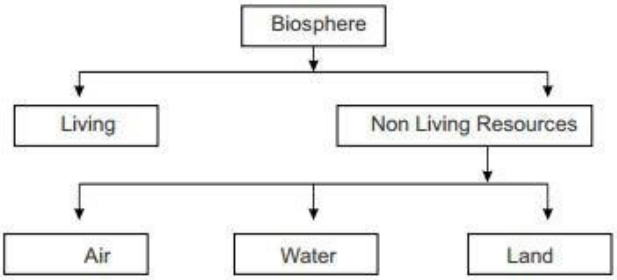
14.1 Introduction:-

In this chapter the students will learn about natural resources which satisfy human needs. This chapter also explains the basic phenomena like cloud formation, rainfall, weather changes etc.

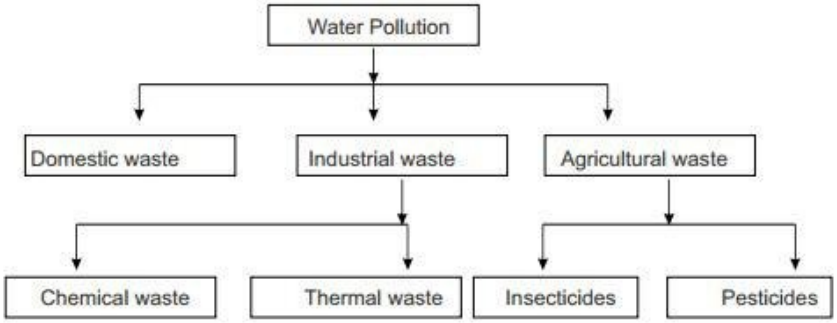
Here a student will also learn how these resources support life.

14.2 Concept Map:-

14.2.1



14.2.2



14.3 Activities:-

14.3.1 Concept:- Compare the rate of heating and cooling of land and water

14.3.1.1 Teaching Strategy:- Activity method

14.3.1.2 **Materials Required:-** (to be procured from students) Two thermometers, two glass, sand, water

14.3.1.3. Steps:-

Let students note down the temperature difference using sand and water in glass placed in sun

Tell them to repeat the experiment in shade.

14.3.1.4. Points of Discussion:-

Discuss with students the following points

- If they have found any difference in temperature?
- Why the temperature was differently observed by them in sun and shade?
- Where they observed the fast cooling?

14.3.2 Concept:- How air moves?

14.3.2.1 Teaching Strategy:- Activity method

14.3.2.2 Materials Required:- (to be procured from students)

Cardboard folded in L shape, a candle, incense sticks (agarbatti), match box

14.3.2.3 **Steps:-**

- Ask students to hold the cardboard in slanting position

- Tell them to hold a burning agarbatti near to the lower end of cardboard and a candle near to upper end.
- Now tell them to invert the position of agarbatti and candle

14.3.2.4 **Points of Discussion:-**

Discuss with students the following points and let them draw inference

- What is the direction of smoke from agarbatti in both the positions?
- What is the effect of heating and difference between temperature in smoke direction?

14.3.3 Concept:- Rain formation

14.3.3.1 Teaching Strategy:- Activity method

14.3.3.2 Materials Required:- (to be procured from students)

. An empty bottle, water , inscence stick (Agarbatti), match box

14.3.2.3 **Steps:-**

- Ask students to pour 5-10 mL of water in bottle and place in sun.
- Lit the agarbatti and allow the smoke to enter the bottle and quickly cap the bottle tightly.
- Press the bottle hard and release, repeat for few times
- Repeat the experiment without using smoke.

14.3.2.4 Points of Discussion:-

Discuss with students the following points

- When was fog present?
- When did the fog disappear and why?
- What was the difference when observed without smoke?
- What happened when the pressure was given and released?
- Relate the experiment with the phenomena of cloud and rain formation in nature

14.3.3. Concept:- Air Pollution

14.3.3.1 Teaching Strategy:- Activity Method

14.3.3.2 Materials Required:- (being procured form students) Two paper plates, vaseline

14.3.3.3. Steps:-

- Let students take paper plates and smear vaseline over them in a small patch.
- Tell them to place these plates for 24 hrs at two different places undisturbed
- Observe the two plates for dust parties.

14.3.3.3 **Points of Discussion:-**

Discuss with students

- The observation and difference between plates
- What is the source of dirt collected on plates in seemingly clean environment?

14.3.4. Concept:- How much water is present on earth?

14.3.4.1 Teaching Strategy:- By using Pie chart

14.3.4.2 Materials Required:-

. Chart paper, markers

14.3.4.3. Steps:-

Prepare pie chart as follows

14.3.4.4 **Points of Discussion:-**

- Discuss about shortage of water faced by people in surroundings especially during summer season.
- Ask students to collect information about the rainfall received and percentage of water usage in various activities.

14.3.5. Concept:- Soil formation

14.3.5.1 Teaching Strategy:- Activity method

14.3.5.2 Materials Required:-

Chalk, water, disposable transparent glass, dried leaves soaked in water

14.3.5.3. Steps:-

- Ask students to rub two pieces of chalk
- Then tell them to put chalk in glass of water and observe for a day.
- Make chalk powder and gently blow over it
- Mix chalk with water soaked leaves

14.3.5.3 **Points of Discussion**

With all above steps, various methods of soil formation and weathering of rocks can be discussed with the students. Dried leaves can be related to humus.

14.3.6. Concept:- Soil Erosion

14.3.6.1 Teaching Strategy:- Activity method

14.3.6.2 Materials Required:-

. Plastic bottles, soil, wheat seeds, dried leaves soaked in water, disposable cups,water,

14.3.6.3 Steps:-

Let students perform this activity in teacher's presence as given in the following picture

14.3.6.4 **Points of discussion:-**

- What difference will they observe in water collected in cups?
- Why is there difference between the quality of water?

14.4 Resources:-

https://www.ucar.edu/learn1_1_2_7t.htm

http://www.ssa.tn.nic.in/docu/alm-manual.pdf

http://www.ametsoc.org/amsedu/proj_atm/modules/Clouds.pdf

http://www.msnucleus.org/membership/html/jh/earth/atmosphere/jhatmosphere.pdf

http://www.scert.cg.gov.in/eduweb.htm

http://www.nasa.gov/pdf/288978main_Meteorology_Guide.pdf

http://greenvalleykashmir.com/CMS/Files2/NATURAL%20RESOURCES.pdf

14.5 **References:-** NCERT Text book on Science for class IX

14.6 **HOTS/ Value based questions:-**

1. Imagine a situation where there is no atmosphere on earth. What difference will you observe during day and night?
Hint: very high temperature during day and very cold nights

2. After a very hot day, cool breeze usually flows during late evenings and night, explain.

Hint: uneven heating and cooling of earth surface and difference in atmospheric pressure

3. Dense fog and hazy days during summer is common feature now. Discuss

Hint: Air Pollution

4. Give reason why no aquatic animals were found in a river along a stretch of 10-15 kilometres away from the point of industrial discharge?
Hint: Dissolved oxygen and thermal changes

5. Give the important role played by the dust and other suspended particles in the air with respect to rain drop formation.
Hint: Dust particle acts as nucleus

6. CFC free refrigerators are in demand now a days. Give reason. Hint: CFC is major cause for ozone depletion
7. Ozone is good or bad, how?

Hint: Ozone is a poisonous gas, stratospheric ozone is protecting life from UV rays

8. Nitrogen is the most abundant gas in atmosphere but living organisms cannot use it directly, why?
Hint: Nitrogen is inert gas

15. Improvement in Food Resources

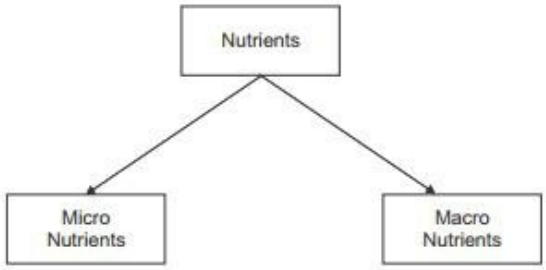
15.1 **Introduction:-**

For feeding the ever increasing Indian population, our capacity of manufacturing crop plants and livestock should be increased through various efforts like green revolution and white revolution. But this should be done in a sustainable manner without destroying our environment. Improving the financial status of people, especially those involved in agricultural practices is essential to provide food security to everyone. The students will learn about several approaches which enable a farmer.

They will also get acquainted with various methods to improve the production of food resources.

15.2 Concept Map:-

15.2.1



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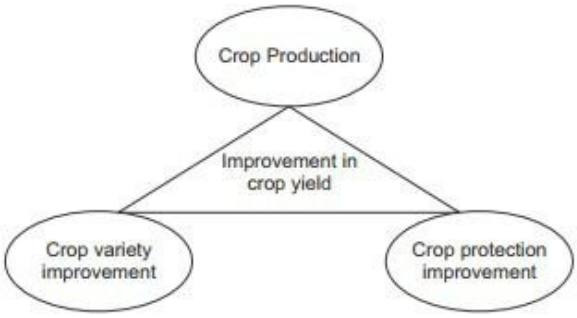
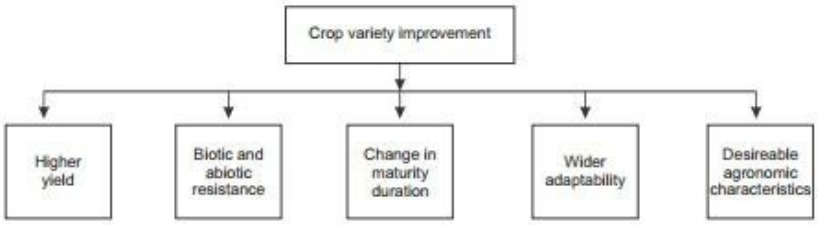


15.2.3.



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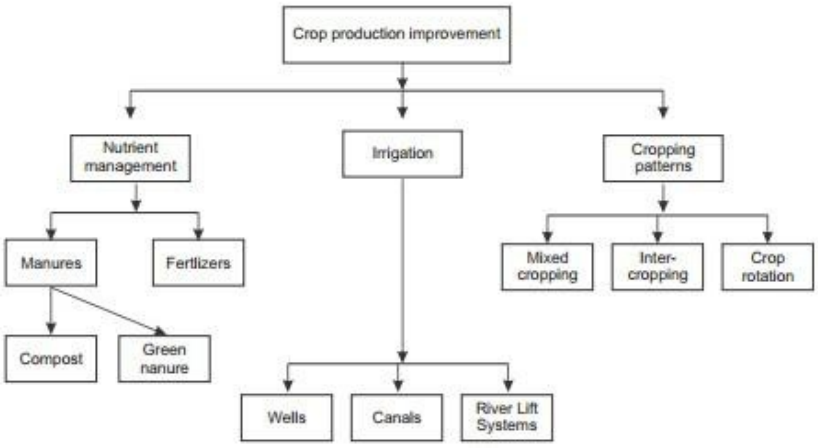

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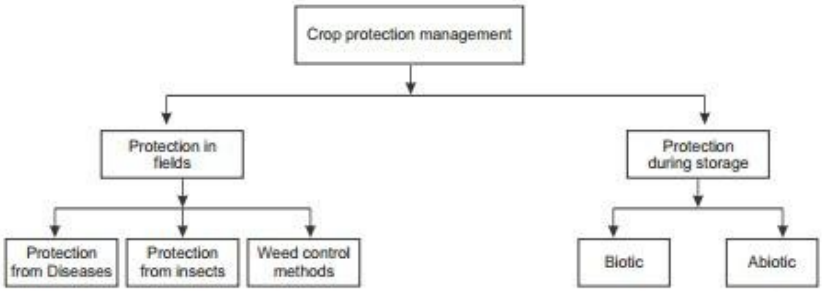

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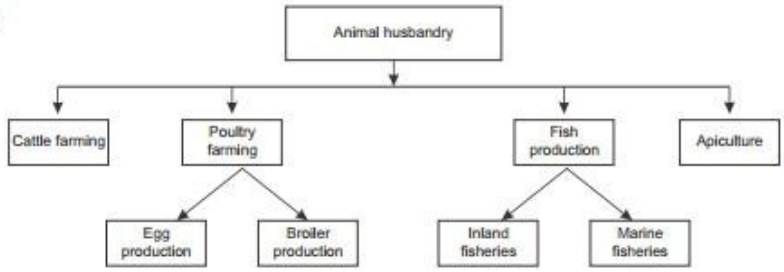


15.3 **Activities:-**

15.3.1 Concept:- Cropping Patterns

15.3.1.1 Teaching Strategy:- Activity method

15.3.1.2 Materials Required:- (to be procured from students)

Three plates/tray, different seeds, soil/cotton.

15.3.1.3 **Steps:-**

After procuring materials, let students set up their farms by sowing seeds in trays in different patterns.

15.3.1.4 **Points of Discussion:-**

Now discuss with students about benefits of these patterns in agricultural system.

15.3.2 Concept:- Irrigation methods

15.3.2.1 **Teaching Strategy:-** Field trip

15.3.2.2 **Materials Required:-** Pen, diary

15.3.2.3 **Steps:-**

Organize a trip to countryside farmland and study about different irrigation methods adopted by our farmers.

15.3.2.4 **Points of Discussion:-**

Let the students discuss about different methods adopted for irrigation in various parts of the country. You can also tell students to take help of geography text book.

15.3.3. Concept:- Fertilizers and Manures

15.3.3.1 **Teaching Strategy:-** Debate

15.3.3.2. **Materials Required:-** Chalk, board, duster

15.3.3.3 **Steps:-**

Let students debate in two groups of 'for and against manures and fertilizers'.

Ask one student to note down all the points of discussion separately 'for and against'.

15.3.3.4 **Points of Discussion:-**Discuss with the students all pros and cons of manures/fertilizers after the points are written.

15.3.4 Concept:- Bee keeping/fisheries/poultry/cattle farming

15.3.4.1 **Teaching Strategy:-** Project

15.3.4.2 Materials Required:- Internet access

15.3.4.3. Steps:- Ask students to make project on any one of the topics.

15.3.4.4. **Points of Discussion:-** Discuss in the class about the use of internet to gather information for these projects, e.g. How egg reaches from poultry to our kitchen?

15.4 **Resources:-** http:www.studiestoday.com/concep-biology-cbse-class-9-biology

Improvement-food-resources-notes-202132.html

http://www.youtube.com/watch?v=6C8tCXIf6BY

15.5 **References:-** Text book of Science NCERT for class IX, page 204-215

15.6 **HOTS/Value based questions:-**

1. Neeraj went to a field and said to his farmer friend,'to obtain good quality of wheat crop, use fungus resistant seeds and irrigation after maturity.' What will happen if farmer follows the instructions of Neeraj?

Hint: Irrigation is required before maturity

2. Despite using good and expensive seeds, production of wheat was reducing in a farmer's field. Give one possible reason for it.

Hint: wheat is infested by micro-organisms

3. Despite using good and expensive seeds, production of wheat was reducing in a farmer's field. Give another reason for it.

Hint: nitrogen content of soil is depleted.

4. Why are legumes desirable in crop rotation? Hint: nitrogen enrichment of soil

5. There are three farmers, first is using high quality seeds in his farmland, second is using ordinary seeds along with irrigation and fertilizers, and the third one has adopted irrigation, use of crop protection measures and good quality seeds. Which farmer will get the maximum benefit from his farmland

Hint: third farmer

6. Why are sportsman recommended to include eggs, meat, fish, and milk as essential part of their diet?

Hint: high amount of protein, essential for muscle development

7. The production of food from animal sources has increased in last few decades, give reason.

Hint: improved varieties, health and disease control

8. Cows A and B are of same breed. Cow A is fed on grass and cow B is fed on maize, grass, barley, etc . Which do you expect to give a higher quantity of milk?

Hint: B, diet contains roughage and concentrates.

9. Why is Italian bee preferred over Indian bee?

Hint: high honey capacity, stings less, stay in beehive for long periods, breed well.

Unit-4

Class X

Unit-4 - Class X

1. Chemical Reactions and Equation

1.1 **Introduction:-**In the previous classes we have already learnt about the physical and chemical change of matter. The transformation of chemical substance into another chemical substance in known as chemical reactions. i.e. whenever a chemical change occurs we can say that a chemical reaction has taken place.

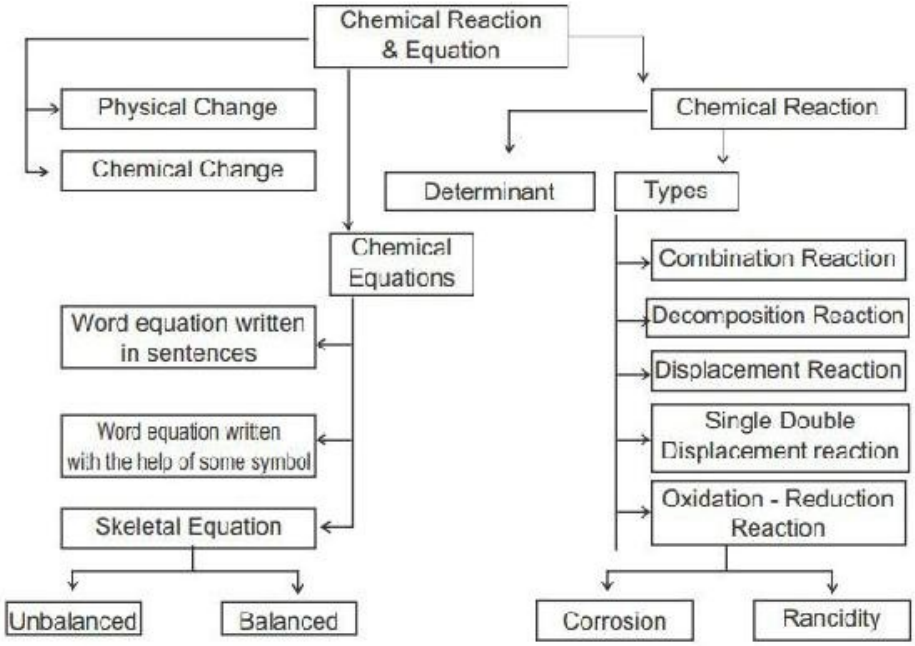
Consider the following situation of daily life and think what happens when.

- milk is left at room temperature in summer day
- an iron nail/tawa is left exposed to humid atmosphere
- food is cooked
- food gets digested in our body

In the above situations the nature and the identity of the initial substance get changed.

Now the question is how to know that a chemical reaction has taken place? For this purpose let us perform some activities to find the answer of this question.

1.2 **Concept Map**



Activity - No. 1.3.1

1.3.1.1 **Method/Strategy: Activities**

1.3.1.2 **Material Required:-**

Magnesium ribbon, sand paper, pair of tongs, Burner, water, lead nitrate solution, Potassium iodide solution, zinc granules, conical flask or test tube, dilute Hydrochloric acid or sulphuric acid.

1.3.1.3 **Steps :-**

The teacher will perform all the three activities in the class room and motivate the students to give the answer about the change occur during those activities. The student will observe the change occurre and answer the questions one by one.

The following are the changes which occur in these activities:-

- **Change in state**
- **Change in colour**
- **Evolution of bubbles / gas**
- **Change in temperature**

1.3.1.3 **Discussion Point:- The following discussion will take place among the teacher and students. If these type of changes occur around us, would you think that chemical substances changes with chemical reaction. Now teacher will ask the to study various symbolic representation known as chemical equation.**

Activity - 1.3.2 Combination Reaction

1.3.2.1 **Method/Strategy: Activities**

1.3.2.2 **Discussion Point**

In the above chemical reaction CaO react vigorously with water to produce lime releasing a large amount of heat.

In the reaction CaO reacts with H_2O and gives a single product.

$$CaO + H_2O \longrightarrow Ca(OH)_2$$

Such a reaction in which a single product is formed from two or more reactants is known as combination reaction.

- We also observed that a large amount of heat is evolved during the reaction which make the reaction mixture warm this type of reaction are known as exothermic reaction, other example, Burning of natural gas.

$$CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(g)$$

Activity - 1.3.3 Decomposition Reaction

1.3.3.1 **Method/Strategy: Activities & open discussion**

1.3.3.2 **Method/Strategy:-**

Ferrous sulphate, test tube, burner pair of tongs. Lead Nitrate , Silver chloride watch glass calcium carbonate.

1.3.3.3 **Steps:-**Activity 1.5, 1.6, 1.7, 1.8, (NCERT)

1.3.3.4 **Discussion Point:-**

In all the reaction are thing what you observed that a single reacted trends down give two or more thane two simple products. There fore these reactants are decomposition reaction.

- Ferrous sulphate ($FeSO_4$ 7 H_2O) observe the change the colour of crystal.

- SO_2 & SO_2 gases

- $CaCO_3$ (s) $\xrightarrow{\text{heat}}$ CaO (s) + Ca (g)
  Lime stone Quick lime

- $Pb(No_3)_2$ (s) $\xrightarrow{\text{heat}}$ 2 PbO (s) + 4 NO_2 (gt) + O_2 (g)

- H_2O Electricity $H_2 + O_2$

- 2 Agc (s) $\longrightarrow$ Ag (s) + C_2 (g)

- 2 AgBr $\longrightarrow$ Ag (s) + Br_2 (g)

- The reaction require energy to decompose so they are known as end othermic reaction

Questions

1. On Diwali Hetal's mother did not allow her to play with crackers. So she brought soft metallic strip and burn. She enjoyed that. It was burning with flame white coloured was left.

   a) Name the metal.

   b) Name the metal.

   c) Write the chemical equation of burning.

   d) Why should not we burn the crackers?

2. In a colourless solution Ravi blow with the help of straw and observed that the solution turned from colourless to turbid. This gas is also responsible for global warming.

   a) Name the solution.

   b) Which gas was passed trough the solution?

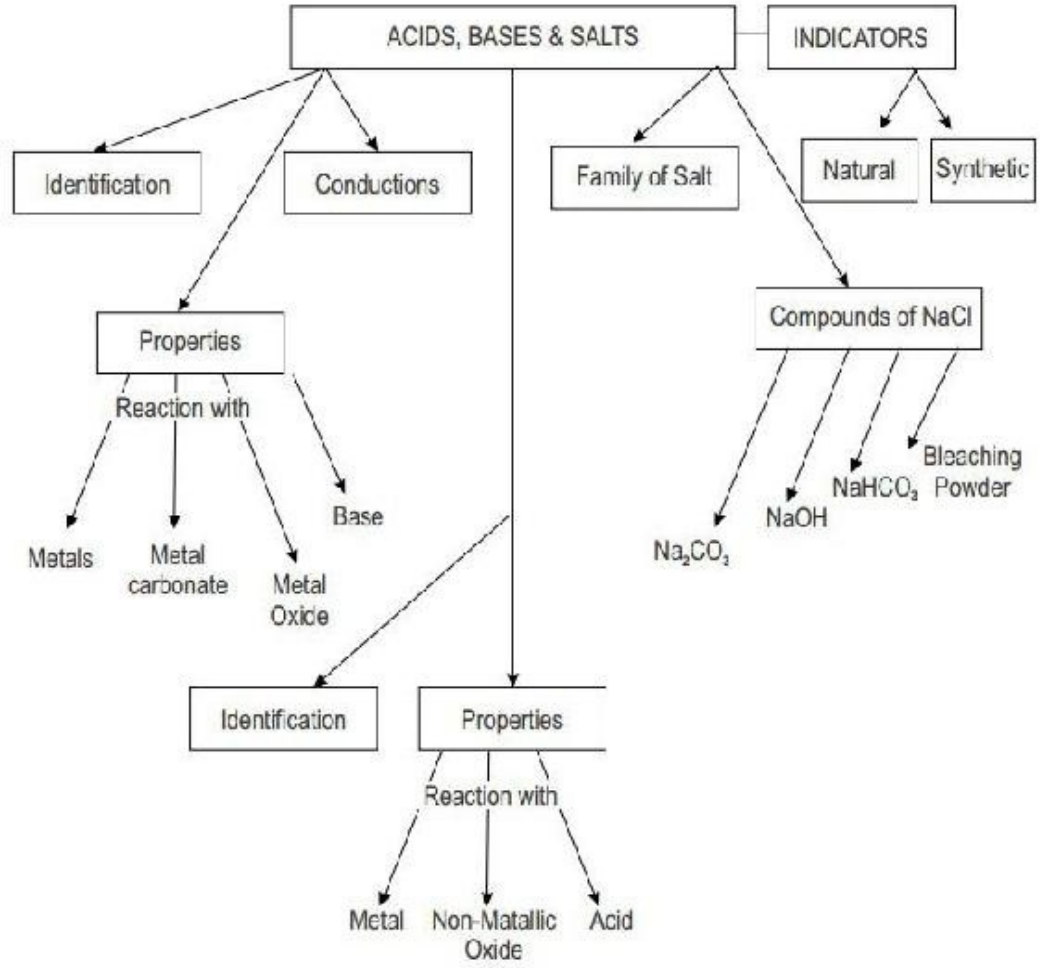
   c) Name the solution formed.

   d) What measure would you like to take to balance the gas in the atmosphere?

2. Acids, Bases and Salts

2.1 **Introduction:-**Certain substances when dissolved in water conduct electricity, such substances are called electrolytes. Various substances which act as electrolytes can be classified into three types- Acids, Bases and Salts. These are used in our daily life and are being dealt in this chapter.

2.2 Concept Mapping.



2.3 Activity- Preparation of own indicator by using natural substances.

2.3.1 Teaching

Strategy:- Individual activity

2.3.1.2 Materials

Required Turmeric, Red Cabbage leaves, Coloured Petals of some flowers(Hibiscus,Petunia etc), beet root, thick paper strips or strips of blotting paper.

2.3.1.3 Steps:- Teacher will ask every student to prepare the indicator paper by using

above mentioned materials.

- method of preparation may be described in brief.
- next the student will bring the prepared indicator strips/paper and that

can be used in the next concept dealt after this.

2.3.1.4 **Discussion Point:-**

- Teacher will tell student s about the indicators.
- type of indicators i.e Natural and Synthetic.
- difference between both type of indicators.
- names of both type of indicators.

Activity 2.3.2 Identification of acidic and basic nature of substances by using indicator papers.

2.3.2.1 **Teaching Strategy:-** Individual Activity

2.3.2.2 **Materials**

Required:- Sample of dil solutions of HC , NaOH, H_2SO_4, HNO_3, CH_3COOH, $Ca(OH)_2$,

KOH, $Mg(OH)_2$ test tubes, blue and red litmus paper.

2.3.2.3 Steps:- Teacher will ask student to take out the indicator strips prepared by them

and will also provide them a strip of blue and red litmus to each student.

-Let the student prepare observation table of the above mentioned

samples to write the colour change during activity.

-Teacher will keep all the samples solutions ready in various test tubes.

-Each student one by one, will came test the nature of substance

(acidic or basic) by change of colour of indicator paper.

- They will write their observations in the table.

2.3.2.3 Steps:-

Discussion Point- After the activity is done the teacher will tell them the nature of substance

on the basis of colour changed of paper.

- Conclude that above substances are either acidic or basic.

<u>Activity 2.3.4</u>:- Study of chemical properties of Acids and Bases with metal, Carbonates

and Hydrogen Carbonates, each others effect, metallic and non-metallic

oxides.

2.3.4.1 Teaching Strategy:- Students oriented group activity.

2.3.4.2 Materials Required:- Dil $H_2 SO_4$, NaOH solutions, sodium metal, $Na_2 CO_3$ CaO, Test tubes, holder.

Passing tube, distilled water, soap solutions, time, match box , etc.

2.3.4.3 Steps- Teacher will instruct the student, about the concept and students will

perform the activity in groups very carefully with the assistance of teacher.

- student will note down the observations in their note book.

(Refer activity 2.3 to 2.7 of NCERT Text Book)

2.3.4.4 **Discussion Point:-**

- The teacher will supervise the students while performing activities and guide their accordingly.
- The following conclusions should be made

- Acids/bases produces hydrogen gas with metal

- Acids produce CO_2 gas with metal carbonates and hydrogen carbonates.

- Neutralization reaction of acid to bases.

- Metal oxide form salt and water with acids

- Similarly non-metallic acids form salt and water with bases.

Activity 2.3.5- Acidic and Basic solutions in water conduct electricity.

2.3.5.1 Teaching Strategy:- Group Activity

2.3.5.2- Materials Required:- Beaker, dil HCL, dil NaOH, 2 nails, rubber cork, 6v battery, bulb, switch connecting wires, solutions of glucose and alcohol.

2.3.5.3 **Steps-**

- With the help of above materials teacher will make a circuit leaving its two terminals unconnected.
- the teacher will divide class into four groups as A, B, C, and D

- each group will be provided the above four solutions separately.

- now each group one by one, will come to test the conductivity of solutions, provided to them.
- they will note down their observations and will draw conclusions.

2.3.5.4 **Discussion**

Point: - Teacher will explain all students of each group's results as follows-

- due to the presence of H^+ in acids and onions in bases in solutions conduct electricity.
- where glucose and alcohol does not conduct electricity due to absence of ions.

Activity 2.3.6:- Acids produces ions only in aqueous solutions.

2.3.6.1 Teaching Strategy:- Experiment and discussion.

2.3.6.2 Materials

Required:- Solid Nac , CO_2, H_2SO_4, a dry test tube fitted with a delivery tube. Test tubes conical flask, litmus paper(blue)

2.3.6.3 **Steps:-**

- Teacher will set apparatus to show the preparations of HC gas by reacting conc

H_2SO_4 and NaC .

- Will bring first dry blue litmus paper in contact with HCL gas prepared and them moist blue litmus paper to show that only moist litmus paper will turn its colour.

2.3.6.4 Discussion Point:- On the basis of above experiment the teacher, will infer and discuss

with students about the acidic character of Dry HC gas and HC solutions.

- That H^+ in HC are produced in presence of water and show acidic nature/character.

Activity 2.3.7:- pH of common substances.

2.3.7.1 Teaching Strategy:- Individual activity.

2.3.7.2:- Materials Required:- Lemon Juice, colourless aerated drink, carrot juice, tomato juice.

Tap water, PH paper strips, test tube, dropper and white tile etc.

2.3.7.3:- Steps

- One day before the teacher will ask students to bring a sample of above substances in the class.
- teacher will provide one strip of pH paper to each student.

- they will observe the change of colour on ph paper by putting drop of sample act.
- student will not down their observations.

2.3.7.3 **Discussion**

Point:- Teacher will summarize the concept on the basis of observation done by each student on black board along with the color and pH value.

Activity 2.3.8(a) Chemicals from Common Salt.(NaOH, $CaOC_2$, Na_2CO_3, $NaHCO_3$, POP)

2.3.8.1 Teaching Strategy:- Quiz

2.3.8.2:- Materials Required:-

Black-board, Chalk, Question Bank, prepared by teacher, stop watch.

2.3.8.3:-Steps:-

- This activity of quiz is conducted in the class to recapitulate the chapter after its completion.
- Entire class is divided into teams a team may contain 10-12 students.

Rules- There may be two rounds of each team if a team gives wrong answer or no answer then 1 mark will be deducted and bonus mark will be awarded to answering team.

- Teacher. May draw a score board in the black board.

Ist round- one word answer, five Qs, half minute

Sample questions-

1. Name the process used for preparing caustic soda.
2. How many number of water molecules present in one formulae unit of washing soda.

2nd round:- true/false questions 30 second, sample question-

1. Baking powder is used in soda-acid type fire extinguisher.
2. P.O.P has Two molecules of water of Crystallization in one formula unit–

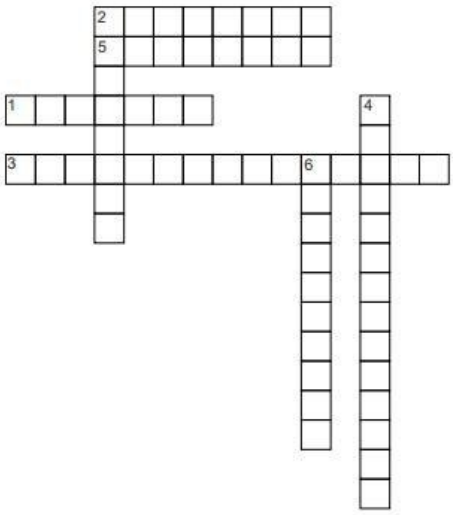
2.3.8.4 **Points of Discussion:-** While gathering the answer from the students in teacher may make the weak point of the students for in chapter and may plan for their remedial teaching.

