part – A.

(1) (a) compare CBSE and stateboard Mathematics syllabi.

Synapsis :

* CBSE syllabus
* Stateboard syllabus
* Difference between CBSE & State board Syllabus.

CBSE :

* central board of secondary Education (CBSE) is a board for the schools under the union government of India. It determines the policies and curriculum for the schools in India.

State board :

* State board is a board for schools under the State government. Each state has its own education board for determining the Standard of education.

CBSE Syllabus :

* In CBSE, the main focus is given to science maths, and application based subjects.
* Mode of instruction followed in CBSE schools will be English and Hindi
* CBSE uses continuous and comprehensive Evaluation in its grading system
* CBSE often review and update syllabus.

State board syllabus :

* State board gives preference to the regional language, culture, state level topics and concepts of local relevance.
* only the schools registered with the state board of particular state will follow the policies
* Each state has its own grading system for schools.
* It gives importance to practical implications in subjects.

Difference between CBSE and state Board:

* An education board is a group of expelts, trustees in a field of education who help in determining the education policy for the area, region or state that they govern. In our country CBSE is an autonomous body that comes under the union government of India.

Difference in Mode of Instruction and Exposure:

* For each state, the individual state board established by its government takes care of the designing and monitoring of the standards of education and examination in that state.
* Unlike CBSE where in it is only English or Hindi, can be English or the regional language of the state.

Difference in applicability:

* Schools registered with CBSE have to follow the guidelines given by the board for pre primary grades to higher secondary grades.

* All the government schools in India like the kendriya vidyalaya, the sarvodya vidyalayas, all strickly abide the guidelines by CBSE.

Difference in categorization of syllabus:

* CBSE offers that each and every subjects entire syllabus be divided into units.
* And each unit is then allocated a certain number of periods or lectures.
* State board works according to a syllabus designed and categorised by the "Department of Education" of the state govarnment.

Difference in consistency over the country:

* CBSE is also known well for its nation wide approach.
* In case a student needs to change his/her residence from one state to another, he might face some major challanges in shifting from one

style and mode of education to another because the two states would follow different curriculum.

* whereas shifting from a CBSE school in one state to another CBSE school in the other state would be a lot more easier for them.

Difference in updates and reviews:

* CBSE board is deemed to be much better than its state - specific counterparts because of its experienced members and their routine of customary syllabus review and update cycles.

* State boards have failed to update their curriculums even once according to the demand of the education field in the contemporary times.

Difference between CBSE & STATE BOARD

(i) Difference in mode of instruction

(ii) Difference in applicability

(iii) Difference in categorization of syllabus

(iv) Difference in consistency over the country

(v) Difference in updates and reviews.

Conclusion :

* Both CBSE and state board have its own pros and cons.

* so students have to adopt for the ability. success does not come from the board of education but it depends on the effort of every student.

(2) (b). Achievement test :

* synopsis
    * Achievement test
    * characteristics of Achievement test
    * construction of Achievement test
    * conclusion.

Achievement test :

* Any test that measures the attainments or accomplishments of an individual after a period of training or learning is called an achievement test.
* Achievement test is a test designed to measure a person's knowledge, skills and understanding ... etc.

Characteristics of Good Achievement Test.

* Reliability
* Validity
* objectivity
* Feasibility.

Reliability :

* Reliability of a test is its trust worthi -ness or its consistency
* It is defined as " The consistency with which a test measures what it intends to measure.
* Therefore reliability is a degree of consistency between two measurements of the same thing

Validity :

* Validity means purposiveness. Validity of a test is the " accuracy with which a test measures what it intends to measure ".

Objectivity :

* A test is said to be highly objective if the score assigned by different, but equally competent scorers are not affected by the judgement, personal opinion or bias of the scorers.

Feasibility :

* In assessing the value of a test, usability or practicability is an important criterion.

Construction of Good Achievement Test :

* The following steps involved in construction of an Achievement test.

(i) Planning
(ii) preparation of a design
(iii) Designing the test items
(iv) Reviewing
(v) Arranging the items
(vi) providing directions
(vii) preparing scoring key
(viii) Scoring
(ix) Evaluation of the test.

Planning the test :

* Test planning is the import steps in an construction.
* It must also involve carful attention to test item, difficulty, to type of test items ... etc.

Preparation of Design :

* Designing is the most important step in the test construction.
* The set of all decisions will be called the design of the test.

Designing the Test Items :

* write the test items according to the table of specifications.
* when the blueprint is ready the next step is to prepare or select the items.

Review and Editing :

* the pool of items for a particular test after being set aside for a time can be reviewed with the help of experts.

Arranging the Items :

* when the final selection of the items has been completed and they are ready to be assembled into a test.

Providing Directions :

* Directions constitute an inseparable of a test.
* the directions for an achievement test should be simple and concise and yet contain information concerning the items.