Activity No 2.3.8(b):- Chemicals from common salt.

2.3.8.1 Teaching Strategy:- Crossword Puzzle.

2.3.8.2:- Materials Required:- Black Board, Chalk, Crossword, Puzzle Prepared by Teacher.

2.3.8.3:- Steps:- Cross word puzzle an activity to make revision or recapitulation of chapter joyful. The clues in the puzzle are given to complete it.



Clues:-

Across:-

1. A basic gas used for Manufacture of washing soda and baking soda and formed in unclean public toilets.(7)
3. Salt used for making glass and soap(15)

5 A gas formed at cathode on electrolysis of brine solutions.(8)

Down:-

2. A pungent smelling gas used to prepare bleaching powder(8)

4 A compound used for plastering fractured bone(14)

6 Acid Present in tomato(10)

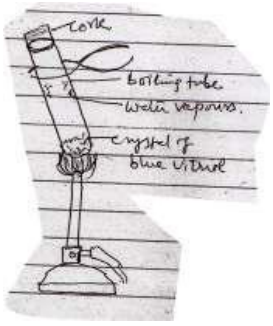
2.3.8.3 **Discussion Point:-**

- Teacher may make correction if there is any wrong answer.

Activity 2.3.9:- Crystalline salts contain water of crystallization.

2.3.9.1 **Teaching Strategy:-** Experimentation and discussion.

2.3.9.2:- Materials Required:- $CuSO4.5H_2O$.(blue vitriol), boiling tube, burner, cone, delivery tube, test tube, clamp stand.


cork
boiling tube
water vapours
crystal of
blue vitriol

2.3.9.3:- Steps- The teacher will manage to set the apparatus as in fig.

The students of the class will observe and teacher may ask question during the experimentation.

2.3.9.4 **Discussion Point:-** Teacher will conclude that crystalline substance have water of crystallization which are lost on heating.

References:- NCERT text book class x CCE

2.4:- manual

of CBSE class X

2.5.1 **Value based Questions:-**

1. Vibha takes Carbonated drinks every day, which contain carbon dioxide, sugar and preservatives.
2. An acid is found in such drinks that may cause tooth decay. On the other hand Vibha's friend Lily takes fruit/vegetable juice instead of carbonated drink.

Answer the following question based on above information:

a. Write name and formula of the acid present in the drink of Vibha.

b. How is Carbonated drink cause acidity/Pain in the stomach

c. Mention the Values possessed by Vibha's friend in taking the fruit/vegetable juice instead of cold drink.

3. An excursion was organized by the school for tenth class students. All students had their lunch at children park near India gate at noon. Tapis has brought oily food and eaten in excess. After some time he was crying with stomach pain. His friend Dev identified the problem and have a tablet and Tapis got relief at some time.

One the basis of above information, answer the following question:

a. Why does excess eating of oily food cause stomach pain?

b. What Medicine(tablet) was given by his friend to get relief?

c. Mention the value shown by Dev.

2.5.2 **<u>Examples/Hots Question.</u>**

1. A dry pallet of a common base B when kept in open absorbs moisture and turns sticky.

The compound B is also a product of CHLOR-/ALKALI Process. Identify B and what happens when B is treated with an acidic oxide? Write a balanced chemical equation for the same.

2. Equal lengths of Magnesium ribbons was taken in test tubes A and B. Hydrochloric acid is added in test tube A and Acetic acid is test tube B. In case of a fizzing occurs more vigorously and why?

3. Explain Why?

a. Blue vitriol changes to white upon heating.

b. If bottle full of concentrated sulphuric acid is left open in the atmosphere by accident the acid starts flowing out of the bottle of its own.

c. Plaster of Paris in stored in a moisture-proof container.

d. Dry ammonia has no actions on litmus paper but a solution of ammonia in water turns red litmus paper blue.
e. Baking powder makes the cake and bread soft and spongy.

4. (a) Crystals of a substance changed their color on heating in a closed test tube but regained it after sometime when they were allowed to cool down. Name the substance and write its formulae and explain the phenomenon involved.

(b) Name the compound where one formulae unit is associated with the water insoluble. How is it prepared give name equation of related reactions: Give the wires of the compound.

5. (a) Identify the compound of calcium which is yellowish white powder and is used for disinfecting drinking water. What is its chemical name and formulae. How is it manufactured? Write the chemical nature for the reaction involved between. List two other uses of the compound.

(b) Write the balanced chemical equation of chlor-alkaline process.

3. **Metals & Non-metals**

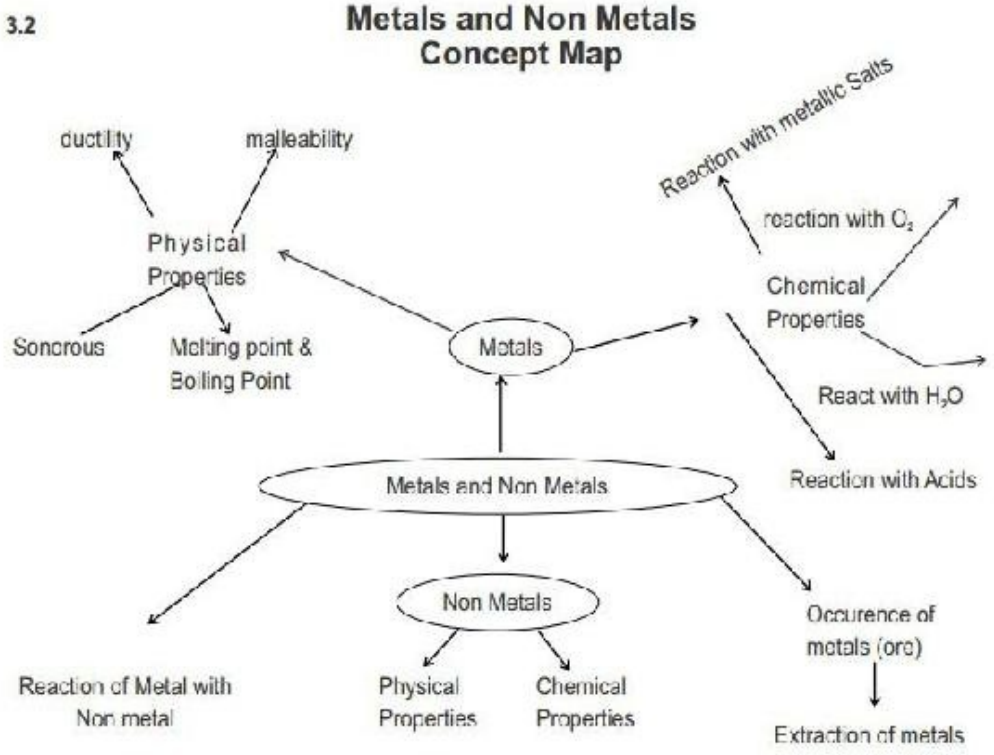
3.1 **Introduction :-**All the 115 chemical elements known till now have some similarities as

well as differences in their properties. On the basis of their properties all the elements can be divided into two main groups : metals and non-metals.

Metals are the elements that conduct heat and electricity and are malleable (beaten into this sheets) and ductile (drawn to them wires) metals are also lustrous, hard, strong, heavy and sonorous. Some of the examples of metals are : Iron, Aluminum, Copper, Silver, Gold, Platinum,

Zinc, Tin, Lead, Sodium, Potassium Calcium and Magnesium Non metals are those elements that do not conduct heat and electricity and are neither malleable or ductile, they are brittle some of the examples of non-metals are:- Carbon, Sulphur, Phosphorus, Silicon, Hydrogen, Oxygen, Nitrogen, Chlorine, Bromine, Helium, Neon and Argon.

3.2



Physical Properties of Metal

3.3 **Activity -(Hardness of metal)**

3.3.1 Method / Strategy:- Project

3.3.2 **Material Required :-** Different kinds of tools

3.3.3 **Steps:**

1. Make groups in the class
2. Ask each group to make list of the tools available at their home and at neighbor house.
3. Now find out the material used in making those tools.

3.3.3 **Points of Discussion:-**

Discussion on why only metals are used for making tools.

3.4.2 **Title of Activity Ductility (3.3.2)**

3.4.1 :- Teaching / Strategy Project .

3.4.2 Material Required : Different kinds of wires

3.4.3 **Steps:-**

1. Make groups of students in class.
2. Make list of the types of wire available in household and surroundings.
3. Find the material used in making these wires.

3.4.4 **Points of Discussion:-**

Why wires are made-up of aluminum and copper.

3.5 Concept:- Meeting Point

3.5.1 Strategy:- Teaching Stary - Telling

3.5.2 :- Material Required Group of Students

3.5.3 **Steps :-**

1. Teacher will recite the story as given below.
2. Mother of boy burned all waste things from house.
3. That, waste have lots of material like old toys, paper, plastic sheets and geometry box etc.
4. When the waste material got burned then some waste like toys, paper, plastic sheets will have ash.
5. But the child saw that geometry box of iron is not reduced to ashes.

3.5.4 **Points of Discussion:-**

Discussion on melting point of metal.

3.6 Concept :- Conduction of heat

3.6.1 :- Teaching strategy Group - Play

3.6.2 Material Required:- Group of Students.

3.6.3 **Steps:-**

1. Ask one student to act and other child to act as a mother of child where in the play,

   Mother places the utensil full of Milk on the stove to boil.

2. In next scene, that child found the milk is hand and the handle Made up of some metal and his hand got burnt.

3.6.4 **Points of Discussion:-**

Why only handle made up of metal got heated up and of child got burnt.

3.7. Concept:- Knowing the meaning of physical properties.

3.7.1 Teaching Strategy:- Play way Method

3.7.2 Material Required:- Group of Students and class room Environment.

3.7.3 **Steps:-**

1. Ask two students to come forward. Now ask them to describe each other.
2. They will describe as on basis of height colour etc.
3. Tell class these are the physical properties.
4. Now make two groups in the class and ask them to make the list of items available in class-room and then write their physical properties.
5. The group with more listed items in given time will be the winner.

3.7.4 **Points of Discussion:-**

Discussion on physical properties of metal.

3.8 Concept:- Malleability

3.8.1 :- Teaching Strategy Observation

3.8.2 Material Required:- Copper wire thick aluminum wire, iron nail, lead of pencil, coal hammer.

3.8.3 **Steps:-**

1. Ask the students to beat the above mentioned material with the help of hammer.
2. Record your observation what happen to their shape on beating / hammering.

3)	Object 1. Copper wire 2. Aluminum wire 3. Iron nail 4. Coal 5. Graphite	Change in Shape on Beating / hammering

3.8.4 **Points of Discussion:-**

Discussion on the changed shape of objects after beating / hammering.

3.9. Concept:- Malleability

Teaching Strategy:- Story Telling

3.9.1

3.9.2 **Material Required:-**

3.9.3 **Steps:-**

1. Teacher will recite the story as follows.
2. In ancient times there was a kingdom famous for its brave Man / Soldiers. In this kingdom lived a small family. they had this a son.
3. The boy loved the soldiers, their armouries swords etc. He went to market with his father and saw a man making sword by hammering a piece of metal.
4. On returning home, he was very anxious to make his own sword and use different kinds of material to make the sword for example:- Wood, bricks etc used Material for making sword gone in vain.
5. Then, finally, he used metal for making sword.

3.9.4 **Points of Discussion:-**

Discussion that why only metal can be used for making sword.

3.10 Concept :- Conduction of electricity

3.10.1 Teaching Strategy:- Observation / Demonstration

3.10.2 Material required:- Electric Circuit

3.10.3 **Steps:-**

1. Teacher ask the students to bring electric circuit.

2. Then, ask the students to use different kind of material on electric circuit.
3. Ask the students to observe which material help in conduction of electricity.

3.10.4 **Points of Discussion:-** Discussion on, which material conduct electricity and why?

3.11 Concept:- Lustrous

3.11.1 Teaching strategy:- Observation

3.11.2 Material required:- Different kind of material such as plastic, Iron, still and wood.

3.11.3 **Steps:-**

1. Teacher will show different kinds of material shown above.
2. Then, teacher ask the students among these ask material, which are and which are not shiny.
3. Then, student will classify the above mentioned material on the basis of shininess.

3.11.4 **Points of Discussion:-**

Discussion on an lustrous and non-Lustrous Material.

3.12.1 Concept:- Sonorous

3.12.1 Teaching point / Strategy:- Demonstration

3.12.2 Material Required:- Utensils

3.12.3 **Steps:-**

1. Teacher will beat the utensils and ask the students to hear the sound.
2. Students will hear the sound of different Material.
3. Teacher will ask the students, which material create sound.

3.12.4 **Points of Discussion:-**

Discussion on Material, which creates sound.

3.13 Concept:- Refining of Impure metal

3.13.1 Teaching Strategy:- Experiment

3.13.2 Material Required:- Strip of pure copper, Impure copper, copper sulphate solution and battery (3.5v)

3.13.3 **Steps:-**

1. Take copper sulphate solution in a beaker
2. Connect the impure upper to positive terminal of the battery. It will act as anode.
3. Connect the pure copper strip with negative terminal of the battery. It will act as anode.
4. On passing electric current.

3.13.4 **Points of Discussion:-**

Discussion on refining of different metals.

Chemical Properties of Metals Non Metals

3.14 Concept:- Reacting with oxygen (o_2) (air) of Metals

3.14.1 Teaching point / Strategy:- Demonstration

3.14.2 Material Required:- Sodium, Potassium, Magnesium, Aluminum litmus, test tubes, candle

3.14.3 **Steps:-**

1. The teacher will take all the metals in different test tubes.
2. Ask students to note down the observation.
3. None the teacher will burn metal like Magnesium & Aluminum directly in air.
4. Again they note this observations.
5. Collect the ashes of metal oxide in a glass dish.
6. Dissolve a little of water in it & then test the solution with litmus paper.

3.14.4 Points of Discussion:-

Reactivity of metals with oxygen

Where to store the metals

Nature of metal oxide

3.15 Concept:- Reaction with oxygen (o_2) (air) of non Metals

3.15.1 Teaching Strategy:- Demonstration

3.15.2 Material Required: Paper, wood, sulphur, burner , gas jar, lid, deflagrating, spoon, litmus paper

3.15.2 **Steps:-**

1. Take a small amount of sulphur, wood & paper (Take sulphur in deflagrating spoon)
2. Burn wood & paper directly in the air & heat sulphur over a bunsen burner flame.
3. Collect the ashes of wood & paper separately & add some water. Test the solution with litmus.
4. Introduced the gas jar over the deflagrating spoon.
5. After the sulphur stop burning remove the spoon. Add a small amount of water into the gas jar, quickly replace the lid.
6. Shake the jar so that the gas formed is dissolved in the water.
7. Test the solution with blue litmus.

Points of Discussion:-

Reaction of Non-metal with oxygen.

Nature of Non Metallic oxide.

3.16 Concept:- Reaction with water with Metals

3.16.1 Teaching point / Strategy:- Demonstration cum experiment.

3.16.2 Material Required:- Metals like sodium, potassium, silver, gold, Magnesium, Aluminum, zinc, Iron, petri dish, cold water, hot water.

3.16.3 **Steps:-**

1. Take all the metal separately in petra dishes.
2. Now add cold water to all the metals.
3. Note down the observation.
4. Remove the water from those metals which do not react with cold water.
5. Now add hot water to the remaining metals.
6. Note down the observation.
7. Pass the steam with those metals which do not react either with cold or not water.
8. Again note down the observation.

3.16.4 **Points of Discussion:-**

Reactivity of metals with water .

Metals which do not react with water & steam also.

What will happen when lighted match stick come near the solution.

3.17 Concept : Nature of Rust

3.17.1 Teaching Strategy:- Experiment

3.17.2 Material Required:- Rust , water, test tube, litmus iron gate.

3.17.3 **Steps:-**

1. To test the nature of rust, scrape off some rust from an old iron gate.
2. Collect a spoon ful of the rust & add small amount of water to it.
3. Shake it well & test with litmus solution.

3.17.4 **Points of Discussion:-**

Nature of Metal oxide

Teacher will discuss the reason of patches of cylinder on the floor.

3.18 Concept : Reaction of non-metals with water

3.18.1 Teaching Strategy:- Experiment

3.18.2 Material Required:- paper, wood, plastic, rubber, water (steam)

3.18.3 **Steps:-**

1. Take all the non metals in a petri dish separately.
2. Add cold water, hot water & pass the steam separately (step wise) one to all the non metals.
3. Note the observation

Non Metals	Cold Water	Hot water	Steam
Paper			
Wood Plastic			
Rubber			

3.18.4 **Points of Discussion:-**

Reaction of non - metals with water

3.19 Concept:- Reaction of dilute acids with metals & Non metals

3.19.1 Teaching Strategy:- Demonstration Method

3.19.2 Material Required:- Magnesium ribbon, Aluminum foils Iron fillings, copper with, charcoal powder sulphur power.

3.19.3 Steps:-

1. Take samples of Metals & Non-Metals.
2. Keep the samples in a separate test tubes.
3. To each test tube add about time dilute Hcl.
4. Note down the observation.
5. If the reaction does not occur, heat the test tube & then test with weighed match sticks.

3.19.4 **Points of Discussion:-**

Reaction of dilute acids with metals & non metals Reason for non reaction of Non metal.

Why acid is not poured (kept) in metal utensil.

3.20 Concept:- Reaction with salt solution (Metals).

3.20.1 Teaching Strategy:- Experiment

3.20.2 Material Required:- Copper sulphate solution, zinc, silver test tube.

3.20.3 **Steps:-**

1. Take copper sulphate solution in a test tube add a strip of zinc metal in the above solution.
2. Observe the colour of the solution & the strip of the zinc metal.
3. Again take copper sulphate solution in a test tube & add a strip of silver metal in the above solution.
4. Observe the solution.

3.20.4 **Points of Discussion:-**

Reactivity of metals with metallic salt.

Place of metals in a reactivity series.

3.21.1 Concept Reactivity of non - metals with salt solution

3.21.2 Teaching strategy : - Role Play

3.21.3 Material Required:- Chair

3.21.4 **Steps:-**

1. Assign the role of silver, copper & zinc to the normal student, class monitor & teacher respectively.
2. Use chair as sulphate (So_4^{2-})
3. The class monitor sits on the chair & when a student (silver) ask the monitor tp give the chair but when the teacher (zinc) comes the monitor (copper) leave the chair (sulphate) & the teacher (zinc) its on it.

3.21.5 Points of Discussion:-

Why the monitor leave the chair for teacher (zinc) but not for normal student (silver)

More & less reactive metals.

3.22 Concept:- Reactive series

3.22.1 Teaching Strategy:- Play way Method

3.22.3 Material Required:- Flash carrels

3.22.3 **Steps:-**

1. Teacher will arrange flash cards in a vertical coloumn in the order of decreasing reactivity.
2. The teacher will tell a formula to learn reactivity series easily (please stop calling me a zebra I like her call my smart goat.)

[Please = potassium , stop sodium, calling - calcium me - magnesium, a - aluminum, zebra-zinc, I 0 iron, like - lead, Hyr - Hydrogen, Call - copper, my - mercury, smart - silver, goat - gold]

3.22.4 **Points of Discussion:-**

ascending & descending order of metals according to this reactivity.

3.23 Concept:- Chemical properties (Reactions)

3.23.1 Teaching Strategy:- Game

3.23.2 Material Required:- Flash cards of metals & Non-metals & one general reaction flash cards.

3.23.3 **Steps:-**

1. Divide the students into groups of 5.
2. Put the flash cards of general reaction on the top.
3. The teacher will write half of the equation of the reaction & asks the student to complete it accordingly.

3.26.4 **Points of Discussion:-**

Chemical Reaction & Formulas

3.25 Concept:- Ionic Compounds

3.25.1 Teaching Strategy:- Role Play

3.25.2 Material Required:- Chalk

3.25.3 Steps:- To understand the concept of metal & non metal we can play a role like:-

1. Firstly make two groups with 11 & 17 N. of students which represents sodium & chloride & atomic no.
2. Then divide students into no of electrons insides as 2, 8, 1 & 2, 8, 7
3. The ask students that which is more easier to give 1 or take 7.

3.25.4 **Points of Discussion:-**

Metals are doubles & Non Metals are receiver of electrons.

Charges of Metals & Non - Metals

3.26.3 Concept:- Properties of ionic compounds

3.26.1 Teaching Strategy:-

3.26.2 Material Required:- Salts as sodium chloride, potassium Kerosene, Iodide, barium chloride, water, petrol,

3.26.3 **Steps:-**

1. Take sample of sodium chloride, potassium iodide, barium chloride or any other salt.
2. Take a small amount of a sample on a metal spatula & heat directly on the flame.

Repeat with other samples.

3. Try to dissolve the samples in water petrol & Kerosene.
4. Make a circuit & insert the electrodes into a solution of one salt.
5. Test the other salt samples too in this manner.

3.26.4 **Points of Discussion:-**

How do Ionic compounds conducts electricity.

How to Learn

Acids turn blue litmus solution into red.

A B R

A - Acids changes B-Blue litmus solution to R - Red.

Base turn Red litmus solution into Blue

B R B

Base Red Blue

changes

to

Reference:

http:II youtube I xwjqugqzuaE (Metal Reactivity series)

Metals and Non-Metals

Assignments

3.27 S.no. Concept:- Procedure

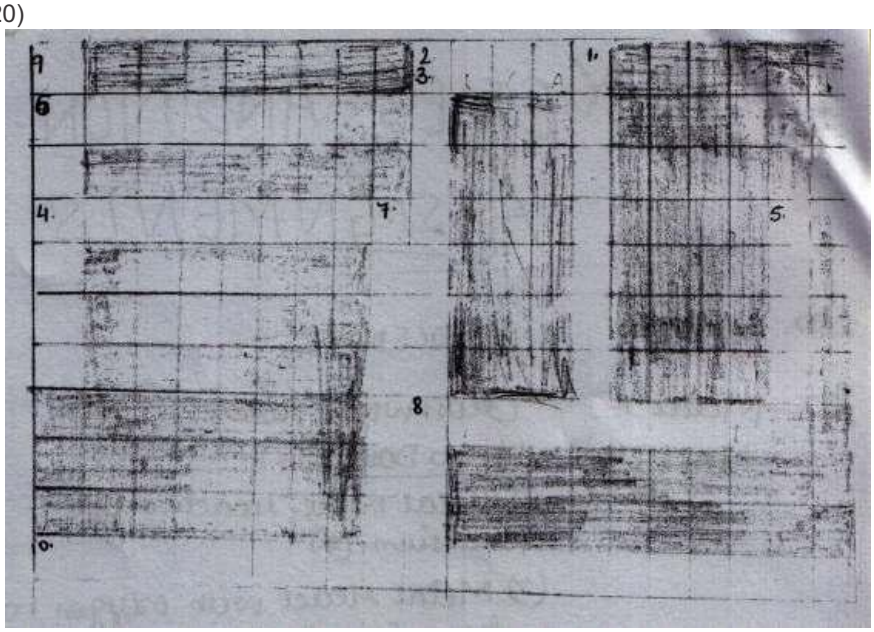
Metals & Non Metal Cross word Puzzle

Up to Down

1. Metal More reactive than potassium (7).
3. Metal react with oxygen to form (10)
5. Metal react with acid to form (4)
7. A metal that is liquid at room temperature (7)
9. A non-metal that is liquid at room temperature (7)

Left to Right

2. Substance that is malleable ductile, sonorants, hard & good conductor of heat. (5)
4. Metal that burns with a dazzling white flame when reacted with oxygen (9)
6. How process in which the atmospheric gases react with metals & eat a way the metals (7).
8. Formed when iron reacts with oxygen in the presence of moisture. (9)
10. Reaction in which a metal with higher reactivity displaces the other metal from the salt (20)



Complete the table

3.28. Physical properties of Metal & Non metal

	Physical Prop.	Metal	Non metal
1.	Physical State		
2.	Hardness		
3.	Lustre		
4.	Malleability		
5.	Ductility		
6.	Sonority		
7.	Conduction of electricity		
8.	Conduction of heat		

Paper, Pc

Complete the table

3.29. Chemical Properties

	Chemical prop.	Metal	Non metal
1.	Reaction with water		
2.	Reaction with oxygen		
3.	Reaction with Acids		
4.	Reaction with solution of other Metals		

Paper, Pc

3.30. **Metal & Non metal**

Choose the odd one out & also give the reason.

1. Sodium Zinc, Carbon, Mercury.
2. Mercury, Calcium, gold, silver
3. Oxygen, Hydrogen, Nitrogen, Bromine
4. Graphite diamond, oxygen, gold
5. Sodium, Potassium, gallium, Zinc

Quiz Time

3.31. **Exception of Metal & Non Metal**

1. A metal that is soft
2. A metal that is liquid at room temperature
3. A non metal that is a good conductor of electricity.
4. A non metal that is liquid at room temperature
5. A non metal that possesses luster.
6. A non - metal that is hard.

3.32. Example of identify the names of Metals Metals

3.33. Example of identify the names of Non Metals Non Metals

3.34. Give two examples of the following

1. Metals
2. Metals that are liquid at room temperature
3. Non metal
4. Salts
5. Metals used to make jewellary
6. Metals can be made into then sheets.

3.35 Reaction Complete the reaction

1) 2 Mg + _____2 MgO
2) _____ + O_2 Co_2
3) S + O_2

   Zn + _____ $ZnSO_4$ +
4) ___

   5) 2Na +____ 2 NaOH + _____

   6) Ag + $ZnSO_4$ _____

7) 3Fe + 2 O_2 _____

   8) 2Na + _____ 2 NaOH + ____

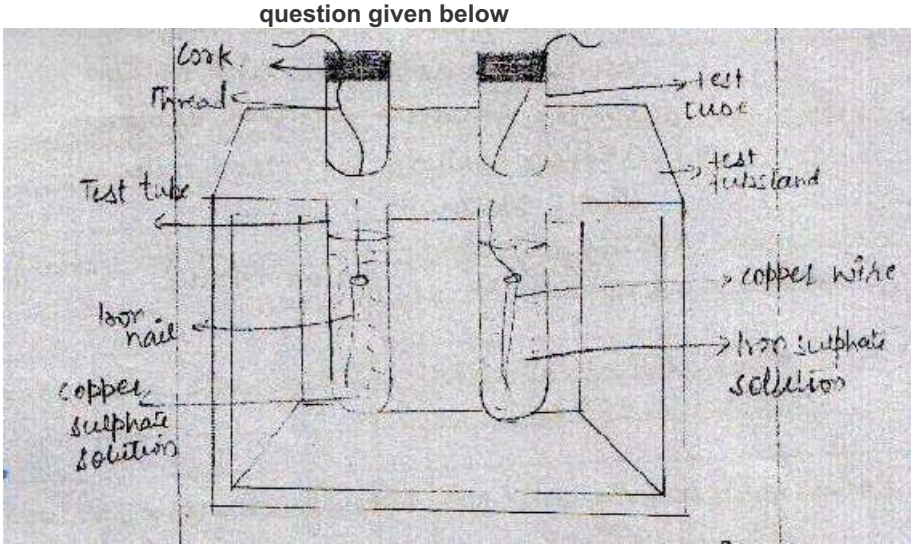
   9) 2K + $2H_2O$_____

   10) Ca SO_4 + Zn _____

3.36. **Displacement Let's Visualize and answer**

Reaction

See the given figure & answer the question given below



Q.1 What is shown by the picture given along side.

Q.2 What is proved from this experiment?

3.37. Complete the following

1. Sodium : Metal :: _____ Nonmetal
2. _____ : Liquid metal :: Bromine : _____
3. Sodium : soft metal :: _____ : hard non metal
4. Malleability : Metals :: _____ : Non Metal
5. Iron : Cooper :: _____ : tin

3.38. **Classification of Metals & Non Metals**

first the metals & Non-metals given below & then classify them & write in the table.

Carbon, gold, diamond. Iodine, Sodium, tin, potassium, bromine, oxygen, calcium, magnesium, zinc, lithium, copper, graphite, sulphur, aluminum, nickle, barium, Iron, lead, mercury, silver, potassium .

Metals	Non Metals

3.39. **Reactivity Series.**

1) **Game**

Arrange the following metals according to their reactivities & as per the reactivity series.
Hg, Zn, Au, Al, Ca, Mg, Na, K, Fe, Pb, H, Cu, Ag.

i) Arrange the following in ascending order of their reactivity Zn, Al, Ag Cu, H.

3.39 **Multi Disciplinary / Value based questions**

- Silver is added to gold for making ornaments, what value of life do you receive from it

- That are impurities of ore called? State the value for learn from it.

- Metals are solid at room temp except mercury which make it exception. What value do you get fun it

- Gold ornaments retain them luster after several year of use why? Which value of life is observed from it.

- Define the term alloy. How do you relate it with life philosophy?

- Define galvanization. What values can be derived from this process.

Value added / based Questions

Q.1 Metals have high melting point. What value can we get from this.

Q.2 Metals are good conductors of heat and electricity which life value does it depict.

Q.3 Which value resembles the property of malleability?

Q.4 Metals are ductile. Which value is related to this property?

Q.5 Hardness of metals can be seen in which life value.

Q.6 Metallic lusture depicts the value of.

3.40 Reference

Concept	Links
Conduction of Electricity	http: II m.youtube.com / watch? v=AmF9aGTEFXO
Conduction of Heat	http: II m.youtube.com / watch? v = SdpcjmzvmLy
Malleability and Ductility	http: II m.youtube.com / watch? v = C382Ziupbbc
Physical properties of metals	http: II m.youtube.com / watch? v = 4gpEAj - veio
Non-metals	http: II m.youtube.com / watch? v = 105 Dz - t3 Fou
Chemical properties of metals	http: II m.youtube.com / watch? v =ohonv3Erjqu
Properties of Ionic compound	http: II m.youtube.com / watch? v = TAVWVOUEWLK
Mercury Extraction	http: II m.youtube.com / watch? v =Pm14Xhqzim
Process of ionic compound	http: II m.youtube.com / watch? v = Zn Qn 7m ZmkiQ
Extraction of Iron from Ore	http: II m.youtube.com / watch? v = Lm4VOW6X25y
Aluminium Anodising	http: II m.youtube.com / watch? v = ooGQPH3SZK
Corrosion and Rust	http: II m.youtube.com / watch? v = XMr 4VSC7Y60
Electrolytic refining of copper	http: II m.youtube.com / watch? v = Wodyxtv=mgcl
Electrolytic refining	http: II m.youtube.com / watch? v = 7UZmI-JJO2UF
Electrolysis	http: II m.youtube.com / watch? v = moLAD,JFHRS
Galvanization	http: II m.youtube.com / watch? v = KWCy 906a atA
Grease dispensing machine	http: II m.youtube.com / watch? v = ooZQizdEBZW
Chrome Plating	http: II m.youtube.com / watch? v = SG500tRoLju
Rusting of Iron	http: II m.youtube.com / watch? v = Ln_VOm__64A
Physical Properties	http: II m.youtube / d - iqaXSCKug
Metals and Non-metals	http: II m.youtube/ma5rlLOmclU
Chemical properties of metal	http: II m.youtube / ohonV3gjqu
Non metals	http: II m.youtube /105DZ +3Fou
Corrosion	http: II m.youtube / l da55ekkT94
Metal Reactivity series	http: II m.youtube / XWjQUgqZugE

4. Carbon and its Compounds

Introduction:-

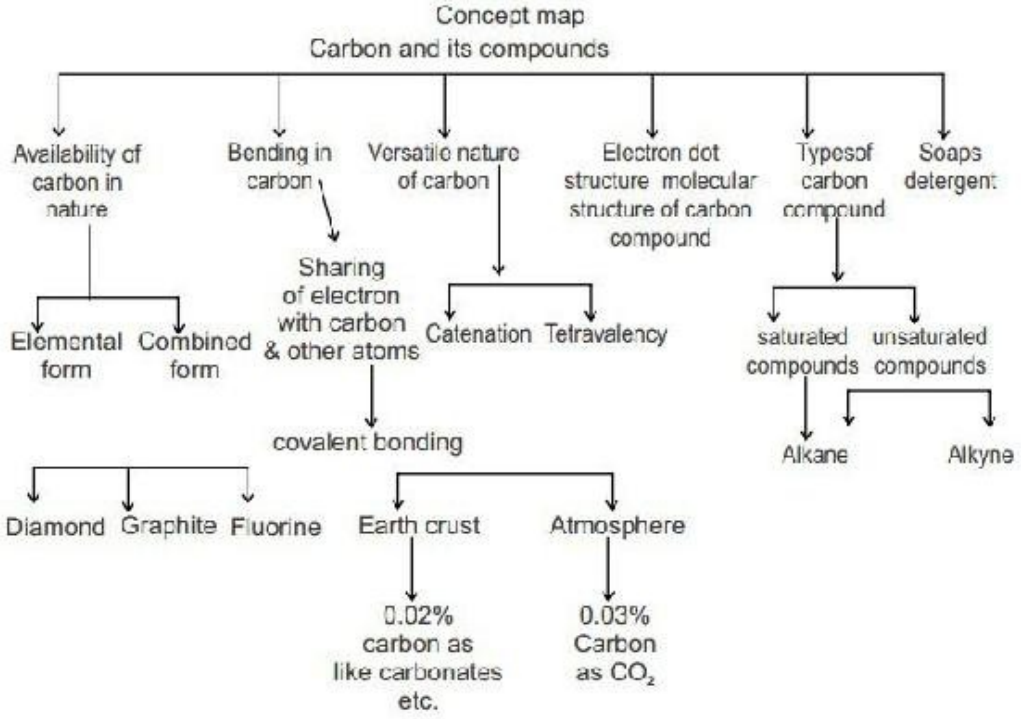
This unit deals with carbon, an element which is of great significance to us in its both elemental as well as in the combined form.

it is always a challenge for a science teacher to make its class room interesting joyful as for the need of learners and for authentic meaningful learning of learners.

All of you as a science teacher ----- variety of approaches methods & strategies to make teaching learning process effective.

We are all at the same plate form for the sake of learners in this regard following are some suggestive methods/strategies techniques which you may/may not used

earlier for making the process effective. At this juncture you may add on more as per your own experiences and/share shave with all of us.



Activity:- Availability of carbon in nature.

4.1.1 Methodology: Concept mapping

4.1.2 Materials: NCERT X class text book

4.1.3 **Steps:**

1. Go through the text and identify various sub concepts and their inter relation

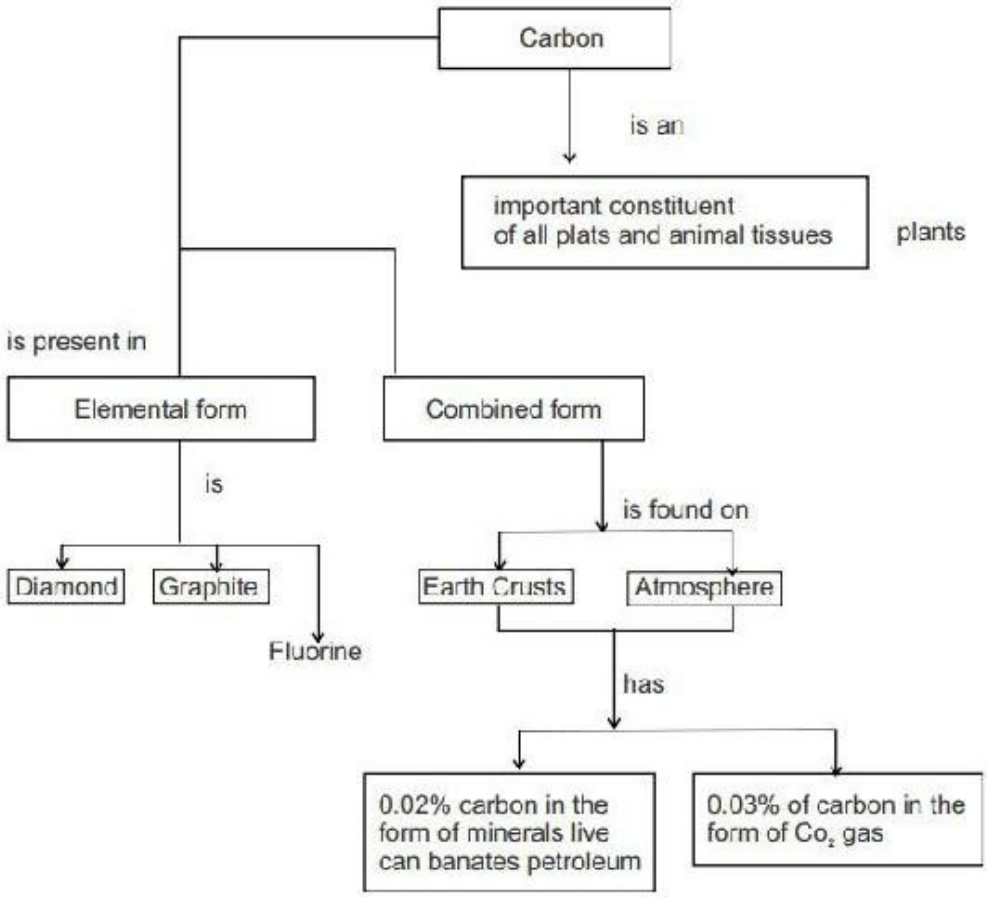
   (inter connected)

2. Present the sub concepts enclosed with in the circle or box and arrange them in two dimensional array hierarchically in descending order i.e placing more general concept at the top followed by the less.

3. Concepts occurring at the same level of observation are placed at the same horizontal level.

4. Link concepts and sub concepts through linkages as arrows ¤ or lines.

5. Use labels for linkages which are also named as prepositions. Some words or phrase may also be used.



Points of Discussion:-

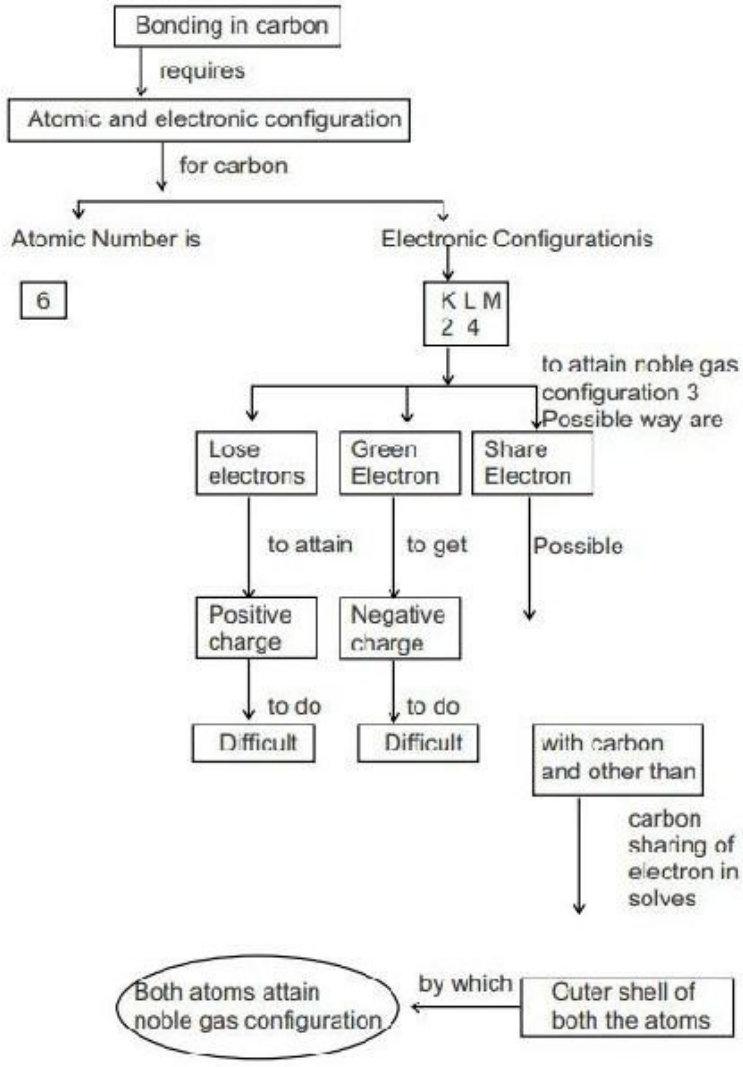
In spite of this small amount of carbon in nature the competence of carbon is more.

4.2.1 Activity:- Bonding in carbon

4.2.2 **Methodology:-**Demonstration Cum Activity

4.2.3 **Steps:**

1. As given above earlier



4.2.4 Points of Discussion:-

Discuss why carbon does not gain or lose four electrons in terms of nuclear charge and in solvent of energy. What type of bonding is this?

Discuss some more content bonding of H_2, O_2 and N_2 along with single double & triple bond.

4.3 Activity:- Molecular model of methane.

4.3 **Methodology:**Demonstration cum activity.

4.3.2 Materials: NCERT X text book, Plasticine, of two different colours, tooth picks.

4.3.3 Steps: Make pair of

1. The students provide them the above materials on their desk.
2. Ask the students to follow you as:-

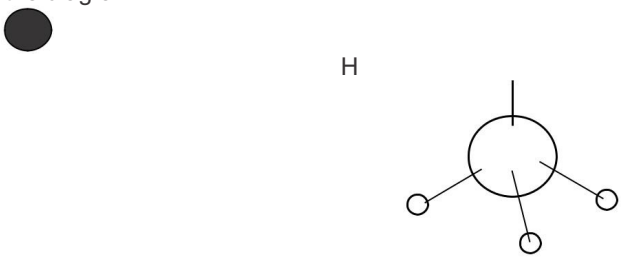
2.1. Make four small balls of the plasticine which is of same colour.

and of same size observe each pair to see whether they are following your demonstration or note.

2.2 Make another ball of other colour but of big size than four balls.

2.3 Now take four tooth picks & cut their lengths to of some lengths.

2.4 Make model of methane as per the diagram



H

H

H

H

4.3.4 Points of Discussion:-

Discuss that four balls of plasticine are hydrogen atom and central ball is carbon which

is covalently bonded to hydrogen atoms.

Also discuss the electron dot structure we methane & its relation with the structural

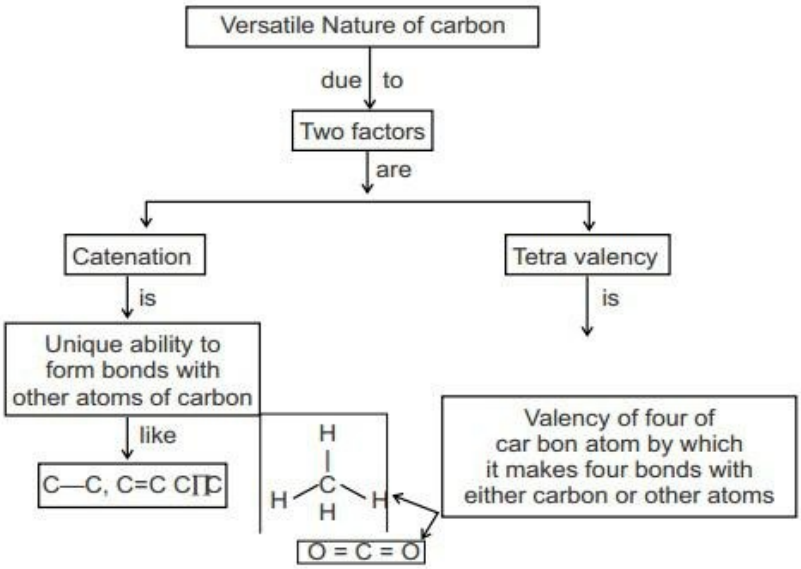
formula. make electron dot and molecular models of ethane, ethane & ethyne later on.

4.2 Activity:- Versatile Native of carbon

4.4.1 Methodology:- Concept mapping & discussion

4.4.2 Materials:- NCERT X text book

4.4.3 Steps:- As given earlier



4.4.4

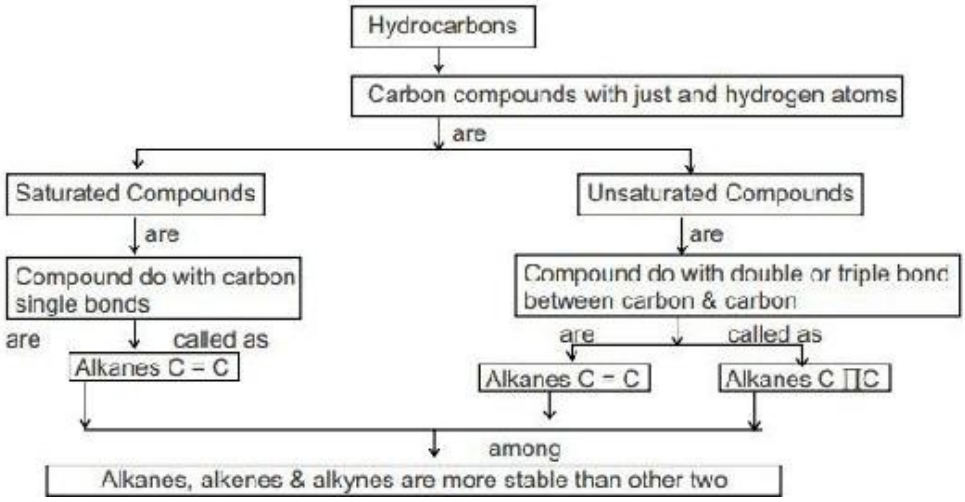
Points of Discussion:-

Discuss catenation of silicon atom adn its reactivity & compare reactivity with carbon - and carbon bond. Also discuss saturated and unsaturated bonds and compounds respectively.

4.5 Activity:- Types of hydrocarbons

4.5.1 **Methodology:-**Concept mapping & discussion

4.5.2 **Steps:**As given above earlier


Hydrocarbons
Carbon compounds with just and hydrogen atoms
are
Saturated Compounds
Unsaturated Compounds
are
are
Compound do with carbon single bonds
Compound do with double or triple bond between carbon & carbon
are
called as
are
called as
Alkanes C = C
Alkanes C - C
Alkanes C ∏C
among
Alkanes, alkenes & alkynes are more stable than other two

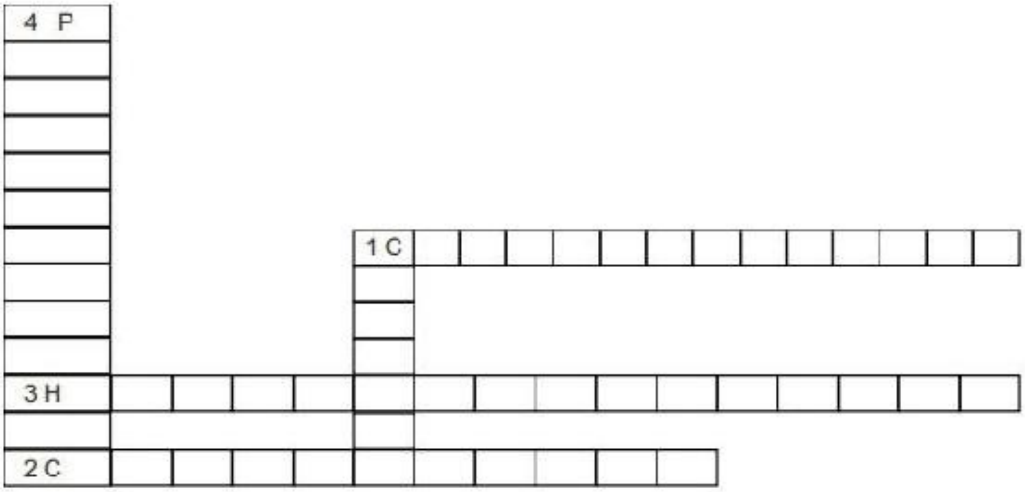
4.2 **Activity :**

Homologous series and functional

4.6.1 group

Methodology : crossword puzzle

4.6 **Materials :** Blank cross word puzzle grid with clues.



Across:-

1. —C— OH formula of a functional group
   ||
   O

2. An organic compound having the formulation $C_6 H_{12}$

3. A series of compounds which differ by a- CH_2 nenit

Down:- An organic compound having three carbon clean with a ket one group.

4.6.3

Points of discussion : Answers should be discussed.

4.7.1 **Activity:-** Combustion of carbon compounds.

4.7.1 **Methodology :**Experiential learning.

4.7.2 **Material required:** spatula, any carbon compound like camphor, naphthalene, alcohol, metal plates Bunsen burner.

given below are some experiences of learners.

1. Learners saw an activity in saw an activity in steels in which some carbon compounds line camphor, Naphthalene, alcohol were burnt on spatula.
2. They also saw that some compounds burnt with smoking flame and some with non smoky flame.
3. They further saw an activity in which bunsen burner gave different flames when air hole was adjusted.
4. They shared their experiences with the class that gas stones used at home was having fair inlets and burnt with blue flame & some times yellow flame.
5. They have also seen that bottom of cooking vessels often get blackened.
6. They asked various questions to teacher based upon their observations.
7. They have tested further that burning of candle and kerosene oil lamp produces sooty flame which darkens metal plate.
8. They have learnt that saturated compounds generally give a class flame while saturated compound give yellow flame with lots of smoke.
9. They also learnt that limiting the supply of air results in incomplete combustion leading to smoky flame.

Above experiences of earners can be viewed into four stages of experiential learning.

Fill the given below table of experiential learning based on above expenses of learners.

Table

Concrete Experience	Observation & Reflection	Conceptualization	Active expt

4.7.4

Points of discussion :

Combustion reaction are also known as oxidation reactions. Combustion of reactant & its product formation in the reaction should be discussed.

4.8 **Activity:-** Oxidation reactions

4.8.1 **Methodology :**observation and discussion

4.8.2 **Materials required :** C_2H_5OH, best tubes, 5% soln of alkaline $kMnO_4$, water bath and burner.

4.8.1 **Steps :**

1. Teacher may ask the learners to observe an activity in which, C_2H_5OH taken in a test tube was warmed in a water bath followed by the addition of alkaline $KMnO_4$ into it.

1. drop wise initially.
2. When excess of it is added in to the test tube.

4.8.4 Points of discussion :

Why colour of $KMnO_4$ disappears or addition while persists on excess addition? Alkaline $KMnO_4$ arts as oxidizing agent.

4.9.1 **Activity:-**Chemical properties of carbon compounds

4.9.2 **Methodology**

Steps

1. What happens when CH_4 is burnt in oxygen?
2. What happens when alcohol is oxidized by alkaline $KMnO_4$?
3. What are the reactions in addition rea of carbon compounds?
4. Will substitution reaction take place in the absence of sunlight?

Second round

1. What happens when unsaturated hydrocarbons are burnt in oxygen?
2. What happens when alk . $KMnO_4$ is added in excess into the alcohol like C_2H_5 OH?

Round Third:-

1. What are the products of complete and incomplete combustion?
2. Why an individual should use unsaturated oils for cooking?
3. Why the chemical reaction of CH_4 with C_2 in the presence of light is tknown as substitution reaction?
4. Why alkaline $KMnO_4$ is known as oxidizing agent.

4.9.3 **Point of Discussion**

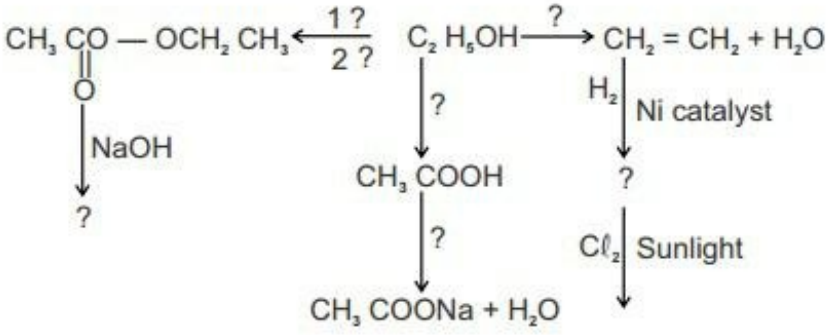
Role of discuss the light in substitution, reaction Role of oxygen in combustion & role of alkaline KMnO4 or acidified $K_2Cr_2o_7$

4.10 **Concept**

Chemical properties of carbon compounds Brain storming.

Steps:-

4.10.2. Fill in the given below gaps with appropriate reactant, reagents, reaction conditions and products.



4.10.3

Points of Discussion:-

Results should be discussed in the Light of reactant, reagents, products and conditions.

4.11 **Activity:**Soaps and Detergents

4.11.1. **Methodology:** Creative Writing.

4.11.2

Steps: Any question which encourages abilities of arguing, explaining detergent thinking may be asked like suppose soaps and detergents only have their one end instead of two ends. In this situation how the clothes could be washed clean? Describe in your own words.

4.11.3

Points of discussion:

This type of activity is stressing that the two ends are having different properties.

4.12 Micelle formation is other solvent

Activity: like ethanol.

4.12.1:- **Methodology:-** Think, ink, pair and share

4.12.2:-

Steps:- Ask learners an open ended question like will Micelle formation be formed in other solvent such as ethanol other than water?

Ask them to think about the possible answer. Ask them to write their thoughts

Ask them to exchange their ions with a partner pair.

Ask them to share the answers of their discussion. 4.12.3:-

Points of discussion:-

Discuss cleaning mechanism of soap and detergents, formation of micelle in solvents like water/C_2H_5OH.

4.13.

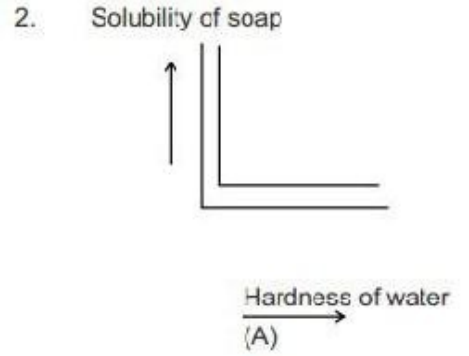
HOTS | Examples | value based questions

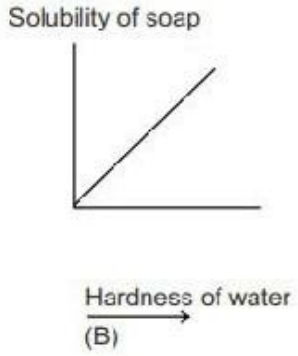
1. An organic compound with molecular formula C_2H_6O (A) reacts with sodium leading to the evolution of hydrogen gas. Compound (A) and (B) in the presence of an acid catalyst give another organic compound (c) which has sweet smelling.

1. Identify organic compounds A, B and C.

2. Name the reaction by which compound (e) is formed.

2.





Analyze the graph A and B and answer the following questions.

1. Which graph represents the highest solubility of soap in water?
2. Which graph represents the highest insolubility of soap with increase in hardness of water?
3. Raju a class X student is very depressed because his father regularly takes alcohol and due to this his family faces lot of alcohol?
    a. What is the constituent of other.
    b. Can you suggest some ways by which Raju can over come his depression and problem of his family.

4. Burning fossil fuels produce lot of smoke on combustion resulting in the formation of oxides of sulphur and nitrogen which are major pollutants in the environment.

Answer the following.

a. Write the down the name of oxides of sulphur and nitrogen produced through combustion of fossil fuels.

b. Why we should minimize the burning of fossil fuels? Suggest ways to minimize the use of fossil fuels.

References:-

1. NCERT, X class science textbook
2. NCERT, pedagogy of science teaching.

5. Periodic Classification of Elements

5.1 Introduction

Need of Periodic Classification

1. Systematic arrangement of elements from disorder to order.
2. Segregation isolation of 110 elements in groups and periods.
3. Systematic study of 118 elements and more than one crore compounds.

Earlier attempts of classification

1. Dobereiner's Triad - Group of 03.
2. Newlands' Law of Octave - Group of 08.
3. Lothermeyer's Gpaph - Similar elements

Advanced Attempts

1. Periodic law based on Atomic mass
2. Mendleev's Periodic - classification
3. Moseley's concept of Atomic number
4. New Periodic law based on Atomic number
5. Long form of Periodic Tab

Salient features of Modern Periodic Table

• Correction in sequence of elements

• Gradation of properties in groups & periods

• Separation of s, p, d and f-block elements

• Easy to predict new elements and their properties

• Proper place for hydrogen

• Proper place for Isotopes within groups

• Proper place for Isobars in different groups

• Systematic study of elements and compounds

Trends in Modern Periodic Table

• In Groups - From Top to Bottom

–Valency remain unchanged

–Enthalpy of Ionization and non - metallic

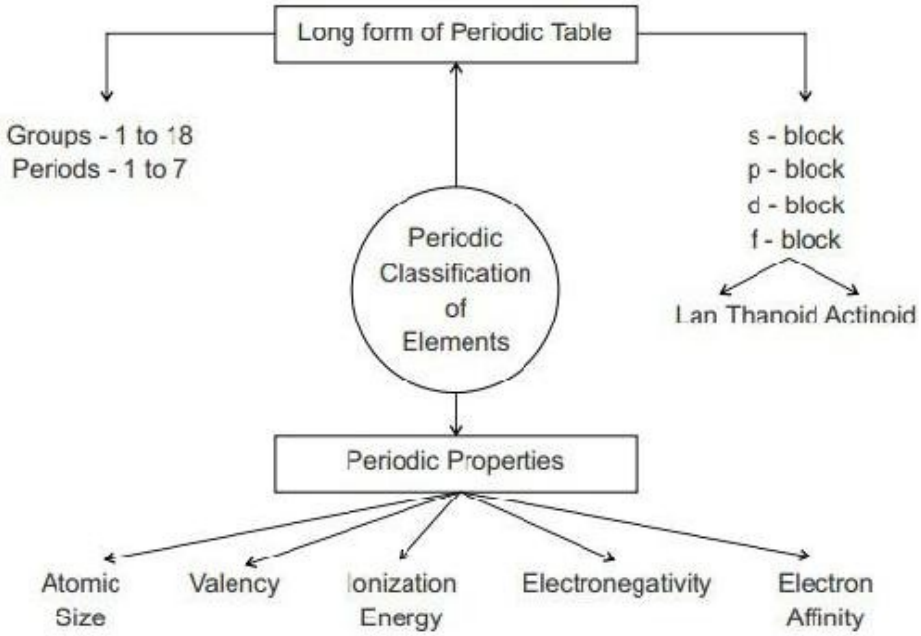
–Character decreases Electronegativity, Election affinity, increases

• In Periods - From Left to Right

–Atomic size and metallic character decreases

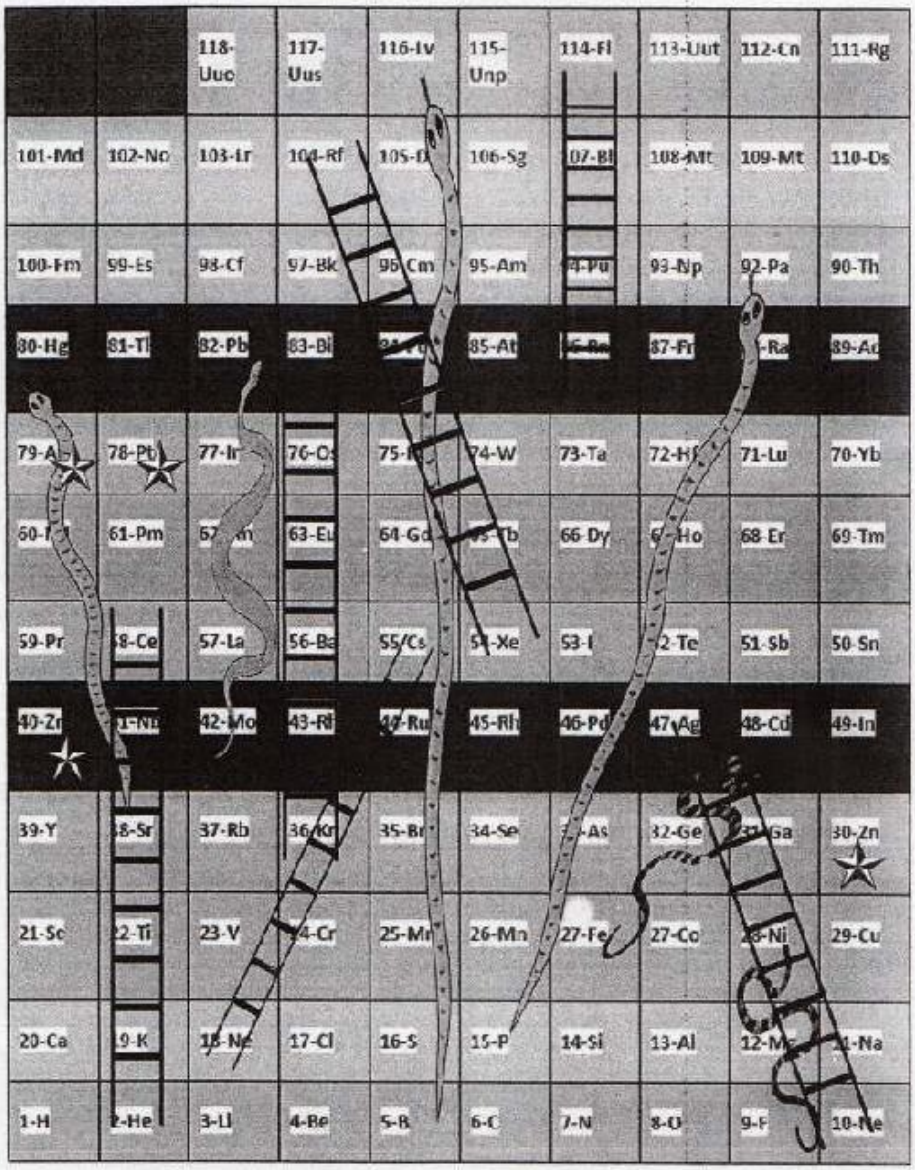
–Valency, Electro-negativity and electron affinity increases

5.2 **Concept Map**



(Activity 5.3.1)

Game1. Snake- Ladder Periodic Table



5.3 **Activity:-**

5.3.1 Concept:- The elements are grouped together on the their properties in a periodic table.

5.3.1.2 **Teaching Strategy:-**Game (Snake and Ladder)

5.3.1.3 **Materials Required:-**Snake Ladder design, Dice of six sides, Plastic or Paper circles of different colours.

5.3.1.4 **Steps:-**

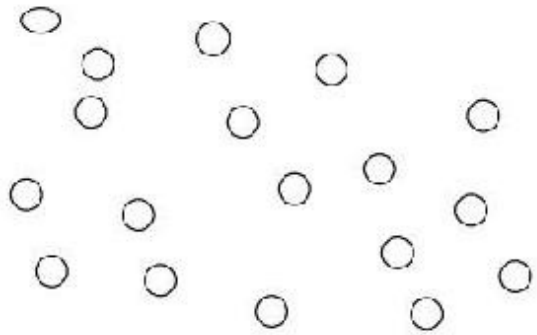
1. Any four group of players can play the game with different coloured plastic coins.
2. Take a dice of six sides and thought dice and as per number go ahead to score Top level.
3. Winner has to score 120 points for victory.
4. Atomic number 30-Zn, 40-Ag, 78-Pt and 79-Au are safe places to move at choice as less reactive or Noble metals.
5. 2-He, 10-Ne, 18-Ar, 36-Kr, 54-Xe and 86-Rn are boosters to take Ladder.
6. 28-Ni, 48-Cd, 80-Hg, 82-Pb, 92-U and 116-Lv are mouth of snakes. By coming to this level will take you to tail.