Preparation of scoring key :

* when the test has been assemble and ready to administer, it becomes necessary to prepare some other important accessories in the form of a scoring key.

Scoring the test :

* At this step it is important to make sure that all students know exactly what is expected of them and to provide them with the most favourable test.

Attain Reliability:

(i) Test – Retest method:

* This is the simplest method of determining the test reliability. To determine reliability in this method the test is given and repeated on same group.

(ii) Parallel Form method:

* when two equivalent forms of tests can be constructed the correlation between the two may be taken as measures of the self correlation of the test.

(iii) Split – Half method:

* The test is divided into two equivalents values and correlation for these half test are found.

$$r_2 = \frac{2r_1}{1 + r_1}$$

(ie) r_2 – Reliability coefficient of full test

r_1 – correlation of half test

Rational Equivalent Method:

This method provides information about the degree to which the items in the test measure similar characteristics.

* Reliability coefficient is,

$$r_{11} = \frac{n}{n-1} \times \left[\frac{\sigma_t^2 - \Sigma pq}{\sigma_t^2} \right]$$

where

r_{11} = Reliability coefficient of the whole test

n = number of items in a test

σ_t — the S.D of test scores

p - The proportion of the group answering a test item

$q = (1-p)$ The proportion of the group answering a test item incorrectly.

Part – B

(3) Theorems :

* A statement until it is proved or disproved is called conjecture.

* A conjecture, if it is proved becomes a theorem.

* A conjecture if it is disproved becomes a false statement. Thus a statement which has been already proved to be true is called theorem.

* If a statement holds true in a particular case, then we say that the verification of the statement is made.

* Following are some theorems which we know already in Algebra and Geometry.

(i) If two sides of a triangle are equal, then the angles opposite to them are equal.

(ii) The sum of the three angles of a triangle is equal to two right angles.

Axiom :

* There are certain statements which are assumed to be true.
* These statements are called axioms.
* Following are some of axioms which we come across in Geometry and algebra.

(i) There is exactly one and only one straight line passing through two given points.

(ii) For any two real numbers, $x+y$ and xy are real numbers.

(iii) If n is natural number then $n+1$ is also a natural number.

(iv) A straight line segment has one and only one midpoint

(v) An angle has one and only one bisection.

Preposition :

* A preposition is a statement that is either true or false. In our course we will usually call a mathematical theorem.

* A preposition that is mainly of interest to prove a larger theorem is called a lemma.

* Some intermediate results called preposition.

* some of the prepositions are

(i) "P and Q" is true exactly when both P and Q are true.

(ii) The numbers 5 and 7 are odd integers.

(ie) "P or Q" is true when at least one of P or Q is true.

(7) Ideas of Jerome Bruner for Learning Mathematics:

Synopsis:

* Introduction
* Bruners 3 Stages of development
  (i) Enactive [concrete-actions] mode
  (ii) Iconic (pictorial) mode
  (iii) symbolic (abstractions - words) mode
* conclusion

Introduction:

* Jerome Bruner is reffered to as one of the founding fathers of constructivism.
* His theoretical framework is based on the theme that learners construct new ideas or concepts based upon existing knowledge.
* Learning is an active process.
* Facts of the process include selection and transformation of information, decision making, generating hypothesis and making meaning from information and experiences.
* As far as instruction is concerned, the teacher should try and encourage students to discover principles by themselves.

Bruners 3 stages of development :

* Bruner hypothesized That the usual course of intellectual development moves through 3 stages : enactive , iconic and symbolic , in That order .

* However unlike piaget's stages, Bruner didnot contend that these stages were necessarily age - dependent or invariant .

Bruner's 3 Stages

↓

Enactive mode

↓

Iconic mode

↓

Symbolic mode

(i) Enactive :

* knowledge is stored primarily in the Form of motor responses.

* In this stage individuals are learning Through motor skills and by experimenting with and learning to manipulate objects.

* At this stage learning involves hands on or direct experience.

(ii) Iconic mode :

* Knowledge is stored primarily in the form of visual images. Human learning is generated by imaginary in this stage.

*. The individual is able to generate mental images of events. Students are able to represent materials graphically or mentally.

(ie) They can do basic addition problems in their head.

(iii) Symbolic mode :

* Knowledge is stored primarily as words, mathematical symbols, or in other symbol system.

* students are able to use logic, higher order thinking skills and symbol systems or formulas such as

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

* First the students manipulate and act on materials then they form images as they note specific features and make observations and Finally they abstract general ideas and principles from observations.

(6) Importance of Text Book.

Synopsis

* text book
* Importance of text book in mathematics teaching
* conclusion.

Text book :

* The mathematics text book is one of the most important resources for teaching and learning mathematics.
* A book used in a study of a subject such as a containing a presentation of the principles of a subject.
* To accomplish a responsible role, textbooks should have useful and relevant matter according to the topic.

Functions of a Mathematics text book :

* Must contain relevant matter according to the syllabus.

* Must include solved examples, problems for review, problems for talented children and summary of the whole chapter.
* Must explain basic concepts and facts in a simple way.

Need and Importance of Mathematics text book:

USEFULNESS TO TEACHER:

* preparing and planning lessons.
* serve as reference books
* Supplement class teaching
* Help in assigning home works to Students
* Helps in setting standard for a particular class
* Helps in assigning projects and other activities.

USEFULNESS TO STUDENTS:

* Helps in preparing topics in advance
* Helps in correcting mistakes
* Helps in doing assignments
* Revision exercises helps in getting a concept correctly.

Characteristics of a good Mathematics textbook:

(*) (i) The author must be competent enough

(ii) The external features of a textbook should be pleasing.

(iii) It should be moderately priced

(iv) Should be free from mistakes

(v) Must provide solved example, which become basis for problem solving nature in students

(vi) It should provide revision exercises and their solutions.

(vii) Matter should be consistent with the topics or syllabus.

(viii) The language should be simple and understandable.

(5) Pedagogical content knowledge (PCK) for mathematics

Synopsis :

* Introduction
* pedagogical content knowledge
  (i) content
  (ii) Teaching
  (iii) knowledge
* conclusion.

Introduction :

* pedagogical content knowledge is the knowledge that teachers represents an intriguing idea.

(ie) pck is the knowledge that teachers develop over time and through experience, about how to teach particular content in particular ways in order to lead to enhanced student understanding.

The teacher :

* A number of factors may influence the teaching of mathematics but teachers play an important role in the teaching process.

* The common belief in society is if a mathematics teacher knows mathematics very well.

* Knowledge of mathematics
  (i) content knowledge
  (ii) knowledge of teaching
  (iii) knowledge of mathematical representations
  (iv) knowledge of students cognitions.

Shulman's conceptualisation of PCK :

* According to Shulman (1986), mathematical content knowledge and pedagogical content knowledge are integrated parts of effective mathematics instruction.

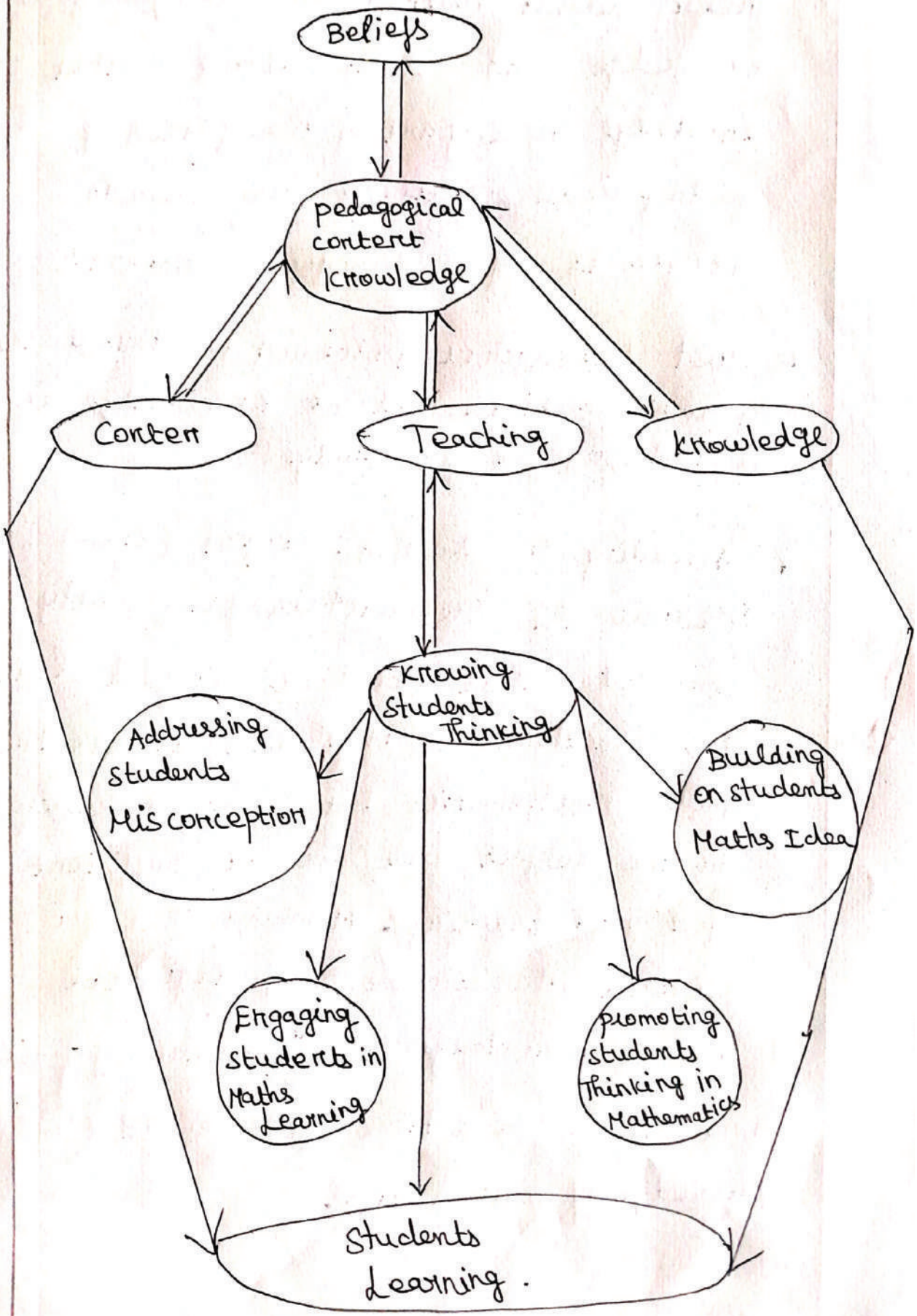
* In order to construct mathematical concepts in students mind, pedagogical knowledge as well as mathematical content knowledge is needed.