5.3.1.5 **Points of Discussion:-** The activity played in the form of game helps familiarise the students with the periodic table. the student forms an association with various elements in the course of playing the game. Subtle concepts like the Noble metals can be introduced here.

5.3.2 Concept:- Familiarizing students with various groups and periods.

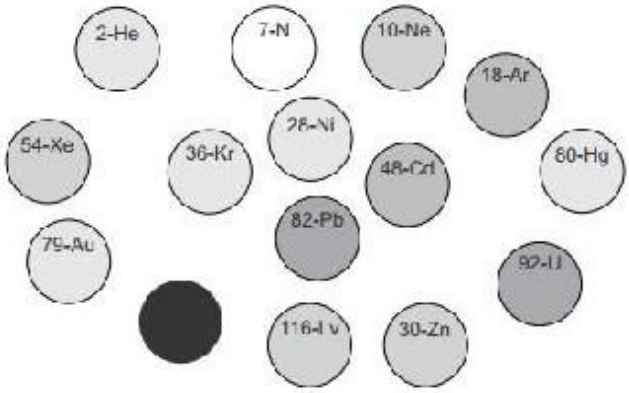
5.3.2.1 Teaching Strategy:- Be the king of elements in groups and periods

Be the King of Elements in Groups and Periods



5.3.2.2 Materials Required : 117 coloured Paper or Plastic strips with Atomic numbers and symbols.

Coloured strips of Blue for s-block (12 in numbers), numbers), Red for p-block (37 in numbers), Yellow colour for d-block and Green for f-block (28 in)



There are 117 Small Circles with Atomic No.

& Symbol of elements.

(Activity 5.3.2)

5.3.2.3 **Points of Discussion**

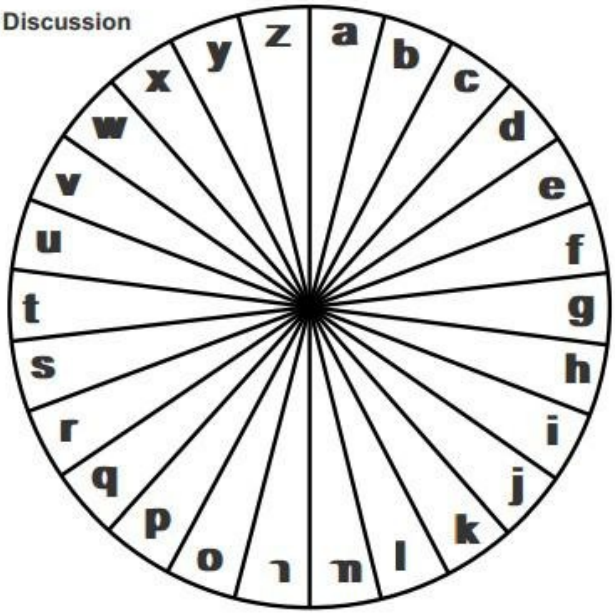
This activity helps involve the class in a bigger way. The large size classrooms can be involved in a big way each student can answer a question based on any element of the periodic table.

5.3.2.4 **Steps**

How to Play the Game:

1. Any number of groups can play the game.
2. Take four coloured round paper or plastic or rubber strips with name of symbol all 118 elements like 3-Li, blue for s-block, Red for p-Block, Yellow for d-Block and green for f-Block elements.
3. Spread all small strips.
4. Ask task to all the group one by one, by a game leader, who will instruct the groups to act as per his instructions.
5. With stipulated time 2-3 minutes, Group Leader will instruct groups one by one.
6. Questions will be : Select Group 1,2,3,4,5,6,7,8,9,10,11,12,13,14 and so on... or Isolate lanthanoids or Isolated Noble gases. Any number of questions may be set.
7. Winners will be the group with maximum correct answers based on Periodic Table based questions.

5.3.2.5 **Points of Discussion**



(Activity 5.3.3)

5.3.3 **Activity:-** Gain or Loose Elements

5.3.3.1 **Materials required:**

Large A4 or More desired Paper design in different colours with A to Z written and

Centre with needle to rotate by fingers.

5.3.3.2 **How to Play:**

1. Any number of players can play the game. One by one all the players will take their turn.
2. There is a circle comprises of 26 division. Each division has one alphabet.
3. To start the game, any player will rotate the needle with the help of Fingers and will note the alphabet indicated by the needle and will write names of which is indicated by the needle and will write the same is copy. Turn wise, all the players will take their turn.
4. Players will write name of elements on that alphabet.
5. Winner will be the player who will gain maximum elements.

5.3.3.3 **Points of Discussion**

This activity should be performed at the end of the end of the drafter. By this stage the students know the elements and can be names and properties.

5.4 **Resources Website:** www.ptable.com www.chemicool.com
www.periodicvideos.com

www.chemicalelements.com

www.rsc.org

5.5 **References**

Naming of new elements (I.U.P.A.C. Recommendations 2002)

Atkins, P.W. (1945) The Periodic Kingdom Harper Collins Publisher. Francl. Michelle (May 2009) Table Manners. Nature Chemistry Mark & Leach 1925 Courtines ‘Periodic

Classification. Periodic Table Wikipedia.

5.6 Value based question/HOTS

1. Newland developed 'law of octave' to classify elements. He was inspired by western musical notes – do, ne, mi, fasia, ti to compare elements and was successful to develop a small table with 56 elements. He found that every eighth element has properties similar to that of first. There was periodicity for few elements but could not do it for all elements. He was laughed by people as chemistry was linked to Music but was true to some extent.

Answer the following from above excerpt ?

(i) What is law of octave ?

(ii) What is periodicity ?

(iii) What clue – was given by western musical not actions ?

2. Mendeleev's Periodic table was based on concept of Newland's octave but in change of statement in Periodicity and was able to give Periodic table based on 63 elements in 1872. He was brilliant in making 'aaps' in his table. He was unable to answer about position of Hydrogen, isotopes, Isobars and in same of properties. He gave predictions for future elements.

Answer the following from above statement

(i) Why did Mendleev created gaps in periodic – table ?

(ii) What was the basis of prediction made by Mendleev.

(iii) Why did Mendleev's Pericastic Table discarded ?

(iv) What is the basis of Modern Percodic Table ?

3. Moseley discovered Atemic Number and explained that Atomic Number is the fundamental basis which influences physical and chemical properties of elements. Neils's Bohr made long firm of Periodic Table based on atemic number. The periodic table has 07 periods and

18 groups, which explains concept of orbitals also and this periodic table was able to remove all the defects of Mendleev's periodic table."

Answer the following :

(i) How many elements exist in modern periodic table?

(ii) Name three Lanthenides and three Actinides?

(iii) Name Moble gases ?

(iv) What is the position of d- block elements in modern percodic table?

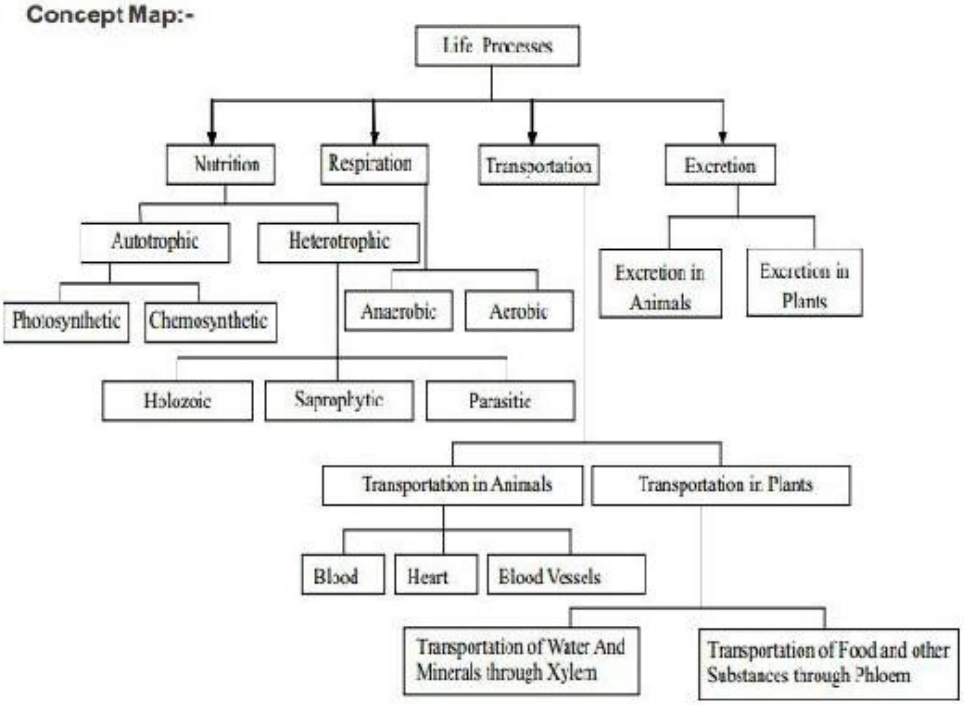
(v) What was the reasons to put hantharoids and Actinoides separately?

6. Life Processes

6.1 **Introduction:-**

All living organisms perform certain basic life processes such as nutrition, respiration, transport of nutrients and excretion - All these processes occur simultaneously and require energy. This energy is obtained from food taken by organisms. Different organisms obtain food from their surroundings in different ways. Respiration is biochemical process in which food gets oxidized to release energy which is stored in the form of A.T.P. Transportation is a life process in which a substance is absorbed or synthesized in one part but moved to other parts of the body. The methods of transportation of substances are different in plants and animals. In metabolic reactions, some useless and harmful by-products are produced in the living organisms. The waste by-products are, therefore, needed to be removed from the body by a process called excretion. Ammonia ,urea, uric acid are the main nitrogenous excretory products in animals.

6.2 Concept Map:-



6.3 Activities:-

6.3.1. Activity:- To show the presence of starch in leaf.

6.3.1.1 **Teaching Strategy:** Group activity.

6.3.1.2 **Materials Required:** Variegated leaf like croton, money plant , alcohol, Iodine solution, petridish, burner, water, beaker, water bath.

6.3.1.3 **Steps:-**

- The teacher will instruct the students to carry the leaves of money plant/croton in advance.
- Students are divided in groups of 4-5 students.
- Teacher will ask the students to trace the green area of leaf on a paper.
- The teacher will guide the students to prepare the leaf for Iodine test (presence of starch).
- The teacher will ask the students to write observations in the table.

Leaf	Effect of Iodine/ change in colour
Green portion	
Non-green portion	

- Students analyse the result.

6.3.1.4 **Points of Discussion:-**

1. Teacher will discuss with students which portion of leaf turns blue-black and which does not?
2. Teacher will discuss the excess food (starch) stored in plant parts like potato, food grains.
3. Teacher will ask the name of plants in which some roots are modified for the storage of food.

6.3.2 **Concept:-** Human Alimentary Canal.

6.3.2.1 **Teaching Strategy:-** Jigsaw puzzle.

6.3.2.2 **Materials Required:-** Paper sheet, pencil, colours, cardboard / thermocol sheet, cutter, scissors, alpins.

6.3.2.3 **Steps:-**

- Teacher will instruct the students in advance to draw the figure of human alimentary canal on a sheet of paper and colour various parts. Cut the alimentary canal from out line and then paste it on cardboard sheet or thermocol sheet. Cut various parts/organs of alimentary canal with the help of cutter .
- Prepare the label strips of all organs.
- The teacher will ask the students to remove all the cut outs of the organs
- They arrange the parts in the proper sequence to complete the human alimentary canal.
- Then the students will label all the parts/organs with label slips using alpins.
- Ask the students to complete the table.

Component of Food	Digestive enzyme	Product after digestion
Starch	Salivary amylase	
Protein	Pepsin	
Fat	Lipase	

6.3.2.4 **Points of Discussion:-**

1. Teacher will discuss the steps of nutrition.
2. Role of liver in digestion.
3. Causes of acidity in stomach

6.3.3 Concept:- To show action of salivary amylase.

6.3.3.1 **Teaching Strategy:-** Group activity

6.3.3.2 **Materials Required:-** Boiled rice, cotton, funnel, test tubes, droppers, iodine solution

6.3.3.3 **Steps:-**

¬ Teacher will demonstrate the steps of activity (controlled experiment).

¬ Students are divided into small groups.

¬ Teacher will instruct the students to perform the activity in groups and analyse the result.

¬ Colour of solution in control test tube_____ and colour of solution in experimental test tube_____ on adding iodine solution.

6.3.3.4. **Points of Discussion :-**

1. The teacher will discuss the following questions with students:
   a. In which test tube do you observe the change in colour of solution (blue-black)
   b. Why is there, a change in colour of solution in one test tube not both?
2. Teacher will discuss the action of other digestive enzymes-pepsin and trypsin on proteins, lipase on fats, role of bile juice in digestion of fat.

6.3.4 **Concept:-** To show fermentation (anaerobic resperation)

6.3.4.1 Teaching Strategy:- Activity based

6.3.4. 2 Materials Required:- Sugar solution, yeast, disposable katori, polythene, rubber band.

6.3.4. **3 Steps:-**

¬ Teacher will help the students to set up the experiment.

¬ Students are grouped in 4-5 students.

¬ After one or two hours, the students will smell the solution and analyse the result.

6.3.4.4 **Points of Discussion:-**

1. a. What do you observe in the odour (smell) of the solution? b. How does ethanol formed during fermentation?
2. Anaerobic respiration with the help of chemical equation:

Yeast

$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2 + Energy$

Glucose Ethanol Carbon dioxide

6.3.5 Concept:- To show the mechanism of breathing.

6.3.5.1 Teaching Strategy:- Group activity

6.3.5.2 **Materials Required:-** Plastic bottle, cork, Y shaped glass/ plastic tube, rubber/polythene, rubber band,

6.3.5.3 **Steps:-**

- Students are divided into groups
- The teacher will guide the students to prepare a working model of respiratory system.
- Teacher will ask the students to keep the rubber sheet up and down tied on the bottle.
- Students will observe the shape of balloons and discuss the reason in the group.

6.3.5.4 **Points of Discussion:-** The teacher will discuss the following points with students

1. a. What do the balloons in this activity represent? b. What does the rubber sheet represent?
2. Correlate the shape of balloons with lungs during inspiration and expiration
3. Respiration in aquatic animals

6.3.6 Concept:- To show transport of water in plants.

6.3.6.1 **Teaching Strategy:** Group activity.

6.3.6.2 **Materials Required:** Plastic bottle/ tumbler, water, red colour/ red ink, a twig of any plant with white flowers.

6.3.6.3 **Steps:-**

- The teacher will divide the students in small groups.
- The teacher will ask the student to bring all the materials required to perform activity in advance.
- In the class, the teacher will guide the student to set up the activity.
- Students will observe the colour of veins in flower.

6.3.6.4 **Points of Discussion:-**

1. a. Why did white colour of flowers change to red? b. How this red colour reached there?
2. The teacher will discuss the role of Xylem in transport of water.

6.4. **Resources:-**

- www.edudel.nic.in (CALtoonz multimedia content for class 10th)
- htt://nroer.gov.in/ICT
- www.youtube.com

6.5. **References:-**

- NCERT, science, text book for class 10th.

- NCERT, Exmplar problems for class 10th.
- Value Based supporting material for class 10th, published by DOE.

6.5 **Examplar Problems (HOTS/ Value based):-**

1. Why is rate of breathing in aquatic organisms much faster than in terrestrial organisms. Hint: less amount of oxygen is dissolved in water as compared to amount of oxygen in air.
2. Leaves of a healthy china rose plant are coated with Vaseline. Will this plant remain healthy for long time? Give reason.

Hint: Gaseous exchange and transpiration stopped due to blockage of stomata.

3. Bile juice has no digestive enzyme but it is essential for digestion of food, why?
   Hint: It emulsifies fat.
4. Why do veins have thin walls as compared to arteries?

Hint: Arteries carry blood from heart to various organs of the body under high pressure.

5. Why is double circulation necessary in humans?
6. How do leaves of plants help in excretion?

Hint: Some waste material is stored in the leaves. Waste materials are excreted by shedding of old leaves.

7. How do kidneys regulate water and ions concentration in our body?
8. Why xylem transport is unidirectional and phloem transport bi-directional?
9. One day Rohan was going to office. On the way, he found a person suffering from acute chest pain. Rohan helped him and carry immediately to the cardiologist in nearby hospital. But the doctor was busy in talking with other colleagues. Rohan requested the doctor for the treatment but he ignored him. Rohan knows the seriousness of heart related problems. He reminded the duty of Doctor. Doctor realized his duty and diagnosed the patient and provide proper treatment.

   (1) Why is heart very important organ of our body?

   (2) Give some possible reasons of heart problems?

   (3) Name any two heart disorders related to heart?

   (4) Which type of values are represented in Rohan's behaviour?

Hint: empathy, awareness, sympathy, to understand others problems, help to others,

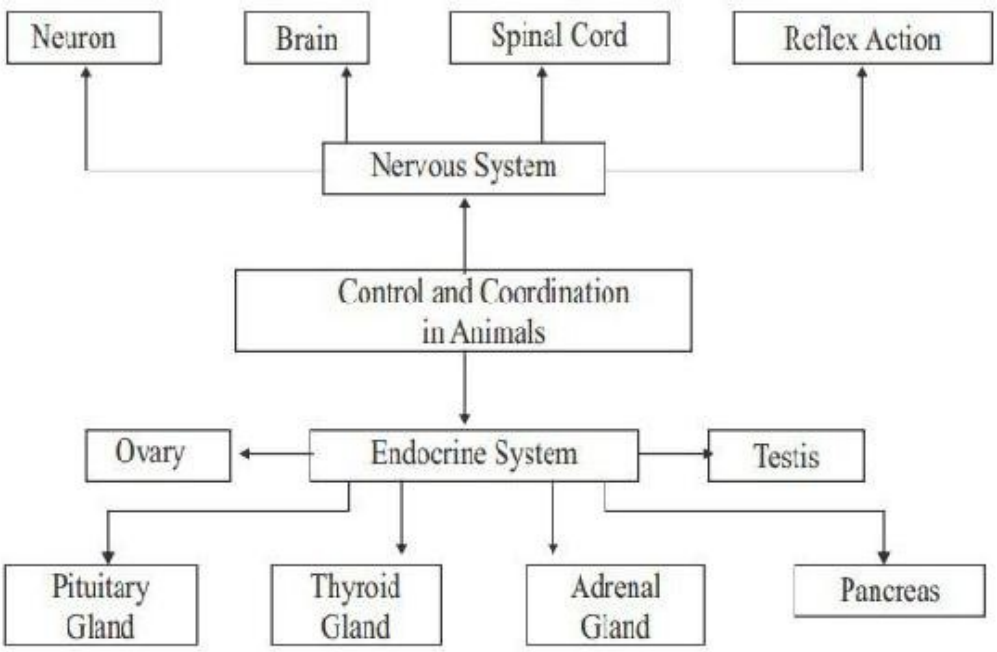
decision making .

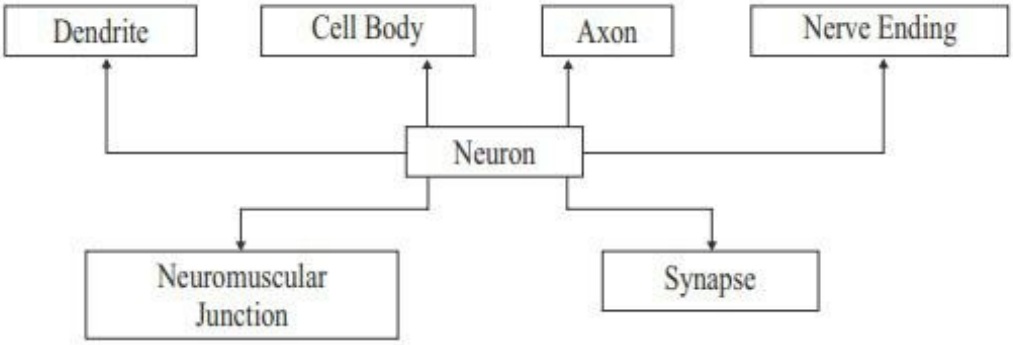
7. Control and Coordination

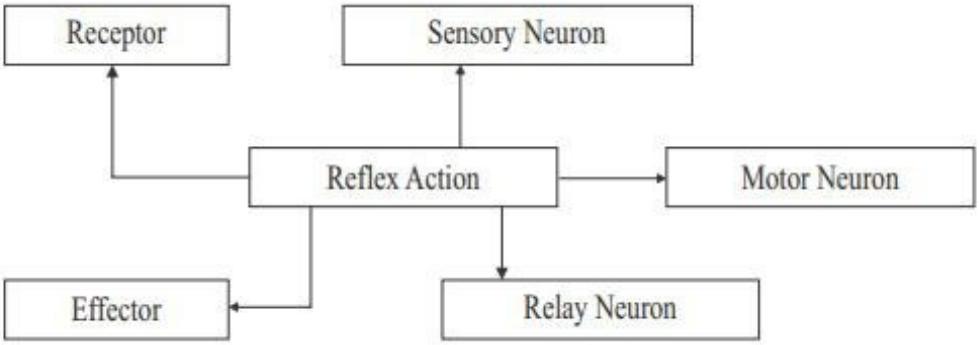
7.1 **Introduction:-**

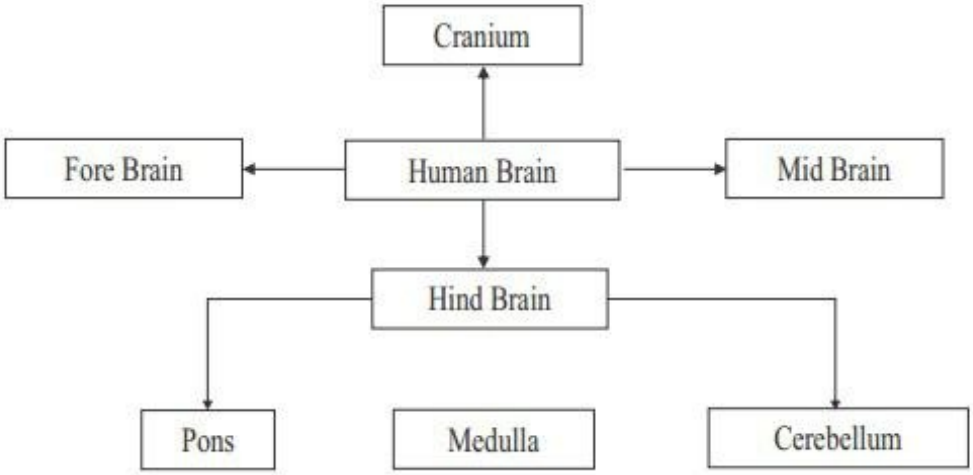
After the study of this chapter, the student will be able to understand the relationship between stimuli and corresponding responses. The student will appreciate the need of the mechanism of control and coordination to regulate various movements of the body of an organism in response to certain stimuli. He will also learn how a change in the environment is recognized and how it is followed by a precisely correct response.

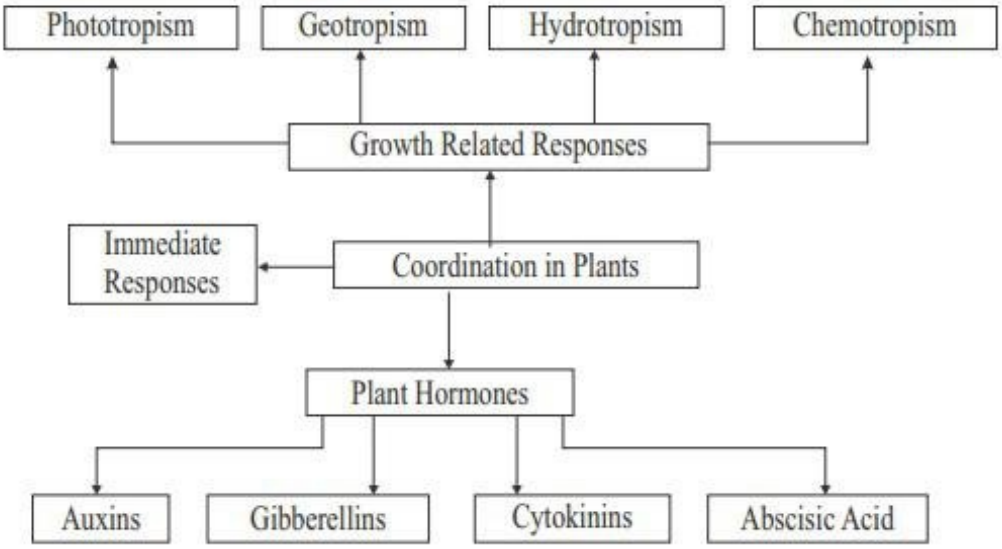
7.2 **Concepts Map:**




Dendrite
Cell Body
Axon
Nerve Ending
Neuron
Neuromuscular Junction
Synapse


Receptor
Sensory Neuron
Reflex Action
Motor Neuron
Effector
Relay Neuron


Cranium
Fore Brain
Human Brain
Mid Brain
Hind Brain
Pons
Medulla
Cerebellum



7.3 Activities:-

7.3.1. Concept:- Neuron Activity and quiz

7.3.1.1 Teaching Strategy:-

7.3.1.2 Materials Required:-

Chart/Diagram of structure of Neuron and Neuromuscular Junction.

7.3.1.3 **Steps:-**

1. Show chart/diagram of structure of neuron and neuromuscular junction to the students.
2. Discuss function of each part labeled in the chart/diagram.
3. Organise a quiz on the functions of each part of the diagram/chart.

7.3.1.4 **Points of Discussion:-**

Cell body, axon, nerve ending, dendrite, synapse and neuromuscular junction.

7.3.2 Concept :- Reflex action

7.3.2.1 Teaching Strategy:- Discussion with students.

7.3.2.2 Materials Required:- Chart/Diagram of Reflex arc.

7.3.3.3 **Steps:-**

1. Cite examples of Reflex actions from daily life.
2. Ask students for more examples.
3. Discuss the reflex arc shown in the chart/diagram of reflex action.

7.3.3.4 **Points of Discussion:-**

Receptor, Sensory neuron, relay neuron, motor neuron, effector.

7.3.4 Concept:- Human Brain

7.3.4.1 **Teaching Strategy:-** Activity based

7.3.4.2 **Materials Required:**- Model/Chart/Diagram of Human brain.

7.3.4.3 **Steps:-**

1. Divide class into groups of 4-5 students each.
2. Assign a part of human brain to each group.
3. Ask each group to give about structure and functions of the part of the brain assigned.

7.3.4.4 **Points of Discussion:-**

Forebrain, midbrain, hindbrain, cerebrum, pons, medulla, cerebellum, cranium, meninges and cerebrospinal fluid.

7.3.5 Concept :- Coordination in Plants

7.3.5.1 **Teaching Strategy:-** Activity based

7.3.5.2 **Materials Required:-**

Touch-me-not plant (if not available then use figure given in the textbook), plastic/glass container, wire mesh/net cloth, freshly germinated bean seeds, water, cardboard box open from one side.

7.3.5.3 **Steps:-**

1. Perform activities to show the tropic movement and immediate response movement (nastic movement).
2. Discuss the stimuli and corresponding responses in each case.
3. Ask students to identify the response which is growth related.
4. Ask students to identify the response which is reversible.

7.3.5.4 **Points of Discussion :-**

Immediate response to stimulus (Nastic movement), Phototropic movement, Geotropic movement, Hydrotropic movement, Chemotropic movement, Auxins, Gibberellins,

Cytokinins and Abscisic acid.

7.3.6 Concept:- Hormones in Animals

7.3.6.1 **Teaching Strategy:-** Discussion method

7.3.6.2 **Materials Required:-**

Chart/Diagram of human Endocrine glands shown in human body.

7.3.6.3 **Steps:-**

1. Show Chart/Diagram of Human Endocrine Glands to the students.
2. Discuss functions of each gland with the students.
3. Discuss the problems caused due to deficiency of hormones secreted by endocrine glands.

7.3.6.4 Points Of Discussion :-

Endocrine glands, exocrine glands, pituitary gland, Thyroid gland, Adrenal gland, Pancreas, Testis and Ovary

7.4 **Resources:-**

1. www.inerbody.com/image/nerv02.html
2. www.livescience.com/29365-human-brain.html
3. www.innerbody.com/image/endoov.com
4. education-portal.com
5. www.cropsreview.com/plant-movements.html

7.5 **References:-**

1. The Tell-Tale by V. S. Ramchandran
2. Understanding Plant Hormones by Shubhrata R. Mishra

7.6 **Value Based Questions/HOTS Questions:-**

1. Nervous and hormonal systems together perform the function of control and coordination in human beings. Justify.
2. What are Gustatoreceptors and Thermoreceptors?
3. Vrinda observed that the neck of her friend Isha is swollen. She checked the packet of salt Isha's family used to consume in food and found that it was not iodised.
   a. Name the disease Isha is possibly suffering from.
   b. Give two values reflected by the behavior of Vrinda.
4. Why is control and coordination essential in organisms?
5. How does the nervous tissue cause action?
6. Which organ secretes hormone when the blood sugar rises? Name an enzyme released by this organ.
7. What will happen when a plant shoot is exposed to unidirectional light?
8. A particular hormone requires iodine for its synthesis. Name the endocrine gland which secretes this hormone and state its location in human body.
9. Identify the glands and mention the hormones produced in each of the following cases
   a. Gland that helps in growth of bones and muscles.
   b. Gland which prepares our body to function at maximum efficiency during anger or danger.
10. What regulates the timing and amount of release of hormones? Explain giving example.
11. In each of the following cases, state whether it is physical change or chemical change or both:
    a. Drooping of leaves of Touch-me-not Plant when touched with finger.
    b. Bending of shoot of germinating bean seed towards light.

8. How Do Organisms Reproduce?

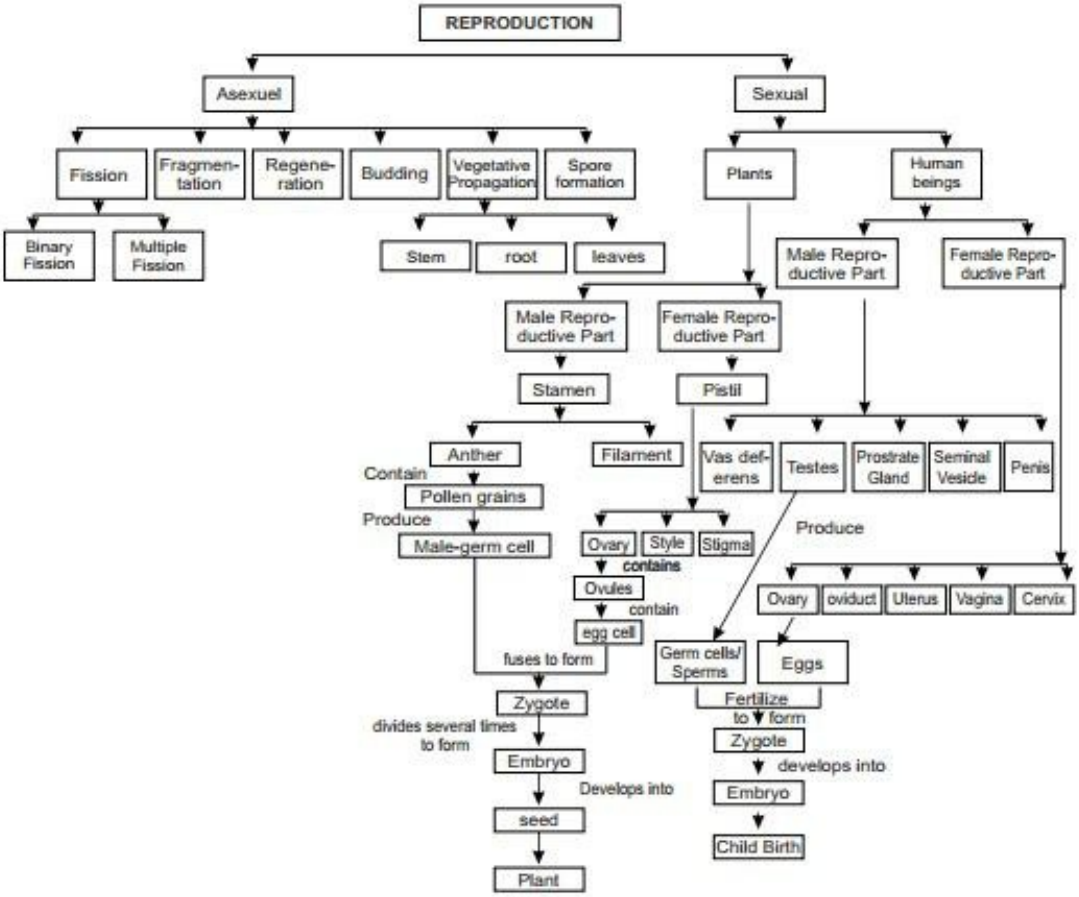
8.1 **Introduction:-**

⇥ All the organisms produce their young ones for the continuity of their life form because reproduction is essential for their existance on the planet earth. There are certain differences in the reproduction of higher and lower organisms due to the difference in their body organizations.

⇥ This chapter will help the teacher to

- ¬ understand the strategies for teaching plant and animal reproduction
- ¬ understand the activities for clarifying the concepts of reproduction
- ¬ utilize various resources for understanding of the concepts of reproduction

8.2 **Concept Map:-**



8.3 **Activities:-**

8.3.1 Concept :- DNA copying

8.3.1.1 Teaching Strategies: Puzzle, observation, problem solving , Group interactive sessions

Activity: Shading of coded region for understanding DNA copies

8.3.1.2 **Materials Required:** Coded sheets, pencil

8.3.1.3 **Steps:**

¬ Provide coded sheets (showing any figure) to the students. A square sheet can be used for making coded sheets. The region to be shaded should be coded by writing a letter 'A' and the portion which is not to be shaded should not be marked by any letter.

¬ Instruct the students to shade the portion marked A and leave the rest portion.

¬ Give them 10 minutes and then collect the sheets.

¬ Organize the sheets which are shaded properly and which are not shaded properly in two lots.

¬ Divide students into two groups and ask them to find the difference

¬ Then, explain them the concept of DNA copies and variations

8.3.1.4 Points of Discussion:- DNA copies, variations

8.3.2. Concept :- Fission

8.3.2.1 Teaching Strategies:- Observation, interpretation, demonstration through a model or chart

Activity:- To show fission in *Amoeba*

8.3.2.2 **Materials Required:**-Slides of fission in *Amoeba*, microscope

8.3.2.3 **Steps :-**

- Clarify the concept of fission in the class
- Set the slide of fission in *Amoeba* under the microscope
- Tell students to observe the slides carefully and note the difference in various stages of fission
- Discuss with students what they have observed in the slides

8.3.2.4 Points of Discussion:- Fission, Binary fission

8.3.3 Concept :- Vegetative Propagation

8.3.3.1 Teaching Strategies:- Field visit, Observation, Group interactive sessions

Activity:- To study vegetative propagation in rose, potato, ginger

8.3.3.2 Materials Required:- Garden where vegetables and floral plants are grown, notebook, pencil

8.3.3.3 **Steps:-**

- Divide the class into four groups
- Tell them to observe the plants in the garden
- Show them the growing part of ginger and potato
- Tell them to note the findings.

¬ Also explain them the parts from where a new plant grows.(similarly explain them rose plant also)

8.3.3.4 Points of Discussion:- Vegetative propagation

8.3.4 Concept :- Reproduction in plants

8.3.4.1 Teaching Strategies:- Dissection, observation, questioning, analysis, synthesis, case study

8.3.4.2 **Materials Required:**- Flowers of different plants such as mustard, Hibiscus, lily, etc**,** needle**,** notebook, pencil, simple microscope, Chart with two plants (both plants should have two flowers drawn on it).

8.3.4.3 **Steps :-**

¬ Show the parts of the flower to the students

¬ Instruct them to remove the petals and sepals

¬ Then explain stamen and pistil and their parts

¬ Dissect the flower and observe the pollen grains under the microscope (other parts can be seen by the naked eye)

¬ Explain stamen, pistil, anther, filament, style, stigma, ovary

¬ Paste real flowers on the chart and explain the process of self and cross pollination

¬ Explain the process of fertilization with the help of flowers

NOTE: For complete activity, three periods will be required

8.3.4.4 Points of Discussion:- Stamen, pistil, anther, filament, style, stigma, ovary, pollination, fertilization

8.3.5 Concept:- Human Male Reproductive system

8.3.5.1 **Teaching Strategies:**-Drawing, quiz, demonstration through a model

8.3.5.2 **Materials Required:-**Sheet on which outline of male figure is drawn, questions prepared on male reproductive parts

8.3.5.3 **Steps:-**

¬ Distribute the sheets among the students

¬ Explain the male reproductive parts and their functions

¬ Guide students to draw the male reproductive parts one by one and label them

¬ Divide the class into four groups

¬ Conduct a quiz on the functions of male reproductive parts

8.3.5.4 **Points of Discussion:-** Testes, vas deferens, penis, seminal vesicle, prostrate gland, urethra

8.3.6 Concept :- Human Female Reproductive System

8.3.6.1 **Teaching Strategies:-**Clay modelling, inquiry, Group work

8.3.6.2 **Materials Required:-**Clay of different colours such as red, white, blue etc, wooden board, flags

8.3.6.3 **Steps:-**

- Explain female reproductive system to the students
- Divide them into groups of four or five students
- Tell them to make the female reproductive system with clay on the wooden board
- Put flags as labels for reproductive parts
- Tell them to show the journey of egg starting from ovaries in both conditions (when egg is fertilized and when egg is not fertilized)
- Appreciate the efforts of students

8.3.6.4 **Points of Discussion:-** Ovary, oviduct, uterus, vagina, cervix, menstrual cycle

8.3.7 Concept :- Reproductive Health

8.3.7.1 **Teaching Strategies:-**Story writing, Dialogue writing, Role Play, Quiz, Case Study

8.3.7.2 **Materials Required:-**5-7 students, table, chair, pictures of contraceptives, etc

8.3.7.3 **Steps:-**

- Explain the different contraceptive measures in the class
- Encourage students to write a short story based on the reproductive health of women keeping in consideration the use of male and female contraceptives
- Approve the best story
- Assign the roles of doctor, patient (suffering from gonorrhoea/syphilis), nurse, attendant of patient, health workers
- Motivate students to write their own dialogues based on the story
- Prepare students for the play by doing rehearsals
- Organize the play and discuss the importance of contraceptives with the students

8.3.7.4 **Points of Discussion:-** Causes of sexually transmitted diseases, contraceptive measures for human males and females

8.4 **Resources:-**

- kidshealth.org
- www.learnnext.com
- www.slideshare.net
- www.mrcbiology.com
- www.uen.org
- www.youtube.com/watch?v=X7zW5W6XGeg
- www.onlinemathlearning.com/science-projectsandexperiments
- skoool.ie
- www.ingridscience.com

8.5 **References:-**

¬ Arey, L.D. – Human Histology

¬ Berry, A.K. – Animal Physiology

¬ Guyton, A.C. and Hall, J.E. – Textbook of Medical Physiology

- M.P. Kaushik- Modern Botany
- Ramesh Gupta – Modern Zoology
- Raven Johnson – Biology by Raven
- Siddiqui and Siddiqui: Teaching of Science: Today and Tomorrow
- Tortora, G.J. and Grabowski, S.: Principles of Anatomy and Physiology

8.5 **Exemplar HOTS Questions:-**

¬ Pollination may occur without fertilization but fertilization will not take place without pollination. Give reason.

¬ What is the fate of mature eggs if the uterus of woman is removed?

¬ Why is Amoeba called immortal?

¬ Variations occur in sexual reproduction but not in asexual reproduction. Why?

¬ A fertilized egg is a blueprint of future development? Explain.

¬ Why is the process of reproduction important for the maintenance of the species and not for the survival of the organisms?

¬ Regeneration power is more in lower animal groups than the higher animal groups. Give reasons.

¬ What is the advantage of cross-pollination over self-pollination?

¬ Why is regeneration not considered as a true mode of reproduction?

¬ Sunita and Shekhar have two daughters. Sunita is satisfied and does not want to extend her family further but Shekhar wants to become the father of a son also. Now, Sunita is in a dilemma because she does not know how to avoid unwanted pregnancy. Suggest few measures to Sunita so that she can avoid the birth of another child.

9. Heredity and Evolution

9.1 **Introduction:-** Heredity is the transmission of characters through generations which make

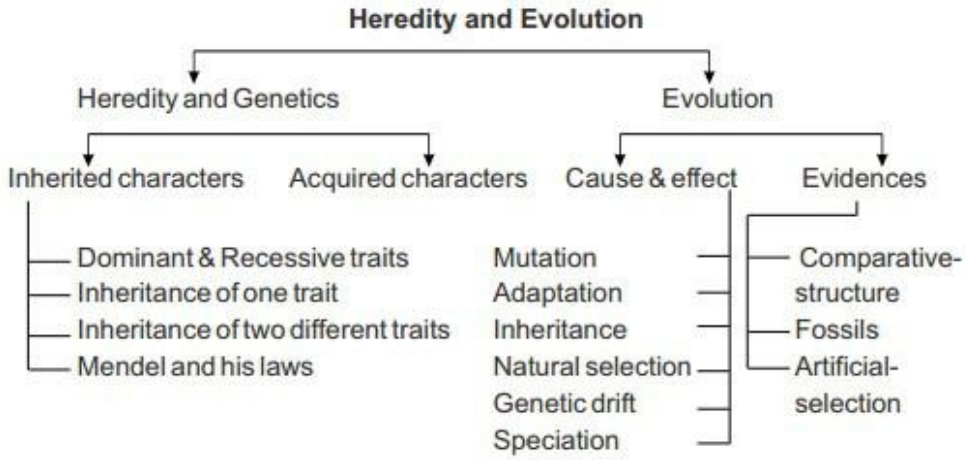
progeny similar as well as dissimilar. Genetics gives us the reason for inheritance. There is very little scope of variation in asexual reproduction. Sexual reproduction involves two individuals, therefore more options of variations are available. Gene variations occur due to mutation which accumulate and over a period of time make them so different from original population that speciation takes place.

When parents differing in any one or more characters cross, express character of either of the two parents (F1 generation). But in F2 generation, hidden character reappears. Mendel, the Father of

Genetics, explained its reason through “Law of Dominance”. Sexual reproduction involves two opposite sexes which inherit their traits to the progeny through germ cells or gametes containing chromosomes. Mutation provides raw material for selection or rejection by nature. Individuals with selected characters or adaptations increase their number with succeeding generations and finally new species originate, the process continues and called evolution.

Charles Darwin proposed the theory of “Origin of Species by Natural Selection” . Comparative study of body structure and their functions, presence of fossils prove evolutionary theory of Darwin. Simultaneous evolution in plants and animals resulted modern biological world including humans.

9.2 Concept Map :-



9.2.1 Important Terms :-

Gene : A segment of DNA on chromosome responsible for inheritance of character i.e. unit of inheritance

Trait : Expression of a genetic character

Allele : Two alternative forms of a gene

Dominant allele : Expressive allele in F1 generation

Recessive allele : Hidden allele in F1 generation.

9.3 **Activities**

9.3.1 **Concept :-** Dominant and Recessive traits in humans.

9.3.1.1 **Teaching Strategy :-** Through project work in groups.

9.3.1.2 **Materials Required :-** Paper and pen / pencil

9.3.1.3 **Steps:-** Divide the class in 3 groups. Select one genetic character for each group i.e.

Ear lobe attachment (Group – A) , Eye colour (Group – B) & Hair pattern (Group – C)

Members of each group will collect data of 50 persons having :

Group A	No. of persons with Free ear lobe	=
	No. of persons with Attached ear lobe	=
Group B	No. of persons with black eye	=
	No. of persons with brown eye	=
Group C	No. of persons with curly hairs	=
	No. of persons with straight hairs	=

Children will analyze the data and find out which characters are found in majority of members (selected and dominant trait), others being recessive.

Express the data through bar graph and pie chart.

9.3.1.3.1 **Extension :-** Collect data of persons among close relatives of recessive trait. Do you find any significant pattern of inheritance.

9.3.1.4 **Points of Discussion :** Do these genetic characters have any fixed ratio in a population. Why do dominant trait found in majority of the members of a population.

9.3.2 **Concept :-** Sex determination in human being.

9.3.2.1 **Teaching Strategy:-** Jigsaw puzzle

9.3.2.2 **Materials Required:-** Cardboard pieces with shapes of egg and sperm, male and female human, paper slips written with 22+X , 22+Y , 44+XX , 44+XY, father, mother.

9.3.2.3 **Steps :-** Ask the students to paste paper slip on human male and female acting as parent.

Ask another group of 4 students who will pick paper slips and paste on male and female gametes (egg & sperm) correctly.

These 4 students will make pair of gametes selecting one cardboard piece of male and another of female.

Let all students observe the four combination of chromosomes in the offspring.

9.3.2.4 **Points of Discussion :-** How many types of combination of chromosomes are there ?

¬ What will be the sex of the child ?

¬ Which chromosome is responsible for male child ?

¬ How chromosome number is maintained from parent to children ?

¬ What is the role of mother in determining the sex of child ?

9.3.2. **Concept :-** Natural Selection of Adapted Character .

9.3.3.1 **Teaching Strategy :-** Story telling / Role play

9.3.3.2 **Steps:-** Role play can be enacted on the story.

A mice couple with four small babies were living happily in a burrow of wheat crop field. They stored plenty of food for lean season. After harvesting of crop, one day they went far off for a long walk. Suddenly mother mouse saw a kite flying high and looking them eagerly. She shouted , run fast back home, kite is approaching. All ran fast towards their home, father ahead of mother and then small mice.

As kite came close, by chance father found a burrow in the field so he tried to enter but his head was large enough . He tried several times but could not succeed .

Mother also reached there, pushed father away and tried herself but her head was also not so small. Both of them tried number of times alternately.

By that time, one small mouse also reached there and finding a suitable occasion, he slipped in easily. Other three also came late but slipped in. Kite was very close, watched the couple minutely and pounced on the father and he was rising high in the claws of kite. Here struggle for existence resulted into natural selection.

9.3.3.4 **Points of Discussion:-** Among members of the family who were fit (adapted) for natural selection (to escape from enemy).

¬ What was the condition to escape from enemy ?

¬ Why did kite select father not mother as prey ?

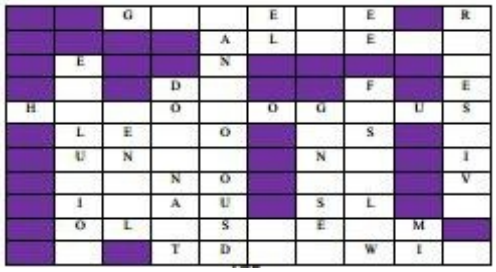
9.3.4 **Concept :-** Evidences of Evolution.

9.3.4.1 Teaching Strategy:- Word Puzzle

9.3.4.2 **Materials Required:-** Word puzzle on work sheet.

9.3.4.3 **Steps:-** Students are provided work sheet.

They will study the hint questions and fill the answer word in horizontal and vertical fashion.



Horizontal :

1. Cells which fuse to form zygote in sexual reproduction.
2. Two forms of a gene.
3. Body parts similar in origin and structure but different in function.
4. Male gamete in animals.
5. Who proposed theory of natural selection ?

Vertical :-

6. Progressive heritable change to form new life forms .
7. Father of Genetics
8. The allele which expresses in F1 generation.
9. Unit responsible for inheritance of characters.
10. Dead body remains of ancient plants and animals .
11. Trait that does not express in F1 generation but express in F2 generation.

9.3.4.4 **Points of Discussion:-** Differences between gene and allele.

Direction of evolution in Homologous and Analogous organs.

Wings of bat and wings of bird – homologous as well as analogous organs.
Example of fast evolution in modern time.

Mendel's conclusion of Law of Dominance.

9.4 **Resources:-**

9.5 **References:-**

9.6 **HOTS and Value based questions :-**

9.6.1 Monu used to eat burger, french fries , noodles and pizza daily. His classmate Sonu eats plenty of vegetables, dal, chapatti and fruits. Sonu plays one hour daily while Monu gets tired after 15 minutes. What body structure difference do you expect in both ? Suggest two remedial actions for Monu.

9.6.2 In India, mother's are abused for giving birth to a girl child . Explain, why father and not mother is responsible for sex of both children?

9.6.3 For evolution, several forces or factors act. Rearrange them as their sequence of occurance in nature - Inheritance of adapted characters, origin of species, mutation, natural selection, multiplication, struggle for existance.

9.6.4 Humans have varying degree of facial shapes, skin colour etc. Are they different races of human species. Support your answer with reason along with human ancestry.

10. **Light**

10.1 **Introduction:-** Light is defined as the electromagnetic radiation with wavelength between

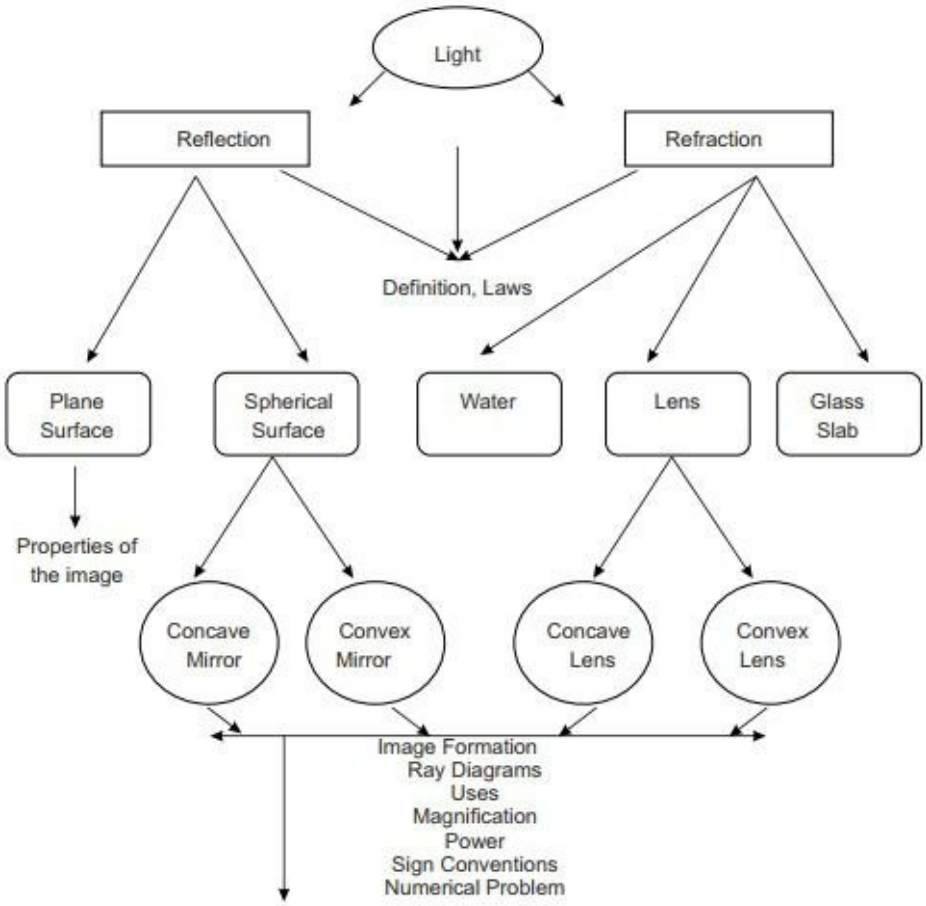
380 and 750 nm which is visible to the human eye. Electromagnetic radiation is generated by the changes in movement of electrically charged particles.

Light is nature's way of transferring energy.

In this chapter a child learns the properties , uses, ray diagrams, sign convention of plane mirrors, curved mirrors (concave , convex) and lens (concave convex).

The student is taught the laws of reflection, refraction and connects these concepts with their nature, applies in daily life and enjoys science.

10.2 **CONCEPT MAP**



10.3. **Activities**

10.3.1. Concept:- Transparent , translucent and opaque objects.

10.3.1. Teaching Strategy:- Demonstration method

10.3.1.2. **Materials required :**

Wooden board, mirror, glass slab, grounded glass, rubber etc.

10.3.1.3. **Steps**

A) Ask the students to look through the above objects and ask them how do they differ.

b) Ask the students whether these objects can be seen in dark also.

10.3.1.4. **Points of Discussion.**

1. Let the teacher discuss transparent, translucent and opaque objects .
2. Let the teacher discuss with different other practical examples these phenomenon.

Let the discussion continue going on to reflection, refraction and

3. absorption

with examples from the surroundings.

4. By the end of the discussion, students should be aware of light passing through different objects, if it reflects, refracts or absorption.

10.3.2 Concept:- Image Formation Of Plane Mirror.

10.3.2.1 : Teaching Strategy:- Activity Method

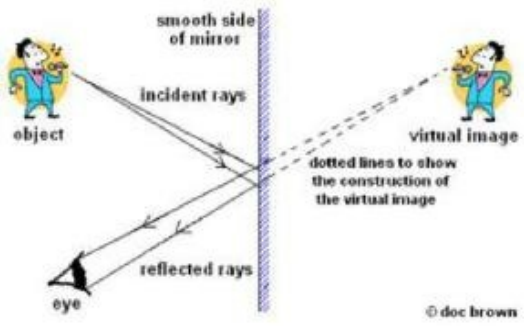
10.3.2.2 : Materials Required : Plane mirror.

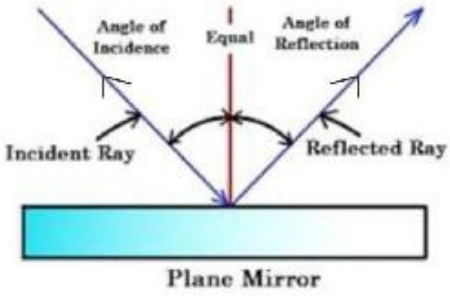
10.3.2.3 **:Steps**

1. let the students see their image in the plane mirror and say about the size , nature .

10.3.2.4 **:Points of Discussion.**

1. Teacher explains the concept of virtual image and lateral inversion.
2. Teacher also discusses the properties of plane mirror.
3. Students are asked to bring any other material which has the same property like a plane mirror.
4. The teacher discusses the ray diagram of the plane mirror.
5. Teacher also discusses the laws of reflection.





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10.3.3 **Concept:-**Convergence and divergence of rays.

10.3.3. 1 . **Teaching Strategy:-** Demonstration Method

10.3.3.2 : Materials Required:- Rubber slipper, long nails.

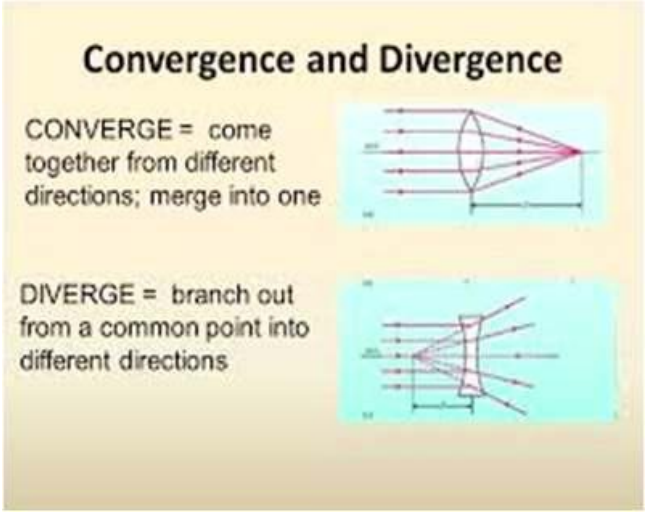
10.3.3.3 **: Steps**

1) Put the nails perpendicular to the flat surface of the rubber slipper.

2) Bend the slipper such that the needles converge or diverge.

10.3.3.4 **: Points of Discussion:**

Teacher explains the similarity between convergence and divergence of light from concave and convex surfaces



10.3.4 Explanation Of The Concept And Definitions

10.3.4. 1 : Teaching Strategy:- Lecture Method.

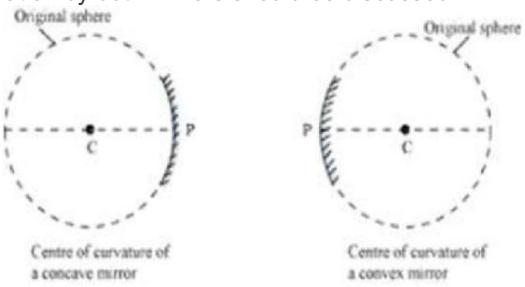
10.3.4.2 **: Materials Required:-** Black Board , Chalks.

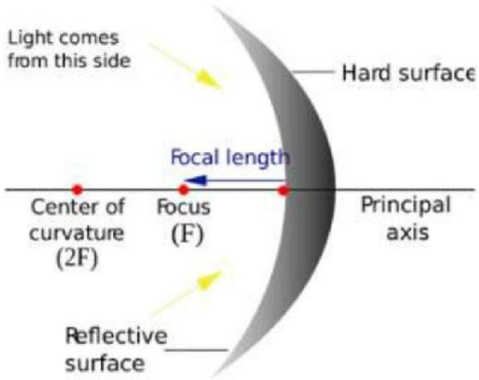
10.3.4.3 **: Steps**

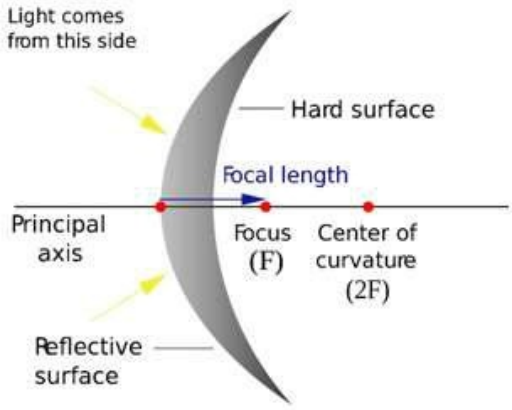
1. Draw the diagram of a spherical glass.
2. cut a part of it and show how a mirror is formed.
3. on the diagram, point out centre of curvature, radius of curvature, focus, focal length and principal axis.
4. Ask the students to draw themselves if they understand.

10.3.4.4 **: Points Of Discussion:**

1. Discuss how the two types of mirrors are formed.
2. The students should be explained about the above concepts for both the mirrors.
3. The teacher should explain the sign convention.
4. Let the teacher also explain the rules to draw the rays how the image is formed.
5. The image formation by both mirrors should be discussed.







10.3.5 : Concept:- Refraction

10.3.5. 1 : Teaching Strategy:- Demonstration Method.

10.3.5.2 : Materials Required :

Glass beaker, pencil, a coin, bowl , water or any other transparent liquid

10.3.5.3 **: Steps**

1. Put the pencil in the beaker of water\
2. puts the coin in bowl of water and ask the students to observe it and give reason further observations.

10.3.5.4 **: Points of Discussion:**

1. Teacher explains the phenomenon of refraction that is the apparent bending of light when it goes from one medium to another due to change in velocity of light.

10.3.6 : Refraction Of Light Using Laser Beam

10.3.6. 1: Teaching Strategy:- Demonstration Method.

10.3.6.2 : Materials Required :

Glass slab, laser light, drawing board

10.3.6.3 **: STEPS**

1. On the drawing board, keep the glass slab .
2. focus a laser light through one side of the slab.
3. observe the light coming out of the slab from the other end.

10.3.6.4 **: Points of Discussion**

1. The teacher shows how light deviates when it travels from one medium to another.
2. The students are explained the laws of refraction, definition and concept of refractive index.
3. The teacher teaches how to measure angle of incidence, angle of refraction and angle of emergence.
4. The students are also taught how to measure lateral displacement.
5. The teacher co relates the concept with different examples related to nature and surroundings.

10.3.7 **:Case Study**

10.3.7. 1 : Teaching Strategy:- Worksheet

10.3.7.2 **: Materials Required :** Paper , Pen

Time Allotted : 10 Min

10.3.7.3 **Steps:-**

A spherical mirror produces an image 48cm, in front it, when an object is positioned 12cm from its pole.

1. Identify the nature of the mirror.
2. Is the image magnified or diminished?
3. State whether the image formed is real or virtual.
4. Is the image formed erect or inverted?
5. Find u and v?
6. Calculate the focal length of the mirror.
7. Calculate the magnification of the image.
8. Draw the ray diagram, showing the formation of the image.
9. If the object size is 5mm, calculate the size of the image formed.
10. Write any two applications of the type of spherical mirror used here.

10.3.6.4 : Points Of Discussion

1. let the teacher discuss the answers in the class .
2. solve the numericals in the class.

10.4 **HOTS**

1. Where is the image formed in a convex mirror, when the object is anywhere in front of it.
2. what will happen to a ray of light when it falls normally on a surface?

Hint: no bending of light occurs.

3. Name the point inside the lens through which a ray of light goes undeviated?
4. when a ray of light passes from a denser medium to a rarer medium which angle is greater: angle of incidence or angle of refraction.
5. Which phenomenon occurs when light falls on

    a) highly polished surface

    b) a transparent medium.

6. Will the lateral displacement increase/decrease if glass block is made more thicker?
7. Printed letters appears diminished, when viewed through a lens. What is the nature of the lens.
8. At what angle a ray of light should strike the surface of glass, so that it does not suffer any refraction.
9. Which lens is used as a magnifying glass .
10. What is absolute refractive index.

Reference:-

[1] Physics Gilbert Rowell and Sydney Herbert, Cambridge University Press

[2] Science textbook for Class IX, NCERT

[3] Science textbook for Class XI, NCERT

[4] Foundation Science, Physics, Class IX, H.C.Verma

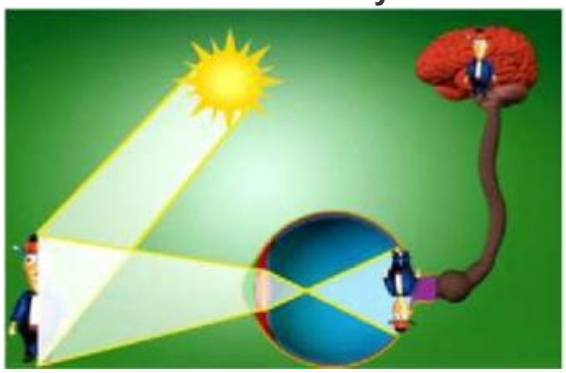
[5] http://www.stmarysacademy.mb.ca/resource/File/Physics_ Fundamentals Physics_Fundamentals_-_Chapter_2.pdf

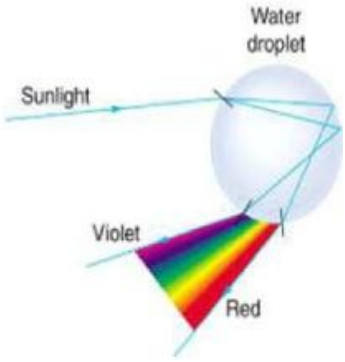
[6] Http://www.zahniser.net/~physics/index. Php?title= Linear %20 Motion %20 Problems

[7] http://www.efm.leeds.ac.uk /CIVE/CIVE1140/ section01/ linear_motion

.html#top

11. Human Eye & Colourful World





11.1 INTRODUCTION:-

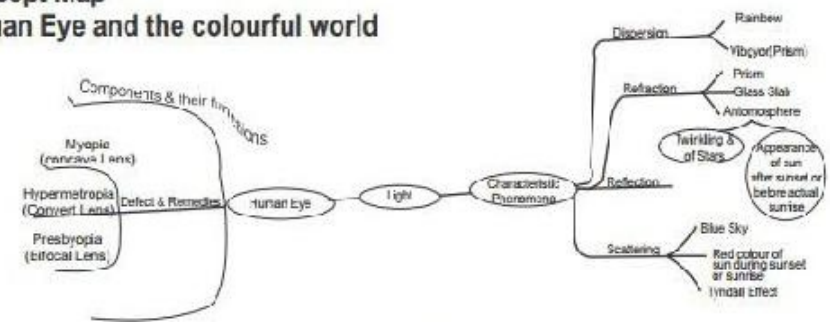
“Light brings us the news of the universe”

William Henry Bragg

Light travels through the universe as tiny invisible waves of energy. Light energy is the only type of energy that is visible . We can see light only when it hits something, which is why empty space is dark. On a sunny day in just one second 1000000000 light photons enter into our eyes to open up panorama of images that may be known, familiar, strange, beautiful, pleasant, horrible, bizarre, weird------ list is endless just like the light. The human eye is the most valuable and sensitive organ and it is a natural optical instrument. It can be compared to a camera which gathers, focuses and transmits light through a lens to create an image of the colorful environment around us. Serene beauty of the blue sky is the consequence of the fact that atmospheric particles are extremely small in size scattering smaller wavelengths (blue end of the spectrum) An interesting example of dispersion, reflection and refraction of sunlight by spherical rain water droplets is the rainbow. Sunlight is precious in a world so dark and our eyes enable us to witness this magic of science.

11.2 Concept Map

Human Eye and the colourful world



11.3 ACTIVITIES

Activity 1:

11.3.1 **Concept:-** Accommodation power of eye lens

11.3.1.1 **Strategy:** Discussion cum demonstration

11.3.1.2 **Material Required:**- Cylindrical bottles of different radii (Homeopathy medicine type bottles) a light source (sunlight/torch of mobile/any other).

11.3.1.3 **Steps:**

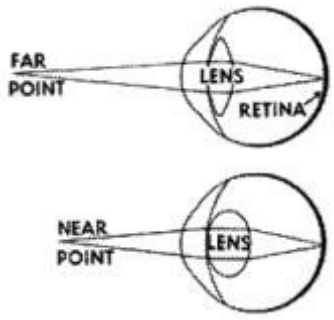
Students are told to fill the bottles with water. A torch or light source is shown near to the cylindrical base of bottles. The light converges at the other side of the bottle. students observe that the distance between base of bottle and the convergence point of light changes with radius of curvature of bottles. Point of convergence of light shows the focus of refracting lenses(bottles). It is easily seen that the more the curvature (thin bottle) the lesser is the focal length. Bottles of larger radius have larger focal length with focus farther from their base.

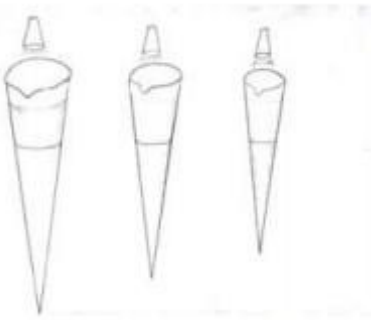
11.3.1.4 **Points of Discussion:-**

Power of accommodation is the ability of eye lens to adjust its focal length to see both distant and nearby objects. In lens formula 1/f=1/v-1/u

Since v= distance between eye lens and retina remains same when u= object distance changes

f= focal length of lens changes upto a certain limit to create clear image at retina.





Resource:science fair Shadow of light through water bottles

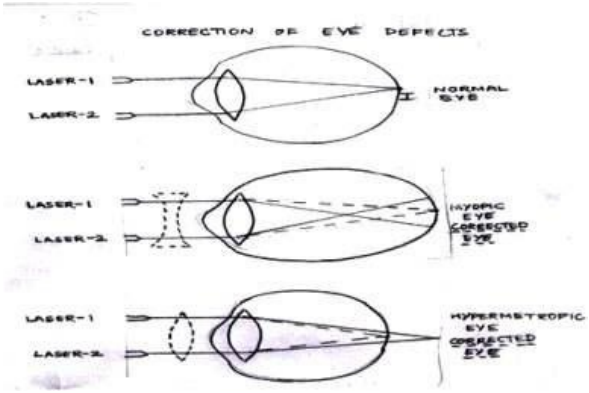
Activity 2:

11.3.2 Concept:- Correction of eye defects

11.3.2.1 Teaching Strategy: Working model

11.3.2.2 **Material required:**

Two lasers, a base made of clay/theremocole on which lenses can be fixed, diagrams of human eye of three different sizes on a paper, convex lens for eye lens, concave lens/ spactacles of myopic person, convex lens/spactacles of hypermetropic person.



11.3.2.3 **Steps:**

Put diagram of human eye on the base (thermocole/clay) and place a convex lens at the position of eye lens (coming out of the base). fix the lasers parallel to principal axis of eye lens. The laser lights should converge at the retina. So this displays a normal eye. Now replace eye with a bulged eye diagram so the converging point of lasers would be inside the eye. Introduce concave lens/spectacles of myopic person in front of laser and show shifting of convergence point towards retina. Teacher point out that this is the way myopia is corrected.

An eye diagram of a shrunken eye can be used for hypermetropic eye so that the converging point falls outside the eye. When convergens / spectacles of hypermetropic person is introduced in between laser and eye the focus again shifts towards the retina.

11.3.2.4 **Point of discussion:**Why a person needs bifocal lenses?

Teacher explains that power of accommodation of eye lens weakens with age. Teacher draws ray diagrams required for correction of presbyopia. The explanation includes understanding of activity 1.3.1 and 1.3.2 both.

Activity 3:

11.3.3 Concept:- Monochromatic and white light

11.3.3.1 **Teaching Strategy:** Experimental method

11.3.3.2 **Material required:** Prism, laser, sunlight, paper a wooden board

11.3.3.3 Steps:- Problem: How dispersion through prism takes place?

Hypotheses:

1. Prism contains seven colours in it.
2. Colours are seen with every source of light

Observations:

1. Prism is kept in sunlight and seven colours appear out of the other face.
2. Another inverted prism is used with spectrum incident on it, white light is obtained.
3. When laser light is used in place of white light, no spectrum is obtained.

11.3.3.4 **Point of discussion:-**

Result is negative hypothesis. Teacher explains that it is not the glass of prism but the white light that is composed of colours of different wavelengths. Refractive index(bending power) of prism inversely varies with wavelength according to cauchy's formula A+ B/λ2. More the wave length lesser is the deviation so red is least deviated inside the prism and violet suffers maximum deviation. This is the reason for splitting of white light into seven colours on refraction through prism. Laser light does not show dispersion as it contains only one wavelength. Hypothesis is negated by observations.

Activity 4:

11.3.4 Concept:- Red colour of sun during sunset/sunrise

11.3.4.1 **Strategy:**demonstration

11.3.4.2 Material Required: A transparent cuboidal box of at least 15-20cm in length, dettol/milk (5-7 drops),a torch.

11.3.4.3 **Steps:-**

Put water in the box and add 5-7 drops of dettol or milk into the water. Shine torch at one side and observe it at other side.

11.3.4.4 **Points of Discussion :-**

Teacher asks the students about the appearance of the torch light through water. If the students observe colour of torch light appearing red on transversing length of the box through water. Teacher explains that the dettol particles are scattering the blue spectrum in exactly the same way as the atmospheric particles do. The light of torch seems red because red light is least scattered and it represents Sun.

Teacher announces conclusions & Explains.

. Big particles scatter large wavelengths

. Small particles scatter small wavelengths

Air contains very small particles so blue side of spectrum is scattered the most and sun appears reddish as red light reaches our eyes unscattered during sunset or sunrise. In the noon time intensity of sunlight is too much to be scatterd away hence sun appears white at noon.

11.5 **HOTS/Questions**

1. Explain the working of human eye.
2. Which part of human eye helps in perception of colours?
3. What is short sight? How can it be corrected?
4. Define the term" accommodation of the eye".

Reference:-

[1] Physics Gilbert Rowell and Sydney Herbert, Cambridge University Press

[2] Science textbook for Class IX, NCERT

[3] Science textbook for Class XI, NCERT

[4] Foundation Science, Physics, Class IX, H.C.Verma

[5] http://www.stmarysacademy.mb.ca/resource/File/Physics_ Fundamentals Physics_Fundamentals_-_Chapter_2.pdf

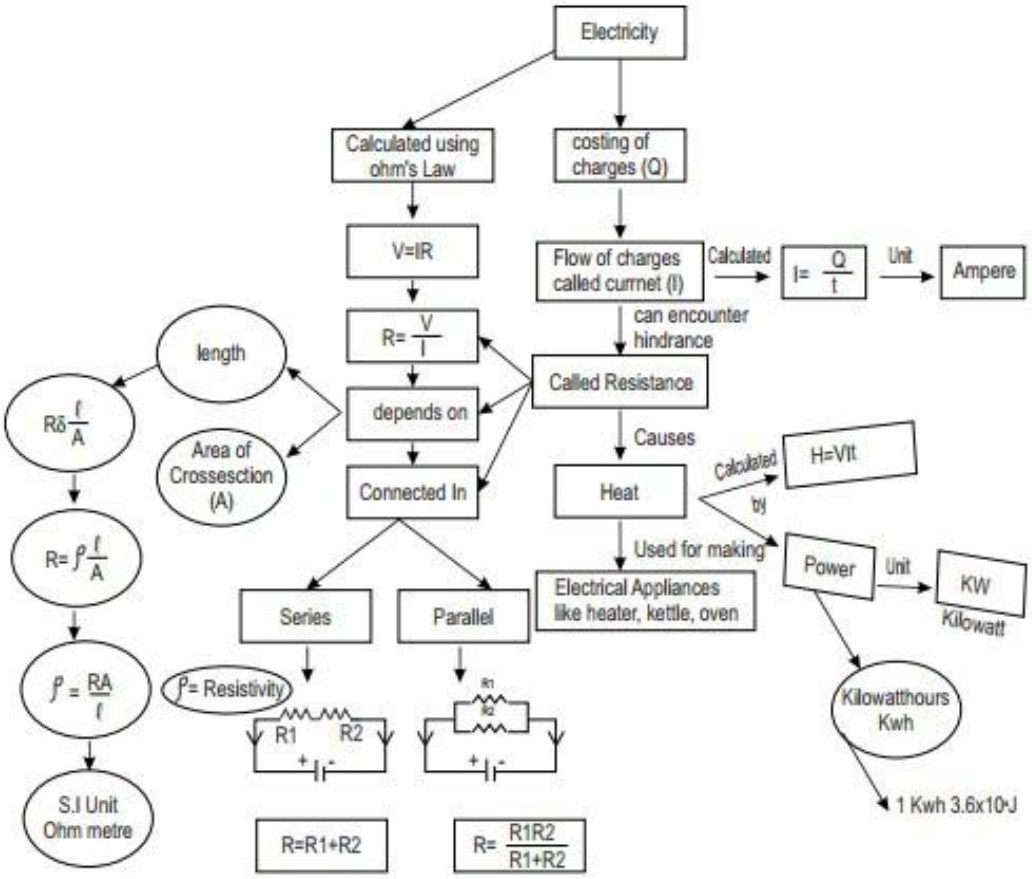
[6] Http://www.zahniser.net/~physics/index. Php?title= Linear %20 Motion %20 Problems
[7] http://www.efm.leeds.ac.uk /CIVE/CIVE1140/ section01/ linear_motion

.html#top

12. **Electricity**

12.1 **Introduction:-**Electricity has an important place in our life. It is one of the most convenient and widely used forms of energy in the world. Electricity can be readily transmitted over a long distances with relatively small loss in energy. Electricity is in fact flow of charges. The existence of electric current in a circuit is perceived through one or more of its effects. These effects could be the heating, magnetic or chemical. In this chapter we shall deal with basic concepts of electricity, simple electric circuits and their components and try to learn how electricity makes a lamp glow or an electric iron get hot.

12.2 **Concept of Map**



12.3.1 Concept:- Electric Current and Circuit

Name of the Activity- Glowing a torch bulb on connecting it with pencil cells through pieces of connecting wire.

12.3.1.1 **Strategy/Methods-** Use of waste material available in the houses/lab to make the Science teaching more easy and effective.

12.3.1.2 **Material Required-** Torch bulb, a pencil cell, pieces of connecting wires, holder etc.

12.3.1.3 Steps: 1. Take a torch bulb with holder.

2. Connect the dry cell with holder, and pieces of connecting wires.

Observations:- The bulb begins to glow as soon as the circuit is closed.

12.3.1.4 Points of discussions:- As soon as the circuit is complete in the closed circuit electrons flows through the bulb. Hence a closed circuit provides a path for electric current.

Use of critical Thinking:-

Note:- The teacher will ask the students to set up an electric circuit by indicating the mark of ammeter, battery the bulb and a key.

Observation of students:-

A. Use of Ammeter in the circuit to measure the strength of the current. [I=Q/T] where t- time for which Q charge is flowing.

B. The direction of flow of the current in the electric circuit is from positive terminal to negative terminal of the battery.

C. Ammeter is connected in series in the circuit. It has very low resistance.

12.3.2 **Activity**

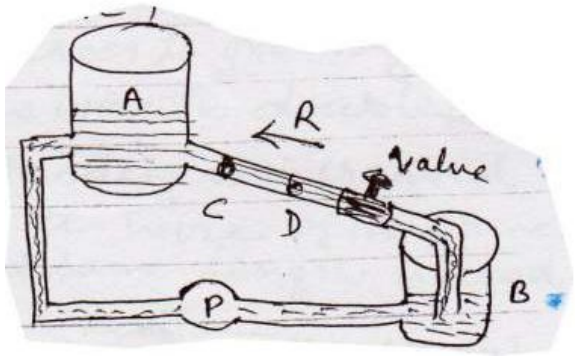
12.3.2.1 **Teaching Strategy:-** Electric Potential And Potential Difference.

The teacher is asked to demonstrate an activity of water flow in a pipe:-

12.3.2.2 **Material used:-** A water pump(P). A small tank B, pipe R, valve, reservoir.

12.3.2.3 **Steps:-**

1. The tank B is connected to the reservoir through pipe R.
2. The Pump(P) is used to main pressure by lifting(A closed water system water from a tank(B) to reservoir(A). Water in the pipe will flow from a point c to d.



Observation:-

(a) After opening of valve(v), water start flowing in the reservoir in the same manner as there is difference of electric pressure this difference of potential in electric

circuit is produced by cell or battery.

(b) The chemical reaction with in cell generates the difference in potential between the electrodes.

12.3.3. **Activity:-** 12.1(Ncert Book Class X Page No 203

To develop the relationship between the potential difference (v) across a conductor and the current(I) through it.

12.3.3 **Ohm's Law Activity**

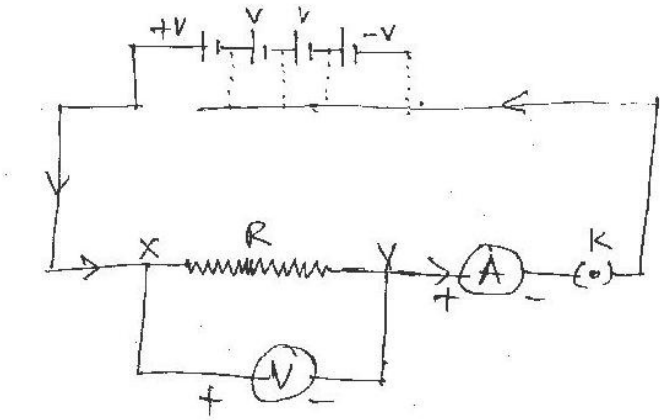
Concept:- The potential diff. across the ends of given metallic wire is directly proportional to the current flowing through it.

12.3.3.1 Teaching Strategy:- Laboratory Method

12.3.3.2 **Material Required:-** An ammeter, a voltmeter, four cells of 1.5 v each, Nichrome wire. Key etc.

Steps:-

i) First of all draw the CKT as given in fig below



ii) Using only one cell note the readings of voltmeter & ammeter.

iii) Use two cells & note the readings of voltmeter & ammeter.

iv) Repeat for three & four cells the same action as (i) & (ii).

v) Plot a graph between V & I.

12.3.3.4 **Points of Discussion:-**

1. The ratio of V to I remains same for all values of V.
2. Nature of the graph- It is a straight line.

Result:- The potential difference V across the end of a given metallic wire is directly proportional to the current.

12.3.4. **Activity:-** (12.3 NCERT Book for class X page 206) **Concept:-** Factors on which the resistance depends.

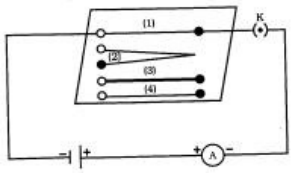
12.3.4.1 **Teaching Strategy:-** Hands on activity.

Method:- Observation

12.3.4.2 **Material Required:-** An electric ckt. Consisting of a cell, an ammeter, a resistance wire of length l namely nichrome wire.

12.3.4.3 **Steps:-**

Set up the CKT as in the figure NCERT Text book of class X science. Page 206.



12.3.4.4 **Points of Discussion:-**

A. The ammeter reading decreases to one-half . When the length of the wire is doubled.

B. The ammeter reading is increased when a thicker wire of the same material and same length is used.

Conclusion:-

1. The Resistance in the circuit is directly proportional to the length of the conducted wire is inversely proportional to the area of cross-section of the conductor wire.

2. Depends on the nature of the material used as conductor.

Note:- Formula $R = \rho L/A$

Significance of electrical resistivity.

- Alloys do not oxidize(burn) at high temperature as they have higher electrical resistivity than that of its constituent metals. They are used in electric iron, Heater etc.

12.3.5 **Concept:- Combination of Resistors**

(A) Series Combination

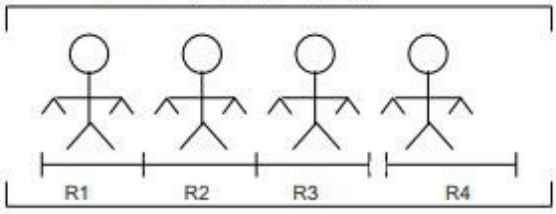
Method/ Teaching Strategy:- Role play method

12.3.6.1 Material Required:- Total students- Four.

12.3.6.3 **Steps:-**

1. Select a group of four students from the class.
2. They will becalled as Resistors, R1, R2, R3, R4, respectively.
3. Ask them to join hands so they form a series.
4. The rest of the students will devlop a sketch diagram of these resistors.

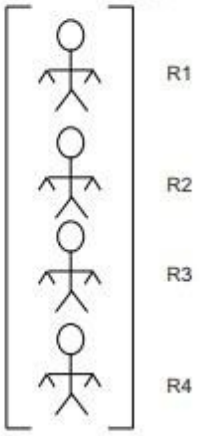
Result:- **The sketch of the group:-** $R = R_1 + R_2 + R_3 + R_4$



B. Parallel Combination:-

1. Again select four students from the class.
2. They will be called as R_1, R_2, R_3, R_4 respectively.
3. Ask them to join their hands in such a way that- they can hold their right- hands together and left hands together.
4. Rest of the students are asked to develop their group sketch

Result:- The sketch of the groups —



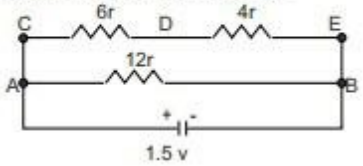
$$\frac{1}{R_{eq.}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \frac{1}{R_4}$$

12.3.6.4 **Points of Discussion:-**

The students are asked to solve the given problems,

A. In the circuit shown below.

1. Calculate the current flowing through the arms AB, AC, CDE,
2. The potential difference across AB, CD, DE.



B. 1. Draw a schematic diagram of a circuit consisting of a battery of three cells of 2 volt each, a 5r resistor, an 8r resistor, and a 12R resistor and a key, all connected in series.

2. Redraw the circuit of Question B(1) putting an ammeter to measure the current through the resistors and a voltmeter to measure the potential difference across the

12R resistor?

12.3.7 Concept of Heating effect of current

Students are introduced to Heating effect of Electric current with daily life

They are asked to prepare a list of appliances in which heating effect is desirable and in which it is highly undesirable.

	Name of the appliances	desirable	undesirable
(1)	Electric motors		
(2)	Incandescent lamps		
(3)	Toasters		
(4)	Transformers		
(5)	generators		

Solve the problems:

A 100 watt electric bulb is lighted for 2 hours daily and 40 watt bulbs are lighted for 4 hours every day. Calculate the energy consumed in (Kwh) in 30 days.

12.4 Hot Questions/Value Based Questions.

Q1. My daughter Shefali has the opinion that the electric wiring in our houses has three wires-live, neutral and earth. According to her, there is no use of earth wire and the first two wires carry current with them. Explain?

Q2. Randhir's father is an Agriculturist. He lives in Punjab, He thinks that the water which comes from Bhakra Dam is not suitable for irrigation purpose. Randhir does not agree with his father. He tries to explain his father. Explain, electric Power is generated by using water at Bhakra Dam.

Q3. The value of current- I, flowing in a given resistence for the corresponding values of P.d.(v), across the resistor are given

I(ampere)	0.5	1.0	2.0	3.0	4.0	
V(volt)	0.5	2.5	6.7	5 1	1.0	15.0

Plot a graph between V and I and calculate the resistance of the resistor.

Q4. We should avoid to stand under a tree during rain. Explain.?

Q5. If you connect three resistors having values 2r, 3r and 5r in parallel, Than will the value of the total resistance be less than 2r or greater than 5r or lies between 2r and 5r. Explain.

References.

1. Supporting material Class X Science (2014) Directorate of education Govt. of NCT of Delhi
2. Supporting material Class XI Physics (2014) Directorate of education Govt. of NCT of Delhi
3. Science Textbook for Class IX (2014) NCERT New Delhi
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5. Physics Part-1 Class XI and XII. NCERT New Delhi
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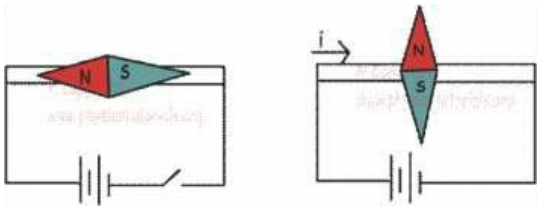
7. Wikipedia internet Websites
8. Khanacademy.com Internet Websites

13. Magnetic Effect of Electric Current

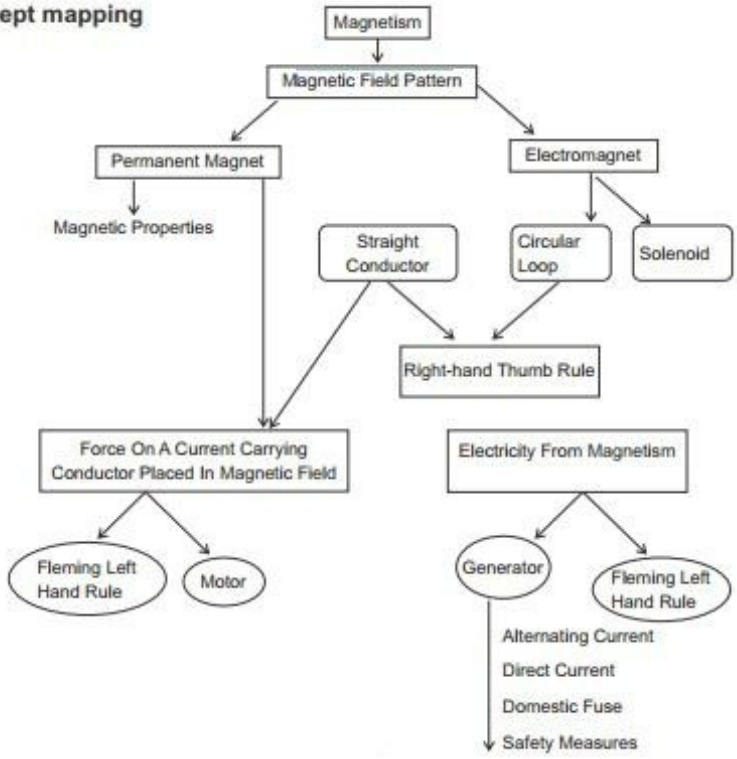
13.1 **Introduction**

In 1800s scientist Hans Oersted observe that, current flowing in a circuit effects the direction of needles of the compass. Picture, given below, shows his experiment. When the switch is closed current passes the circuit and direction of the magnet changes under the effect of magnetic field produced by current.



Moreover, Faraday and Joseph Henry are other scientists showing the relation of magnetic field and current. If you move the magnet placed near the circuit you produce current or, if you change the current of circuit you can get current in another circuit placed near it.In this chapter, we will learn all the types of current produced by magnetic field.

13.2 Concept mapping

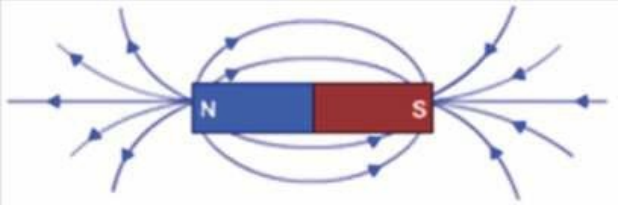


13.3 **Activities**

13.3.1 **Activity:-**Magnetism and Magnetic Fields

13.3.1.1 **Methodology/Strategy Adopted:-** Experimentation

13.3.1.2 **Material required-** Bar magnet, Compass, Wooden board, & Thumb pins



13.3.1.3 Steps- Class will be divided in group of four students.

Teacher will choose a leader of the group.

Each group leader will do plotting of magnetic field lines.

13.3.1.4 **Points of discussion-**

The imaginary lines of magnetic field around a magnet are called field line or field line of magnet.

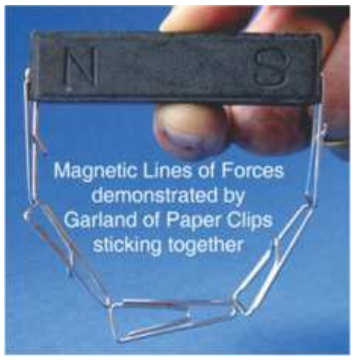
When the lines get closer to each other, this means that magnetic field is strong in that region.

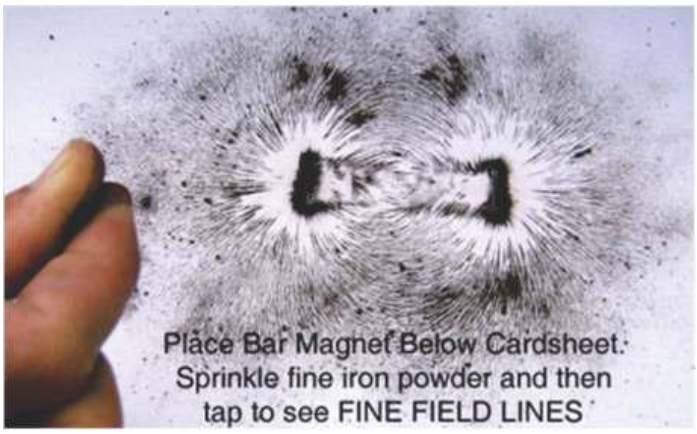
Magnetic field lines never intersect.

If they are parallel we say that there is a regular magnetic field.

Direction of Field Line:- Outside the magnet, the direction of magnetic field line is taken from North Pole to South Pole. Inside the magnet, the direction of magnetic field line is taken from South Pole to North Pole.

Strength of magnetic field:- The closeness of field lines shows the relative strength of magnetic field, i.e. closer lines show stronger magnetic field and vice-versa. Crowded field lines near the poles of magnet show more strength.


N
S
Magnetic Lines of Forces
demonstrated by
Garland of Paper Clips
sticking together



13.3.2 **Activity:-**Magnetic field Due to a Current Carrying Conductor

13.3.2.1 **Strategy Adopted:-** Hands On Activity

13.3.2.2 **Material required:-** A battery (12 V), a variable resistance (or a rheostat), an ammeter (0–5 A), a plug key, and a long straight thick copper wire.

13.3.2.3 **Steps:-** Class will be divided in group of five students. Teacher will choose a leader of the group. He will ask to

Insert the thick wire through the center, normal to the plane of a rectangular cardboard. Take care that the cardboard is fixed and does not slide up or down.

Connect the copper wire vertically between the points X and Y, as shown in Fig. 6 (a), in series with the battery, a plug and key.

Sprinkle some iron filings uniformly on the cardboard. (You may use a salt sprinkler for this purpose.)

Keep the variable of the rheostat at a fixed position and note the current through the ammeter.

Close the key so that a current flows through the wire. Ensure that the copper wire placed between the points X and Y remains vertically straight.

Gently tap the cardboard a few times. Observe the pattern of the iron filings.

You would find that the iron filings align themselves showing a pattern of concentric circles around the copper wire.

13.3.2.4 **Points of discussion:-**

What do these concentric circles represent? They represent the magnetic field lines.

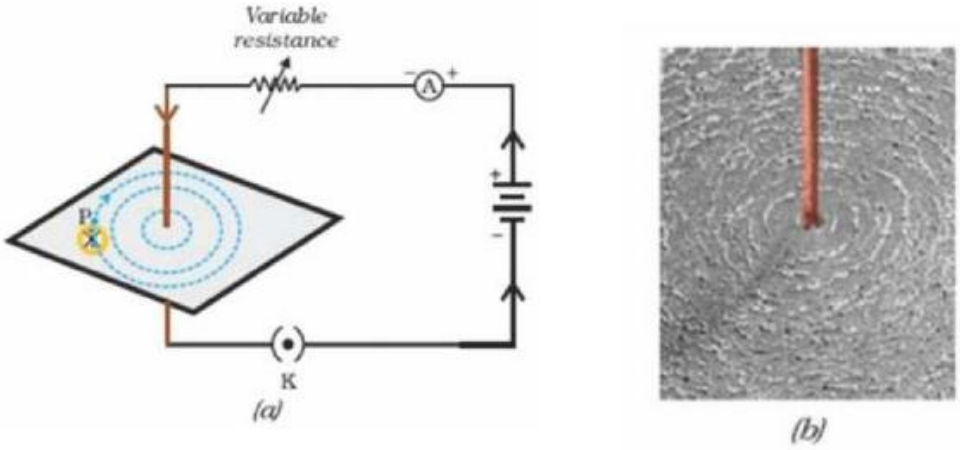
How can the direction of the magnetic field be found? Place a compass at a point over a circle. Observe the direction of the needle. The direction of the

north pole of the compass needle would give the direction of the field lines produced by the electric current through the straight wire at point P. Show the direction by an arrow.

Does the direction of magnetic field lines get reversed if the direction of current through the straight copper wire is reversed? Check it.

What happens to the deflection of the compass needle placed at a given point if the current in the copper wire is changed? To see this, vary the current in the wire. We find that the deflection in the needle also changes. In fact, if the current is increased, the deflection also increases. It indicates that the magnitude of the magnetic field produced at a given point increases as the current through the wire increases.

What happens to the deflection of the needle if the compass is moved from the copper wire but the current through the wire remains the same? To see this, now place the compass at a farther point from the conducting wire (say at point Q). What change do you observe? We see that the deflection in the needle decreases. Thus the magnetic field produced by a given current in the conductor decreases as the distance from it increases. From Fig. 6, it can be noticed that the concentric circles representing the magnetic field around a current-carrying straight wire become larger and larger as we move away from it.



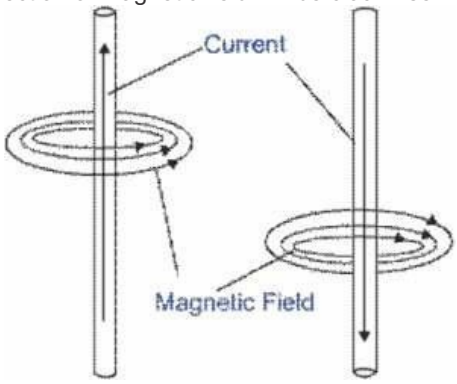
A pattern of concentric circles of field lines of a mag. field around a straight conducting wire

A closeup of pattern of field lines

Fig.6

Conclusion:- A current carrying straight conductor has magnetic field in the form of concentric circles; around it. Magnetic field of current carrying straight conductor can be shown by magnetic field lines. The direction of magnetic field through a current carrying conductor depends upon the direction of flow of electric current. The direction of magnetic field gets reversed in case of a change in the direction of electric current.

Right Hand Thumb Rule:- Let a current carrying conductor be suspended vertically and the electric current is flowing from south to north. In this case, the direction of magnetic field will be anticlockwise. If the current is flowing from north to south, the direction of magnetic field will be clockwise.



13.3.3 Activity:- Magnetic field produced by a current carrying circular coil.

13.3.3.1 **Methodology/Strategy Adopted:-** Demonstration by students to the class under supervision of teachers.

13.3.3.2 **Material required:-** Cardboard having two holes, circular coil, battery, a key and a rheostat& iron filings.

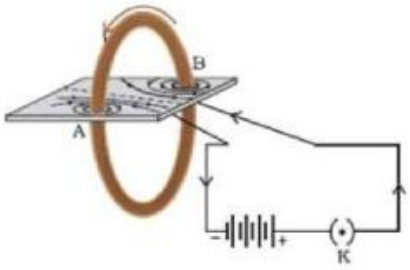
13.3.3.3 **Steps of processing:-**Teacher will choose two students to demonstrate the activity. He will ask to-

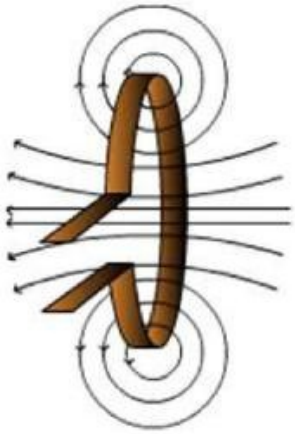
Take a rectangular cardboard having two holes. Insert a circular coil having large number of turns through them, normal to the plane of the cardboard.

Connect the ends of the coil in series with a battery, a key and a rheostat, Sprinkle iron filings uniformly on the cardboard.

Plug the key.

Tap the cardboard gently a few times. Note the pattern of the iron filings that emerges on the cardboard.





13.3.3.4 **Points of Discussion:-**

In case of a circular current carrying conductor, the magnetic field lines would be in the form of concentric circles around every part of the periphery of the conductor.

Since, magnetic field lines tend to remain closer when near the conductor, so the magnetic field would be stronger near the periphery of the loop. On the other hand, the magnetic field lines would be distant from each other when we move towards the center of the current carrying loop. Finally; at the Centre, the arcs of big circles would appear as a straight lines.

The direction of magnetic field can be identified using Right Hand Thumb's Rule. Let us assume that the current is moving in anti-clockwise direction in the loop. In that case, the magnetic field would be in clockwise direction; at the top of the loop. Moreover, it would be in anticlockwise direction at the bottom of the loop.

Clock Face Rule:- A current carrying loop works like a disc magnet. The polarity of this magnet can be easily understood with the help of clock face rule. If the current is flowing in anti-clockwise direction, then the face of the loop shows north pole. On the other hand, if the current is flowing in clockwise direction, then the face of the loop shows south pole.

Magnetic field and number of turns of coil: Magnitude of magnetic field gets summed up with increase in the number of turns of coil. If there are 'n' turns of coil, magnitude of magnetic field will be 'n' times of magnetic field in case of a single turn of coil.

13.3.4. **Activity:-**Electromagnetic Induction

13.3.4.1 **Methodology/Strategy Adopted -** Demonstration by students to the class under supervision of teachers.

13.3.4.2 **Material required:-** Coil of wire, galvanometer, strong bar magnet

13.3.4.3 Steps - Teacher will choose two students to demonstrate the activity.

He will ask to

Take a coil of wire AB having a large number of turns. Connect the ends of the coil to a galvanometer.

Take a strong bar magnet and move its north pole towards the end B of the coil. Do you find any change in the galvanometer needle?

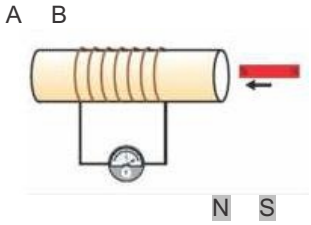
There is a momentary deflection in the needle of the galvanometer, say to the right. This indicates the presence of a current in the coil AB. The deflection becomes zero the moment the motion of the magnet stops.

Now withdraw the north pole of the magnet away from the coil. Now the galvanometer is deflected toward the left, showing that the current is now set up in the direction opposite to the first.

Place the magnet stationary at a point near to the coil, keeping its north pole towards the end B of the coil. We see that the galvanometer needle deflects toward the right when the coil is moved towards the north pole of the magnet. Similarly the needle moves toward left when the coil is moved away.

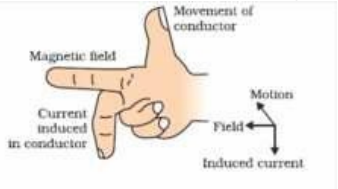
13.3.4.4 **Points of Discussion:-** When the coil is kept stationary with respect to the magnet,

the deflection of the galvanometer drops to zero. What do you conclude from this activity?



A moving magnet can be replaced by a current-carrying coil and the current in the coil can be varied.

The induced current is found to be the highest when the direction of motion of the coil is at right angles to the magnetic field. In this situation, we can use a simple rule to know the direction of the induced current. Stretch the thumb, forefinger and middle finger of right hand so that they are perpendicular to each other. If the forefinger indicates the direction of the magnetic field and the thumb shows the direction of motion of conductor, then the middle finger will show the direction of induced current. This simple rule is called Fleming's right-hand rule.



13.4 **Resources:-**http://www.physicstutorials.org/home/magnetism/magnetic-effect-of-current

http://schools.aglasem.com/16719,https://www.patana.ac.th/secondary/science/anrophysics/unit6/commentary.htm#Electromag

13.5 **Hot Questions -**

1. Choose the incorrect statement from the following regarding magnetic lines of field.

   The direction of magnetic field at a point is taken to be the direction in which the north pole of a magnetic compass needle points

   a. Magnetic field lines are closed curves

   b. If magnetic field lines are parallel and equidistant, they represent zero field strength

   c. Relative strength of magnetic field is shown by the degree of closeness of the field lines

   Answer: (c) If magnetic field lines are parallel and equidistant, they represent zero field strength

2. A current through a horizontal power line flows in east to west direction. What is the direction of magnetic field at a point directly below it and at a point directly above it?

   Answer

   The current is in the east-west direction. Applying the right-hand thumb rule, we get that the direction of magnetic field at a point below the wire is from north to south. The direction of magnetic field at a point directly above the wire is from south to north.

3. A circular loop placed in a plane perpendicular to the plane of paper carries a current when the key is ON. The current as seen from points A and B (in the plane of paper and on the axis of the coil) is anti clockwise and clockwise respectively. The magnetic field lines point from B to A. The N-pole of the resultant magnet is on the face close to

   a. A

   b. B

   c. A if the current is small, and B if the current is large

   d. B if the current is small and A if the current is large

   Answer: (a) A

4. List three methods of producing magnetic fields.

   Answer: Three methods of producing magnetic fields are as follows:

   a. By permanent magnet

   b. By electromagnet

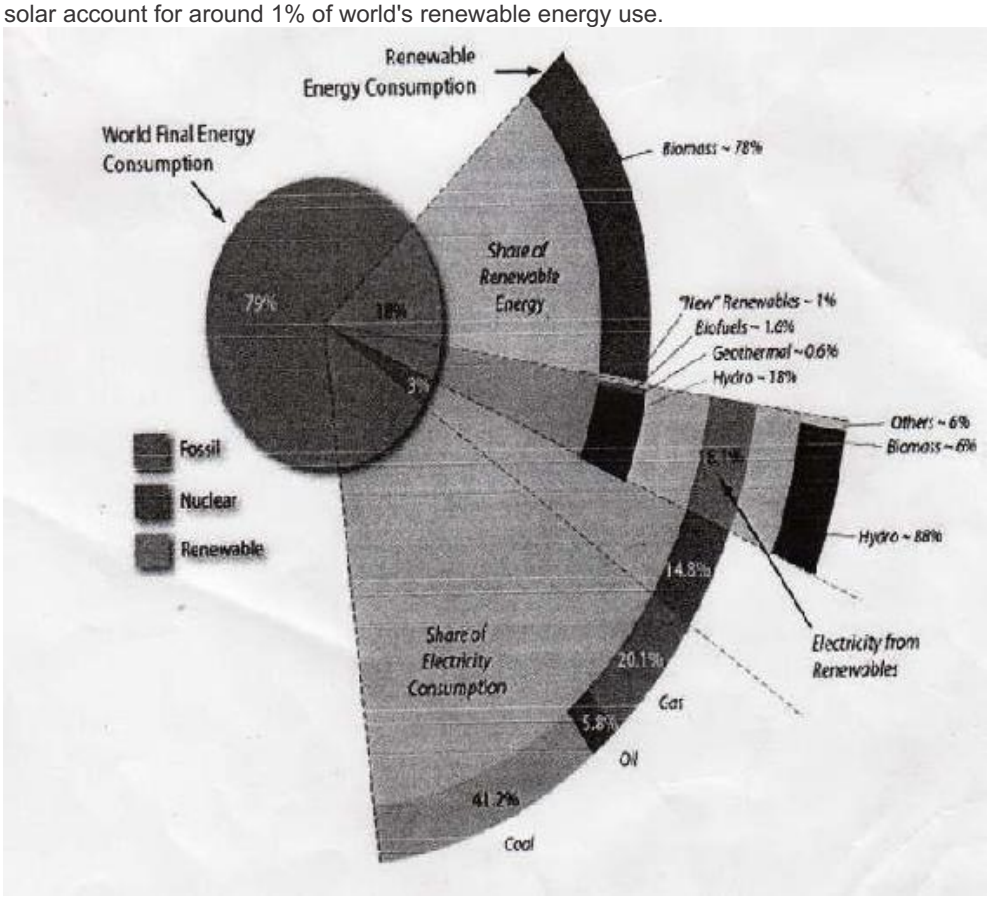
   c. By current carrying conductors

5. Explain different ways to induce current in a coil.

14. Sources of Energy

14.1 **Introduction**

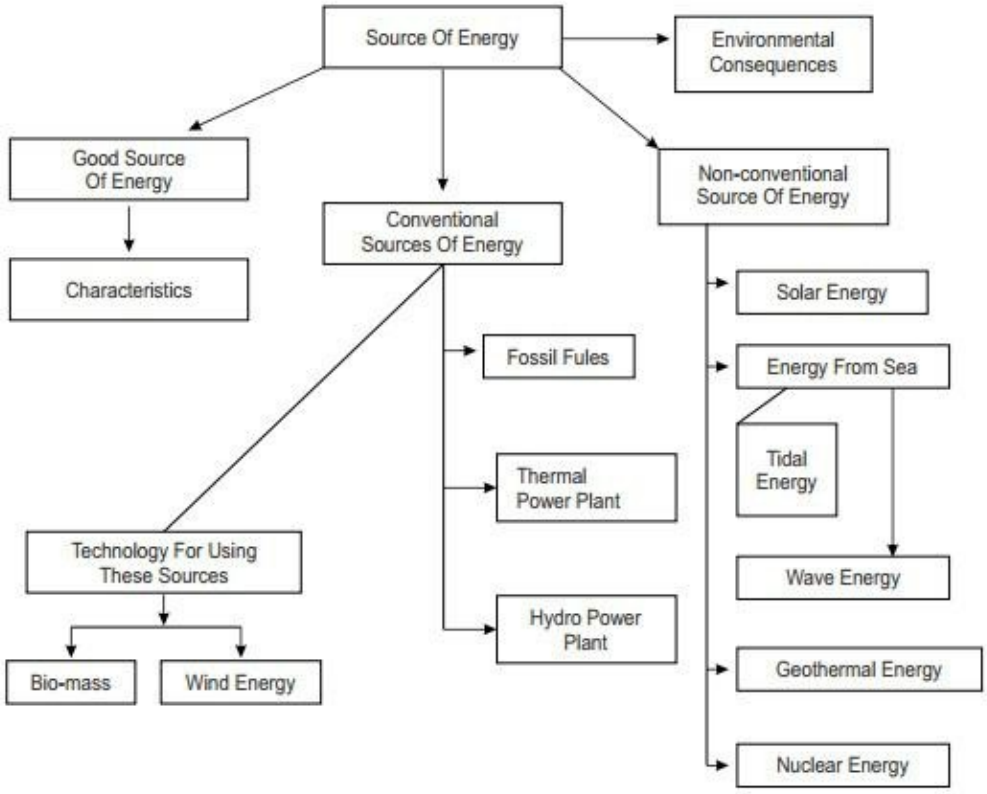
Energy plays a very important role in our lives because energy enables is to do each & every task. It enables productivity and gives us an option to live the way we want to. Our lives are literally surrounded by energy. There are seven billion people on earth who use energy each moment to make their lives richer, more productive, safer and healthier. Today, most of the energy the world uses, does not stem from renewable sources. In fact, only 18% of the world's final energy consumption comes from renewable. The majority is divided up by fossil fuels (79%) and nuclear energy (3%). Of the renewable, biomass is by far (78%) the most prominent source, mostly used for heat, followed by hydro energy (18%). So-called "new" sources including wind and solar account for around 1% of world's renewable energy use.



The picture looks very different when considering electricity generation. About one fifth of the world's energy is consumed in the form of electricity. Here, the share of renewable is slightly higher

(18.1%). However, the mix of renewable is very different. 88% of electricity from renewable comes from hydro - i.e. rivers and dams, followed by biomass (6%) and others (6%). We use energy in homes and commercial buildings also. We keep rooms at comfortable temperatures, provide lighting, heat water for bathing and hand washing, and power computers, copiers, appliances, and other technologies. Many of these luxuries weren't even possible 100 years ago-and they require a lot of energy. In 2008, 41% of all the energy consumed in powering homes and commercial buildings. Hence, any source of energy we use, to do work, is consumed and cannot be reused.

14.2 **Concept Mapping:-**



14.3 **Activities**

14.3.1 **Concept No. 1:-**Good source of energy.

14.3.1.1 **Methodology/strategies-** Quiz, linkage with hindi story-HAMID KA CHIMTA written by MUNSHI PREM CHAND.

14.3.1.2 **Material Required:-** Questionnaire for quiz.

Teacher will divide the class into three groups, A,B,C and ask the questions from each group. Each question will carry one mark.

14.3.1.3 **Steps:-**

A. Teacher will prepare following questions on fuel for quiz-

1. What are the various options to choose a fuel for cooking the food?
2. Is fuel easily available?
3. Does fuel produce a lot of smoke?
4. How much heat does fuel release on burning?
5. Is fuel safe?
6. Is it convenient to use?
7. Does fuel ignite easily?

8. Can we store and carry the fuel easily?
9. Is fuel cheap in cost?
10. Does fuel pollute the environment?

14.3.1.4 **Points of Discussion:-**Teacher will ask following questions from the story

1. What kind of fire source was used by Hamid's dadi to cook the food?
2. What problem did Hamid observed?
3. How much money did dadi give to him to see the mela?
4. What item was purchased by Hamid in mela and why?

Conclusion - After going through the two activities, we can see that fuel (source of energy), we select for performing some work should have the following characteristics :

- It should do a large amount of work per unit mass or volume - it means that the output energy must be more than the input energy. It should have high calorific value.
- It should be easily accessible - the energy source should be able to provide energy over long period of time, Example : coal and petroleum.
- Should be easy to store and transport - most common sources of energy such as coal, petrol and LPG need to be transported to users from their points of production. They also need proper storage. Thus it is important to store and transport these sources safely and economically.

¬ Safe and convenient to use - energy sources should be safe as it is used by a large number of people and should be convenient.

Example : Nuclear energy from a nuclear power plant is hazardous to be used at home. A source of energy which has above characteristics is called as Good source of energy.

14.3.2 **Concept No.2 -** Conventional Sources of energy - 2.1 (FOSSIL FUELS)

14.3.2.1 **Methodology/Strategies -** PUZZLE/WORD GAME, linkage with Hindi story -HAMID KA CHIMTA Written By MUNSHI PREM CHAND.

14.3.2.2 **Material Required:- Hindi Story** (Hamid ka Chimta)

14.3.2.3 **Steps of processing :**

(A) Tr. will write down some following questions on the paper in form of word game.

(B) Copying this word game/questionaire for distribution amongst students.

14.3.2.4 Points of Discussion:- Word game

Coal, Oil, Natural Gas

How will you know about fossil fuels beside each sentence below, write down weather it is talking about coal, oil or natural gas.

Name of fossil fuel

1. ..... There is probably enough of this fossil fuel to last another 200 years.
2. ..... Started out as plants (tiny plants and animals) millions of years ago.
3. ..... This fossil fuel provides 40% of the world's energy.
4. ..... In its early stages this fossil fuel is a spongy brown material called peak.
5. ..... This fossil fuel provides about 40% of the world's electricity.
6. ..... This fossil fuel produces more carbon dioxide than any other fossil fuel.
7. ..... Before people can use the fossil fuel it is clean and separated at a special factory called a refinery.
8. ..... Using this fossil fuel contributes to global warms.
9. ..... More than half of this fossil fuel comes from the middle east.
10. ..... This fossil fuel burns the hottest, which makes it the most efficient for making electricity.

(Am)

1. Coal
2. Oil/Natural Gas
3. Oil
4. Coal
5. Coal
6. Coal
7. Oil, Natural Gas
8. Coal, Oil, Natural Gas
9. Oil
10. Natural Gas

From Hamid ka Chimta. Tr. will ask following questions.

1. What kind of fuel Hamid's dadi was using in her home?
2. Was this fuel different from the fuel used by most of others villages?
3. Do we use this fuel in our house today?

Conclusion :-

Hamid's dadi was using wood as a fuel, which was the common source of energy in the villages at that time. This source of energy requires cutting of lots of tree and also non-renewable. Today we use gas as a cooking medium which is derived from fossil fuel.

A hydrocarbon, deposit, such as petroleum, coal or natural gas, derived from the accumulation remains of ancient plants and animals are used as fuel. Carbon dioxide and other green house gases generated by burning fossil fuels are considered to be one of the principal causes of global warming.

Fossil fuels are non-renewable source of energy. 'A non-renewable resource is a natural resource that is used up faster than if can be made by nature. It can not be produced, growth or generated on a scale which can sustain how quickly it is being consumed once it is used up, there is no more available for future needs!

Burning of fossil fuels has disadvantages also.

¬ air pollution due to burning of coal.

¬ the oxides of carbon, nitrogen, sulphur that are released on burning fossil fuels are acidic oxides and lead to acid rain which affects water and soil resources.

14.3.2 **Concept -3 Thermal Power Plant**

14.3.3.1 Methodology/strategies - Poem recitation

Planning and organisation of activities.

Tr. will ask the following questions before reciting the poem.

Q.1 How does you bulb give you light at night?

Q.2 Do you know that electricity for this bulb is generated by two thermal plants in Delhi-One at Rajghat and second at ITO.

Q.3 Do you know that coal is burnt in those two power plants and smoke comes out them huge chimneys which pollute the environment.

14.3.3.2 **Material required - Pencil, Paper**

14.3.3.3 **Steps of organization -**

Tr. will recite the following poem in the class-

i;kZoj.k dks ge lcus cpkuk gS]

blds fy, vc le; ugha x¡okuk gS]

vxj i;kZoj.k ugha jgsxk lqjf{kr]

rks okrkoj.k cusxk nwf"kr]

vr% ,d&,d isM+ dks yxk,a]

vkSj mtkZ ds mi;ksx ds fy, eu dks euk,¡]

rki fo|qr dk mi;ksx de djsa]

i;kZoj.k esa iznw"k.k ?kVk,¡]

chekfj;ksa dks vyfonk dgyk;saA

14.3.3.4 **Points of Discussion -**

Tr. will ask following questions from the poem.

Q.1 gesa isM+ D;ksa yxkus gSa\ Why should we plant the trees.

Q.2 rki fo|qr dk vFkZ D;k gksrk gS\ What do you mean by production of electricity through thermal power plant?

Q.3 rki&fo|qr dk mi;ksx D;ksa de djuk pkfg, \Why should we discourage thermal power plants.

Q.4 rki&fo|qr ls iznw"k.k fdl izdkj gksrk gS\ How thermal power plants increase pollution?

Q.5 lkSj mtkZ ls D;k le>rs gSa\ What do you understand by the term solar energy?

Conclusion -

From the answers of the question, Tr. will explain that.

rki fo|qr (Thermal electricity) means fuel is burnt to produce heat energy which is converted into electrical energy through thermal power plant. In thermal power plant, prime mover is steam driven. Water is heated, turns into steam and spins a steam

turbine which drives an electrical generator in India, coal is used as fuel of boiler.

Therefore it is also called as coal thermal power plant. Thermal power station is responsible for Global Warming because of large amount of emission of smoke.

Smoke cases our pollution. The heated water that comes fresh thermal power plant has an adverse effect on the lives in the water and disturbs the ecology. So, solar energy is preferable natural source of energy in comparison to production of electricity by power station and we have to utilize this energy maximum.

14.3.4 Concept- Hydro Power Flash

14.3.4.1 Methodology/Teaching Strategy - Experimental, Visuals

Planning - Tr. will arrange photographs visuals of the Bhakhra Dam.

Tr. will arrange following items in advance Table Tennis Ball, Metal Sheet, Bulb,

Dynamics.

14.3.4.2 **Material Required: -** Dynamo Bhakhra dam photographs, tennis ball, metal sheets

14.3.4.3 **Steps**

(A) **'for visual'-**

Tr. will explain that the water falling from a height moves the turbine at a great speed thereby generating the electricity.

(B) For experiment

Hydro Power Plant

Steps :

1. Arrange one tennis ball, one rod/bamboo stick and 3 fan like slits cut from aluminum sheet.
2. Call 3 volunteers from the class.
3. Guide the 3 children to fix above three slits in the ball at approximately equal distance like a table fan.
4. Pierce the tennis ball with the rod at its centre, take rod in-out several times to ensure that the tennis ball rotates freely on the rod. The students may be advised to put adhesive tape/ (in case of metal rod) or wire/mail (in case of bamboo stick) on both sides of the ball.
5. Connect cycle dynamo to this.
6. Connect a '0' watt bulb in series.
7. Attach a rubber pipe on the nozzle of the pressure cooker. Heat water in the cooker.
8. Direct the water stream from the jug kept at height on the blades of the tennis ball and observe.

14.3.4.4 **Points of Discussion & Conclusions**

This renewable source of energy has its own limitations e.q.

1. It requires lots of money to construct these dam.
2. Production of electricity is dependent upon availability of water.
3. Storage of water required lots of space.
4. Surrounding eco-system is destroyed the habitation gets immersed in water.

14.3.5 **Concept:-**Improvement in the technology for using conventional sources of energy.

1. Bio Mass

14.3.5.1 **Teaching Strategy** - Field Visit

14.3.5.2 **Material Required:-** Sulabh Shochalaya in a J.J. Cluster

14.3.7.2 **Planning -** Teacher will enquire the usage of Sulabh Shouchalya amongst the homes of students and shall arrange the visit of students there.

14.3.5.3 **Steps:- Preparation / Planning :**

1. prepare 3-4 groups of 2-3 volunteer students to visit some Jhuggi-Jhopri Clusters or resettlement colonies to locate sulabh shauchalya.
2. Take the students to sulabh shauchalya.
3. Show how the EXCRETA is collected from the toilet to a pit.
4. Show how the gases emanated from the decomposition of this stool passes to the air by a pipe. This gas is inflammable.
5. This visit can be further augmented by visit to a nearby village (Called GOBAR GAS PLANT)

14.3.5.4 **Points of Discussion:-** Social Benefits

1. Students shall appreciate the Government scheme of eradication of SCAVENGER system where the fifth used to cleaned by scavengers in the houses.
2. Concept manure is produced as a by-product
3. Individual initiative at the house level to mohalla level, to village level makes the village self sufficient in energy requirements as per the dreams of Mahatma Gandhi.

14.3.6 **Concept: -** Wind Energy

14.3.6.1 **Teaching Strategy :-** Visuals

Planning

Tr. will show the photographs of generation of electricity through wind mills in Tamilnadu.

14.3.6.2 **Materials Required:-** Photographs

14.3.6.3 **Steps:-**

The photographs shall be discussed and students shall be advised to see these wind

mills in their visits to Tamilnadu any time.

14.3.6.4 **Points of Discussion:-**

In Tamilnadu 380MW of electricity is generated through wind energy. To generate electricity, the rotatory motion of the wind mill is used to turn the turbine of the electric generator. The output of a single wind mill is the small and cannot be used for commercial purposes. Wind energy is an environment friendly and officer source of energy. But one limit is - Wind energy firms can be established only at those places where wind blows for the greater part of year.

14.3.7 **Concept:-**Alternative or non conventional sources of energy

14.3.7.1 **Teaching Strategy/Technique** question - answer

Material Required:- Paper,

14.3.7.2 Pencil

Planning - teacher will tell their students in advance that they will find out from their

grand parents or other elders.

1. How did they cook their food?
2. How did they go to school?
3. What were sources of water in their young days?

14.3.7.3 **Steps of processing** - from the answers of questions given in advance, teacher will ask-

1. Compare the answers with the present situation.
2. Write the differences in tabular form.

14.3.7.4 **Points of Discussion Conclusion:-**

In olden days, life styles were simple. Due to technological development demand of energy increases day by day. Therefore, we need to look for more and more sources of energy like energy generated by using wind, tides, solar, geothermal heat and these sources are known as non-conventional energy sources. All these sources are renewable or inexhaustible and do not cause environmental pollution. More over they do not require heavy expenditure.

14.3.8 **Concept:-** Solar energy.

14.3.8.1 **Methodology/Teaching Strategy:-** Activity, Project

Planning - Teacher will tell in advance to students to bring-

1. Glasses
2. Black and white paint
3. Brush

14.3.8.2 **Material required -** Glasses, paint, brush, aluminum foil, shoe box

14.3.8.3 **Steps**

1. Teacher will make two groups in the class.
2. Direct the students - one group will paint their glasses with white and other group will paint their glasses with black.

3. Both the groups will fill their glasses with water.
4. Tell the students to place their glasses in direct sunlight for one hour.
5. Both the groups will touch their glasses and find out which glasses are hotter?

14.3.8.4 **Points of Discussion Conclusion -** A black surface absorbs more heat as compared to a white surface. Solar cooker use this property in their working.

14.3.9 **Activity -Model of Solar Cooker**

14.3.9.1 Teaching Strategy/Methodology:- Project

Planning

- Teacher will give project to students in groups of five students to prepare models of solar cooker.

14.3.9.2 **Material Required:-**

- Shoe box
- Aluminum foil
- Black construction paper or spray paint
- Clear Plastic
- Glue

14.3.9.3 Steps- Teacher will instruct to students-

1. Paint the box (or cover the box) with black paint or paste black paper.
2. Cut a rectangular flap out of the top of the box lid, so that there are three cuts-two short ones parallel to the short ends of the box and one long one parallel to the long edge of the box. Put a small crease in it so that the flap sticks up.
3. Glue aluminum foil to the inside of the shoe box for reflector due to shiny side the one that faces out. Glue aluminum foil to the inside of the flap in the lid.
4. On the inside of the box lid, lay a sheet of clear plastic and glue it in. This will trap the heat inside the box.
5. Put cooking items inside the box, and put the lid on, so that it reflects sunlight into the hole in the box top, and set it out on a spot where the sun shines. Depending on the brightness of the day and the quantity of cooking food, it may take anywhere from 20 minutes to two or three hours to cook something.

14.3.9.4 **Points of Discussion & Conclusion:-**

A solar cooker is a device which uses the energy of direct sunlight to heat, cook food.

Solar cooking relies on the following basic principles :

1. Concentrating sunlight : A mirrored surface with high specular reflectivity is used to concentrate light from the sun onto a small cooking area. Depending on the geometry of the surface, sunlight can be concentrated by several orders of magnitude producing temperatures high enough to melt salt and smelt metal. For most household solar cooking applications, such high temperatures are not required. Solar cooking products, thus, are typically designed to achieve temperatures of 150°F (65°C) (baking temperatures) to 750°F (400°C)

(grilling/searing temperatures) on a sunny day.

2. Converting light to heat : Solar cookers concentrate sunlight onto a receiver such as a cooking pan. The interaction between the light energy and the receiver material converts light to heat. This conversion is maximized by using materials that conduct and retain heat. Pots and pans used on solar cookers should be matte black in color to maximize the black body effect.

3. Trapping heat : It is important to reduce convection by isolating the air inside the cooker from the air outside the cooker. Simply using a glass lid on your pot enhances light absorption from the top of the pan and provides a green house effect that improves heat retention and minimizes convection loss. In resource constrained settings, a high-temperature plastic bag can serve a similar function, trapping air inside and making it possible to reach temperatures on cold and windy days similar to those possible on hot days.

The biggest advantage of solar cookers is their eco-freindliness we can maintain better air quality indoors and reduce the amount of carbon monoxide emissions.

14.3.10 Concept; - Solar cells

Planning- Teacher will organise discussion among the students regarding solar cells.

14.3.10.1 **Material Required:-** Calculator without battery, black paper.

14.3.10.2 **Teaching Strategy:-** Discussion

14.3.10.3 **Steps:-**

1. Tr. will ask the students to cover the solar cells in the calculator with the black paper.
2. Find the efficiency of calculator.
3. Remove the black paper.
4. Keep the calculator in such a way light falls on the calculator.
5. Find the efficiency of calculator.

14.3.10.4 **Points of Discussion & Conclusion:-**

A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly into electricity by the photovoltaic effect. A large number of solar cells are, combined in an arrangement called solar cell panel silicon, which is used for making solar cells, is abundant in nature.

Advantages-

¬ Solar cells have no moving parts and hence require little maintenance and work quite satisfactorily without any focusing device.

¬ It does not cause any environmental pollution like the fossil fuels and nuclear

power.

- Solar cells last a longer time and have low running costs.

Disadvantages-the domestic use of solar cells is limited due to its high cost.

Solar cells or solar cell panels are used in -

- Artificial satellites in space probes like Mars orbiters
- Wireless transmission systems or TV relay stations in remove locations
- Traffic signals, calculators and in toys.

14.3.10 **Concept-**Energy from the sea Tidal Energy, Wave Energy

14.3.11.1 **Teaching Strategy:-** Visuals

14.3.11.2 **Material Required:-** Photographs

Tr. will show photographs of Tidal & wave energy.

14.3.11.3 **Steps**

1. With the help of visual, Tr. will explain.

14.3.11.4 **Points if Discussion & Conclusion**

2. Due to gravitational pull of mainly the moon on the spinning earth, the level of water in the sea rises and falls. This phenomenon is called high and low tides and the difference in sea-levels gives us tidal energy.
3. Wave-energy - Kinetic energy possessed by huge waves near the sea-shore can be trapped to generate electricity.

14.3.12 **Concept:-**Geothermal energy

14.3.12.1 **Teaching Strategy:-** Interaction (teacher-learner, learner material)

Planning

- Tr. will ask the students which hill station they have visited.
- Has anybody visited Kullu-Manali?
- Has anybody seen Manikaran hot water springs?

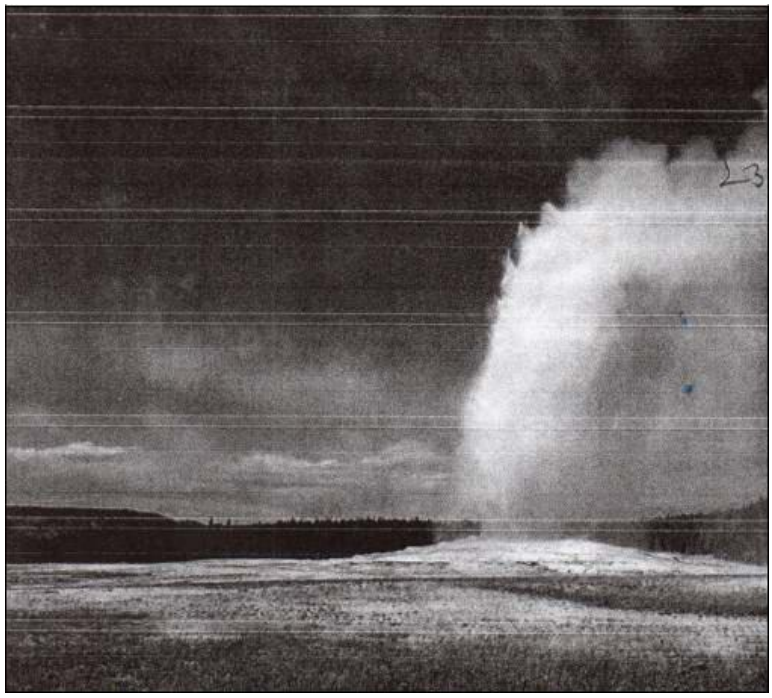
14.3.12.2 **Material Required:- Net, Websites, Computer System with internet**

14.3.12.3 Steps:- Web browsing seeing the content relevant to topic through google.

14.3.12.4 **Points of Discussion**

What is Geothermal Energy?

In winter all of us uses warm water in the geysers in the bathroom for bathing. Nature too has geysers which throw up a huge amount of hot water and steam. The 'Old Faithful'. as one of the geysers in the Yellow Stone National Park in the United States of America is called, spews out boiling water at intervals of 33 to 120 minutes.



Old Faithful, as one of the geysers in the Yellow Stone National Park in the USA is called, spews out boiling water at intervals of 33 to 120 minutes

Why do natural geysers spew hot water?

Deep inside the earth, the rocks are in a super heated molten form called magma.

Sometimes water that seeps into the earth, through cracks in the rocks, comes in contact with this molten magma. This results in the water getting super heated.

This hot water can reach temperatures of more than 302 degrees Fahrenheit or 150 degrees celsius. That's

a lot hotter than boiling water, which boils at 212 degrees fahrenheit or 100 degrees celsius. As the water heats up, it rises up to the surface of the earth and spews out of the cracks. This is the geyser.

The steam and water that geysers throw up often makes a spectacular sight as the discharge comes out with so much force that it sometimes rises as high as 500m, outlets from where hot water comes at the surface called hot springs.

Geothermal energy to electricity

This heat energy, hidden under the surface of the earth, is called geothermal energy.

Now, scientists across the world are trying to tap this energy to generate electricity

and feed power stations.

14.3.13 **Concept-**Nuclear energy

14.3.13.1 **Teaching Strategy:-** interaction (teacher-learner, learner-material)

14.3.13.2 **Material Required:-** Computer system with internet

14.3.13.3 **Steps of processing- Teacher will ask-**

- Did you hear the talks between Shri Narender Modi and Barak Obama recently?
- Did you hear anything regarding nuclear co-operation?
- Searching through google about nuclear energy you websites.

14.3.13.4 **Points of Discussion & Conclusion:-** Both Leaders talked about production of electricity through Nuclear Power Plant.

Nuclear energy is energy that is generated through the use of Uranium, a natural metal that is mined all over the world. Nuclear energy is created through complex process in nuclear power stations, and the first nuclear power station was established in 1956 in Cumbria, England. Today, many military operations and vessels use nuclear power plants and nuclear energy for their energy source and nuclear energy is used in many other capabilities such that it provides 16% of the earth energy.

Nuclear energy is created through chemical reactions that involve the splitting or merging of the atoms of nuclei together. The process of splitting an atom's nucleus is termed fission and the process of merging the nuclei of atoms is termed merging. Converting nuclear masses into energy forms is known through the popular chemical equation of $E= mc^2$, where E is known as the amount of energy released, m is known as the mass of the nuclei c is the value of the speed of light. The power from nuclear energy was first discovered in 1896 by Henri Becquerel, a French physicist who saw that some photographic plates that had been stored near uranium turned dark, or black, like X-Ray plates did. Thus, Uranium was seen as a resource of nuclear energy.

Nuclear energy is created in nuclear power stations, where uranium rods are the fuel used to create the energy or heat. The process through fission, where neutrons in the Uranium smash into the nucleus of atoms of Uranium. The Uranium nuclei will then split in half and release an energy that comes in a form of heat. At this point, carbon dioxide in gas form will be pumped into the reactors with the Uranium, removing the

heat from the system. The gas turns very hot and this heat is used to heat water into steam. The steam created from this process will drive the turbines which in turn drive the generators that produce the nuclear energy.

The nuclear power reactor that is creating all of these reactions is controlled through rods of boron, known as control rods. These boron rods absorb the neutrons. The rods will be lowered into the reactor to absorb neutrons and slow down the process of fission in order to generate more power, the rods are raised again so that even more neutrons can crash into the atoms of Uranium.

Creating nuclear energy is a complex chemical process that can be very dangerous. It does however have many advantages. Nuclear energy is more affordable to create than coal energy and does not use as much fuel in the process. It also produces less waste and does not produce carbon dioxide or smoke. These benefits mean that nuclear energy is more advantageous than coal energy, as the production of nuclear energy does not contribute to environmental hazards or the greenhouse effect.

14.3.14 Concept- Environmental consequences

Teaching

14.3.14.1 Strategy:- Case-study, discussions

14.3.14.2 Material required- Net, paper-pencil

Planning- Teacher will ask the student to search about Bhopal tragedy and Hiroshima tragedy in advance.

14.3.14.3 **Steps-**Teacher will discuss these case studies (above mentioned)with the students.

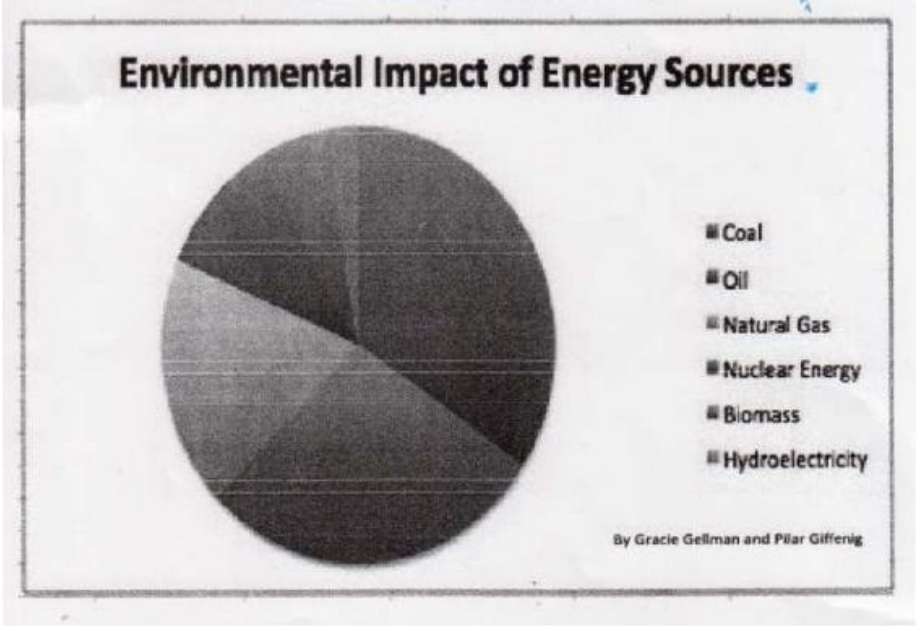
14.3.14.4 **Points of Discussion & Conclusion:-**

The Bhopal disaster, also referred to as the Bhopal gas tragedy, was a gas leak incident in India, considered the world's worst industrial disaster.[1]

It occurred on the night of 2-3 December 1984 at the Union Carbide India Limited (UCIL) pesticide plant in Bhopal, Madhya Pradesh. Over 500,000 people were exposed to methyl isocyanate (MIC) gas and other chemicals. The toxic substance made its way in and around the shanty towns located near the plant.[2]

In August 1945, during the final stage of the Second World War, the United States dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki. The two bombings, which killed at least

129,000 people, remain the only use of nuclear weapons for warfare in human history.


Environmental Impact of Energy Sources
Coal
Oil
Natural Gas
Nuclear Energy
Biomass
Hydroelectricity
By Gracie Gellman and Pilar Giffenig

Most Consequential Types of waste

- Nitrogen oxides
- Carbon dioxide
- Sulfur dioxide
- Mercury compounds

- Methane

NATURAL GAS

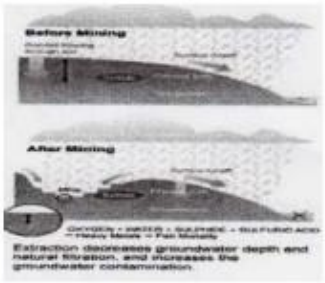
- Nitrogen oxides, carbon monoxide & carbon dioxide
- Less emissions than coal or oil
- Methane sometimes emitted or leaked
- Affects people and animals who depend on aquatic life in lakes and rivers

Pollutant	Oil
Carbon Dioxide	117,000
Carbon Monoxide	40
Nitrogen Oxides	92
Sulfur Dioxide	4
Particulates	7
Mercury	0.000

COAL

- Carbon dioxide, sulphur dioxide, nitrogen oxides, and mercury compounds
- Gives off sulphur dioxide- harms trees
- Lakes and rivers are contaminated from coal power plants

Pollutant	Oil
Carbon Dioxide	117,000
Carbon Monoxide	40
Nitrogen Oxides	92
Sulfur Dioxide	4
Particulates	7
Mercury	0.000



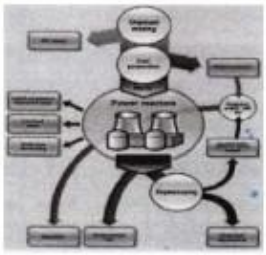
OIL

- Methane from oil wells & equipment
- Natural gas burned from oil production
- Harmful to fish and plants

Pollutant	Oil
Carbon Dioxide	164,000
Carbon Monoxide	33
Nitrogen Oxides	448
Sulfur Dioxide	1,122
Particulates	84
Mercury	0.007

NUCLEAR ENERGY

- Radioactive
- Aquatic life badly affected because of waste
- Radioactive waste

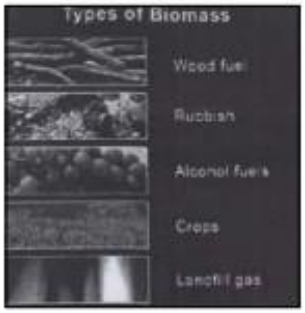


HYDROELECTRICITY

- Methane and nitrous oxide can be released if vegetation decomposes into the lake
- No fuels are burned during process
- Affects people and animals who rely on the **rivers**
- Affects drinking water, **supplies, plants and wild life.**

BIOMASS

- Nitrogen oxides, sulphur dioxide and carbon dioxide
- Ash is created when biomass is burned



14.3.15 **Concept:-**How long will an energy source last?

14.3.15.1 **Teaching Strategy:-** Essay writing, debates, slogan-writing

14.3.15.2 **Material Required:-**

Planning-Teacher will tell in advance debate topics to the students (mention in NCERT of 10th Class Science Text Book on page no. 254, activity-14.9)-

14.3.15.3 Steps- The class will divide into 2 groups for both the topics- group 'A', group 'B'. 'A' group will prepare for topic 'a' and 'B' group will prepare for topic 'b'. Best essay will be awarded.

14.3.15.4 **Points of Discussion & Conclusion:-**

Sources that will get depleted are called exhaustible sources or non-renewable sources of energy, like fossil fuels. Sources that can be regenerated are called renewable sources of energy. A renewable resource is a resource which is replaced naturally and can be used again.

Examples are: oxygen, fresh water, solar energy, timber, and biomass.

Renewable resources may also include goods commodities such as wood, paper and leather. Gasoline, coal, natural gas, diesel, plastics and other things that come from fossil

fuels are non-renewable. They take millions of years to be made and cannot be renewed in our lifetime or even a nation's lifetime (they are called fossil fuels because they are as old as fossils). Plastic can be recycled and ways have been developed to make biodegradable plastic and biodiesel and other fuels from renewable resources such as corn, sugar cane, soyabeane and canola.

A problem with fossil fuels is the pollution and global warming gases they produce.

Renewable resources are usually much cleaner. But they can also cost more. New technology for renewable resources is helping to make them cheaper. And now even fossil fuels are becoming harder to find and more expensive.

14.4 **Resources-**

1) www.youtube.com/watch9(fossilfuelformation)

2) https://www.google.co.in

3) en.wikipedia.org/wiki/solar-cooker

4) www.pitara.com/science

5) www.slideshare.net/chemrcwss/c26-pollution?next-

6) en.wikipedia.org/wiki/Bhopal_disaster

7) en.wikipedia.org/Atomic_bombingof Hiroshimaand Nagasaki

14.5 **Value based questions/HOTS**

Q. Mr. Chopra forms an NGO and he approaches corporation of a city. He puts a proposal to the corporation that his NGO would collect the waste material and garbage of the city at a particular area and promises them to supply electricity for street lights. In return the corporation has to pay them a nominal amount. The corporation accepted their proposal-

(a) Explain the value exhibited by Neha.

(b) Explain how she tried to give same values to her brother.

Q.1 Mr. Chopra forms an NGO and he approaches municipal corporation of the city. He puts the proposal to the corporation that his NGO would collect the waste material and garbage of the city. At a particular area and promise them to supply electricity for the street lights. In the return the corporation has to pay them a nominal amount. The corporation accepted this proposal.

a) Explain the values exhibited by Mr. Chopra.

b) Explain two advantages that occur to the city by accepting Mr. Chopra proposal.

Q.2 Ram and Shyam went to a remote village in Kerala to meet their grandmother. They were surprised to see a bio gas plant in Mr. Negi's house in their neighborhood. There were plenty of livestock and the household used working gas from the plant also their farm had nch vegetation. They contacted Sarpanch of the village and convinced him to set up a biogas plant for village community.

a) Mention the values displayed by Mr. Negi, Ram and Shyam.

b) Explain the possible arguments given by Ram and Shyam to convince Sarpanch for setting up a community biogas plant.

Q.3 On returning home, chahat a IX standard student notice that her 6 yrs. old brother Ram was watching TV with all the lights and fans on. She notices that all the windows were closed and curtains were drawn all to which the room was dark. So Raman had put on the lights she calmly opened the windows, drew the curtain aside which illuminated and aerated the room. Then she made raman put off the light and made him understand the reason behind her action.

a) List some values displayed by chahat.

b) Explain how she try to gave some value to his brother.

Q.4 Shaloo was visiting her city after 1 year. Since during summers there were frequent power breakdown. She was a bit uncomfortable thinking about the unruly traffic in the city without traffic signals but to her surprise she found that the traffic signals were working inspire of the load shedding. She saw that all the traffic signals were powered by solar cell panels. At one particular signal she saw that some naughty boys were trying to break the solar panels. She stopped them from doing so and explain them not do so.

a) State the values exhibited by shaloo.

b) Explain any two arguments in favour of using solar panels for running traffic signals for managing traffic.

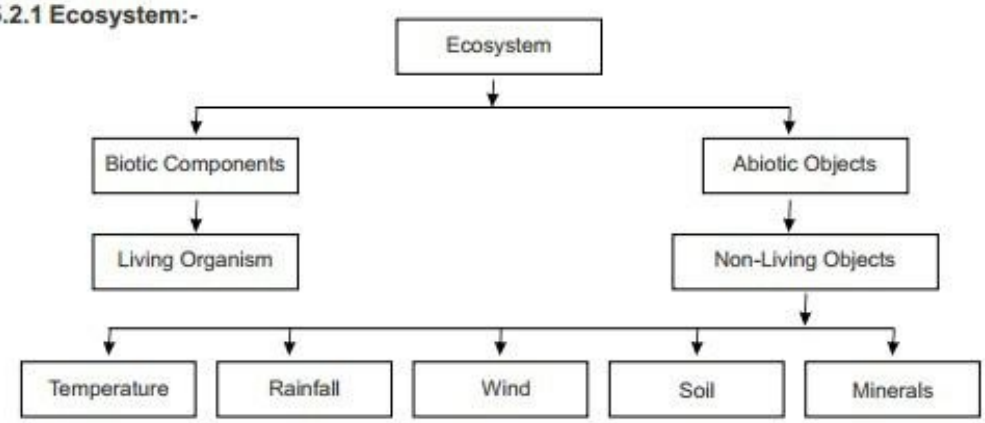
15. Our Environment

15.1 **Introduction:-**

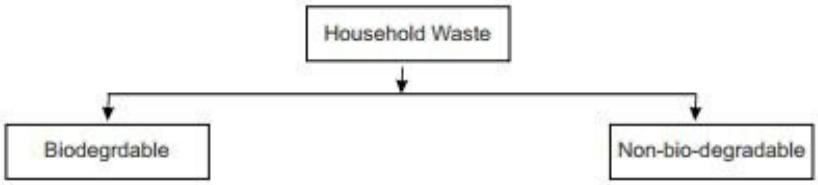
The chapter includes the study of all the components in our surroundings, how they interact with each other and what is the effect of our activities on our environment?

15.2 **Concept Maps:-**

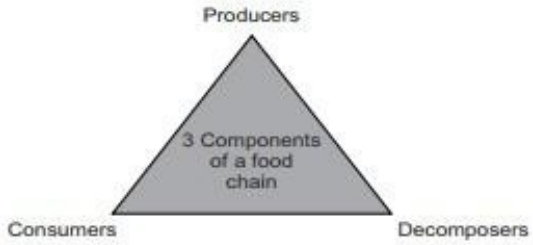
15.2.1 Ecosystem:-



15.2.2 House Hold Waste:-



15.2.3 Food Chain;-



15.3 **Activities:-**

15.3.1 Concept:- Components of an ecosystem

15.3.1.1 Teaching Strategy:- Open space technique

15.3.1.2 **Materials Required:-** Chart

15.3.1.3 **Steps:-**

Divide class into groups

Let each group discuss and speak on each component of an ecosystem.

15.3.1.4 **Points of Discussion :-**

Discuss the interaction between various components of ecosystem.

15.3.2 **Concept :-**Who eats whom?

15.3.2.1 **Teaching Strategy :-** Activity Method

15.3.2.2 **Materials Required :-**

Pictures/cards of different living organisms living on land and water, thread, thumb pins. **Note:-** Teacher should tell students beforehand to bring the material.

15.3.2.3 **Steps:-**

1. Teacher will divide the whole class in different groups of 10 students each.
2. Now tell the students to arrange the organisms 'who eats whom'?
3. Fix them on table by thumb pins. You can also use display board to arrange these pictures.
4. Connect them with thread.
5. Now tell two groups to interlink their chain with each other with the help of thread.

15.3.2.4 **Points of Discussion:-**

Relate the first arrangement of single chain formed by food chain and then all chains connected with each other to form food web.

Categorise the cards/picture into different groups like producers, consumers and decomposers.

These can be further categorised into primary, secondary and tertiary consumers

or

into herbivores and carnivores.

15.3.3 Concept:- Trophic levels

15.3.3.1 Teaching Strategy:- Stacking Cups Activity

15.3.3.2 **Materials Required:-**

1. Styrofoam/plastic disposable cups
2. Pictures of various living organisms
3. Marker

15.3.3.3 **Steps:-**

1. Glue the Images on the cups
2. Write the names of that oranism on the rim of the cup.
3. Mix them up and tell children to stack the cups in order of who eats whom (food chain).

15.3.3.4 **Points of Discussion:-**

Each cup in a stack represents the trophic level and the shape of stacking obtained will

be pyramid shaped.

15.3.4 Concept:- Garbage reduction

15.3.4.1 Teaching Strategy :- Case study/project

15.3.4.2 **Materials Required:-** Case study information/material

15.3.4.3 **Steps:-**

Discuss how one can change the life style to reduce the waste generation from our households by giving few examples.

Students should be given project on reduction in waste generation in their own household. The project can be given in groups of 3-5 students so that they learn by sharing their own ideas.

Collect some stories like one given in book or from internet and let students discuss on this. Later children can also try to find out some case studies from their vicinity or internet.

15.3.4.4 **Points of Discussion:-**

Discuss how one can change the life style to reduce the waste generation from our households by giving few examples.

15.3.5 **Concept:-**Ozone depletion and ultra violet radiation

15.3.5.1 Teaching Strategy:- Activity method

15.3.5.2 **Materials Required:-**

Disposable plate, candle, match box, torch, stand to hold plate in horizontal position

15.3.5.3 **Steps:-**

- Take a disposable plate and fix it on a stand in horizontal position. Mark it as ozone.
- Hold a burning candle below the plate which depicts CFC's and other ozone depleting gases. The plate will melt and hole appears.
- Hold the torch (UV rays) from top of the plate and let the light pass through the hole.

15.3.5.4 **Points of Discussion:-**

- Role of ozone in protecting the environment
- Effect of CFCs in depleting the ozone layer
- Role of UNEP in this area

15.4 **Resources:-** Websites, google search engine

15.5 **References:-**

Text book of Science NCERT for classIX, Class X page 256-264

15.6 **HOTS/Value based questions**

1. List out biotic and abiotic components of your surroundings.

2. In a food chain insect is at second trophic level, can this insect be at some other trophic level in other food chain. Explain with the help of an example.
(Hint) Big insects prey upon small insects.

3. Compare the amount of energy provided by vegetarian and non-vegetarian food to our body?
Hint : Vegetarians are primary consumers

4. What is the difference between harmful and useful ozone?

Hint : Surface ozone is harmful and stratospheric ozone is useful

5. Give reason why any food chain cannot extend beyond 5-6 trophic levels.

Hint : Energy is lost at each trophic level.

6. Which trophic level do you think is the most important in any food chain/web? Give reason.
Hint : Producers capture solar energy and pass it on to the higher trophic levels in

reducing fashion.

7. Imagine a situation where the bacteria, fungi and other microorganisms are absent on earth. What will be the consequence of such a situation?
Hint : In absence of decomposers the biodegradable remains will not be

degraded.

8. Why has man positioned himself at top level consumer as well as primary consumer?
(Hint): Primary consumer obtains maximum energy from plants.

16. **Management of Natural Resources**

16.1 **Introduction:-**

A natural resource is anything that people can use which comes from nature. Natural resources are generally defined as all those things given by nature on, above and under the surface of earth.

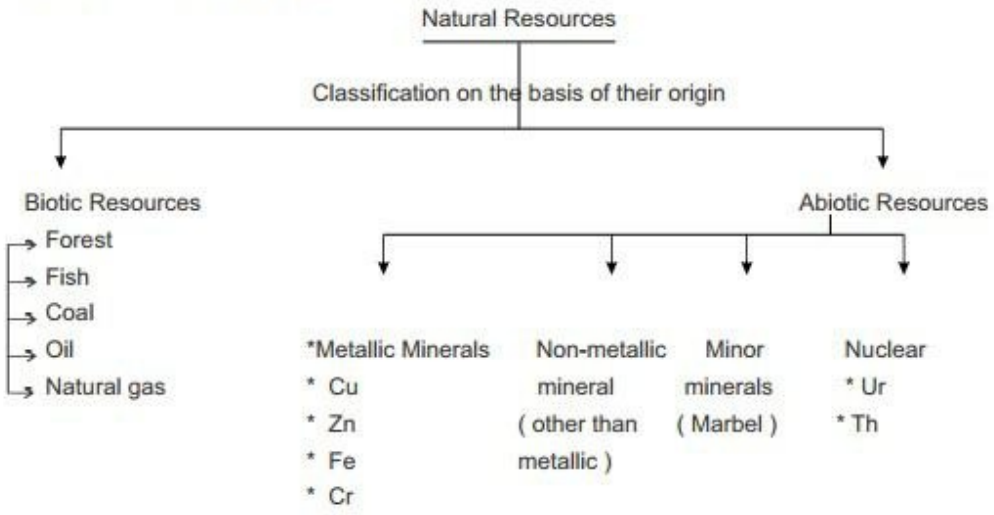
In the broad sense natural resources include land, water, forests, fishries, animals, mineral ores and sources of energy like coal, petroleum gas, uranium etc. Expanding human population resulted in to expanding needs of man. With scientific progress and technological development.

Man started utilizing these natural resources at a much larger scale. Continuous increase in population caused an increasing demand for resources. This created a situation when the non

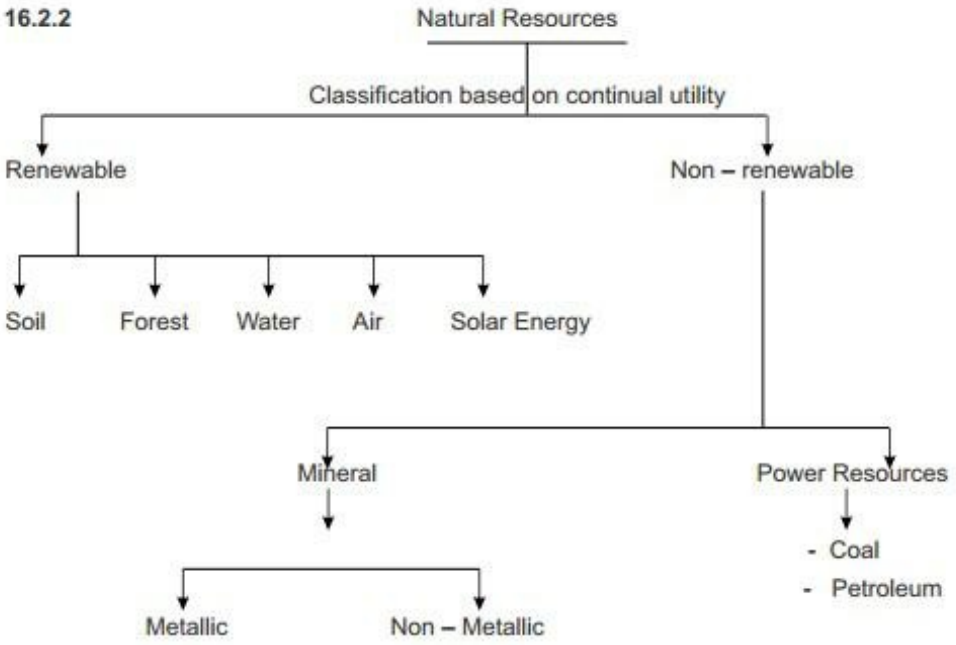
–renewable resources may come to an end after some time. So this is need of the hour to conserve these resources. A system of controlling the use of natural resources in such a way as to avoid their wastage and to use them in the most effective way is called management of natural resourcess.

Our late Prime minister Indira Gandhi emphasised our ancient care, conservation, and worship of trees and animals while launching the world conservation strategy in india on 6thMarch 1980. In her own words " The interest in conservation is not sentimental one but the rediscovery of a truth will be honour to our gurus. The Indian tradition teaches us that all forms of life, humans, animals and plants are so closely linked that disturbance in one gives rise to imbalance of others."

16.2.1 **Concept Map:-**



16.2.2



16.2.3

Conservation of Natural Resources

In- situ conservation (Conservation with in natural habitat)	Ex – situ conservation (Conservation outside natural habitat)
● In National parks ● Sanctuaries ● Nature reserve ● Wild life conservation	● Seed banks ● Botanical garden ● Pollen storage ● Tissue culture ● Zoological parks

16.3.1 **Activities:-**

16.3.1 **Concept:-** Resources around us.

16.3.1.1 Teaching Strategy : Think and list to make the students understand what are resources and their types.

16.3.1.2 Materials Required :- White sheet, pen

16.3.1.3 **Steps:-**

1) Ask the students to think, recall and list the things around them.

2) Ask them to group them as natural and man – made resources.

16.3.1.4 **Points of Discussion:-**Discussion and sum up by teacher

Note:- Teacher has to summarise and give clarification wherever required

16.3.2 **Concept :** Classify natural resources as exhaustible and non- exhaustible resources

16.3.2.1 Teaching Strategy:- Group / Individual activity

16.3.2.2 **Materials Required:-**List of Natural resources provided by teacher, white sheets, pen, marker

16.3.2.3 **Steps :-**

1) Provide the list of natural resources to students by teacher.

2) Ask the student to read the list and group them as exhaustible and non – exhaustible resources.

16.3.2.4 **Points of Discussion:-**Discussion by teacher on what are local resources in the surrounding locality.

16.3.3 Concept :- Water resources, its uses, pollution, water harvesting.

16.3.3.1 Teaching Strategy :- Survey, field trip

16.3.3.2 **Materials Required :-**Village map, check list, white sheet, pen.

16.3.3.3 **Steps :-**

1) Prepare /orient the students for survey report.

2) Arrange the materials required.

3) Make groups and assign group leaders

4) Go for survey

5) Digital documentation

6) Presentation of survey report

16.3.3.4 **Points of Discussion**:-

* Which are main water resources in your town / village ?

* How many bore wells are there ?

* How is water polluted ?

* How many of you have seen water harvesting? Whether people are aware of it or not ?

16.3.4 Concept:- Soil conservation

16.3.4.1 Teaching Strategy:- Essay writing (Mind Map)

16.3.4.2 Materials Required:- White sheet, pen

16.3.4.3 **Steps :-**

1) Explain about the structure of soil, its uses, erosion and conservation.

2) Give the students topic for essay.

3) Provide time schedule.

4) Make each child to write.

5) Submission of essay.

6) Result declaration

16.3.4.4 **Points of Discussion:-**

* What is your experience while collecting and selecting topic and matter to write ?

* In what way this event was useful ?

Note for Teacher : Teacher has to summarise and give clarifications wherever necessary.

1.3.5 Concept :- Local problems and its remedies related to natural resources and role of man in it.

16.3.5.1 Teaching Strategy :- Quiz, Debate

16.3.5.2 Materials Required :- Sheet, pen

16.3.5.3 Steps :-

- Give date and time of debate well in advance.
- Give a title like " Is man a destroyer of resources" ?
- Name 5 students to talk in favor and 5 against. Let others to be listeners.
- Let 2 members keep the timings.
- Teacher can monitor. He can invite other teachers as judge.
- Give 3 – 4 minutes to each child
- Divide the marks for content & presentation

16.3.5.3 **Points of Discussion:-**

Finally before announcing result discuss the topic with both angles & conclude the debate by saying the needs of preserving the resources by man.

16.4 **Resources**

1. Wikipedia website
2. you tube website
3. www.slideshare.net

16.5 **References**

1. Science Text Book Class X Published by NCERT New Delhi
2. Elementary biology-XII class (Teumen Publication)
3. P. D . Sharma " Ecology and Enviornment" published by Rastogi Publications,meerut

16.6 **Exemplary HOTS questions-**

Multiple choice Questions

1. From the list given below pick the item that is not a natural resource.

a) Soil

b) Water

c) Electricity

d) Air

2. The most rapidly dwindling natural resource in the world is

a) Water

b) Forests

c) Wind

d) Sunlight

3. The main cause for abundant coliform bacteria in the river Ganga is

e) disposal of unburnt corpses in to water

f) discharge of effluents from electroplating industries

g) washing of clothes

h) immersion of ashes

4. The 3 R's that will help us to conserve natural resources for long term use are-

i) recycle, regenerate, reuse

j) reduce, regenerate, reuse

k) reduce, reuse, redistribute

l) reduce, recycle, reuse

5. The pH range most conducive for life of fresh water plants and animals is

m) 6.5-7.5

n) 2.0-3.5

o) 3.5-5.0

p) 9.0-10.5

6. Khadins, Bundhis, Ahras and Kattas are ancient structures that are examples for

q) grain storage

r) wood storage

s) water harvesting

t) soil conservation

*** Short answer type questions**

1. Prepare a list of five items that you use daily in the school, identify from the list such items that can be recycled.

2. In a village in Karnataka, people started cultivating crops all around a lake which was always filled with water. They added fertilizers to their fields in order to enhance the yield. Soon they discovered that the water body was completely covered with green floating plants and fishes started dying in large numbers. Analyse the situation and give reasons for

excess growth of plants and death of fishes in the lake.