* the manner in which teachers relate their subject matter to their pedagogical knowledge and how subject matter knowledge is a part of the process of pedagogical reasoning are seen as integrants of pedagogical content knowledge.

* Most researchers point out the importance of mathematical content knowledge as well as pedagogical knowledge.

* According to Kahan, cooper (2003) review the researches frequently conclude that students would learn more mathematics if their teachers knew more mathematics but content knowledge in the subject area does not sufficient for good teaching. However they also outlined the content of pedagogical content knowledge is "content-specific" and at the same time goes beyond simple knowledge of mathematics.

The network of pedagogical content knowledge



(9) Enrichment programmes for the Gifted :

Synopsis :

* Identification of Gifted.
* Characteristics of the mathematically Gifted.
* Enrichment programme for the Gifted.

Identification of the Gifted :

* the identification of the mathematically gifted is as important as nurturing their mental abilities and skills to acquire a high level mathematical thinking and reasoning.
* the unique characteristics exhibited by the gifted students will help the teacher in identifying them.

Characteristics of the Mathematically Gifted :

* The secondary school curriculum committee gives the following general and special characteristics which mark the mathematically gifted.

General characteristics :

* Has excellent memory, good vocabulary, broad attention span, and high reading ability.
* Makes associations readily and retains them indefinitely
* Recognizes similarities and differences quickly.

Special characteristics :

* Frequently impatient with drill and details that he thinks are not important.
* May be reading mathematics books years ahead of his age
* prefers to think on higher level of abstraction
* Follows a long chain of reasoning, frequency anticipating and contributing.
* Frequently asks profound questions.
* Recognizes patterns readily and enjoys speculating on generalizations.

Enrichment programme for the Gifted :

* The gifted children have tremendous energy with a lot of determination to realise the goals.
* The idea of giving special attention to the gifted children by arranging separate classes or sections is not practicable as the number of such students in a particular school, class and subject may be very small.
* For providing additional learning opportunities, under the enrichment programmes, the following two channels are suggested.

(i) Differentiated curriculum for the Gifted:

* A curriculum which is more challenging can be devised for the gifted students
* Such curriculum should contain more advanced topics and challenging tasks.
* The parallel track curriculum (Example : 'A' level and 'O' level will provide the necessary flexibility.

Enrichment within the existing curriculum:

* under the second scheme, attempts may be made to provide enrichment programmes and opportunities within the existing curriculum.

The following steps may do greater justice to them:

* A differential curriculum providing an enriched syllabus to motivate the mathematically gifted students.
* Differential assignments such as multiple level and contract type assignment which are challenging and stimulating.
* Adopting teaching methods such as project method, Analytic method, Heuristic method, Discovery method and problem solving method, so that the learning process involves participation and independent thinking.

(8) Problem Solving Skill in Mathematics :

Synopsis

* Introduction
* problem solving in Maths
* steps are involved in problem solving
* conclusion.

Introduction :

* In Mathematics classrooms we often find that students are solving problems. Students are able to respond better when they are given direct question but in the case of unknown question in which they have to decide upon which method to apply then they become uncomfortable.

* This happens in the class room because students have not developed the skill of problem solving.

Problem solving skill in Mathematics :

* problem solving is a process and comprises of a sequence of steps :

* Understand, Think, Try and Look back.

Steps are involved in problem solving.

Understand the problem

↓

Think what can make it possible

↓

Try the problem

↓

Look Back.

Understand the problem :

* Before you solve a problem you must understand it.
* Read and Read the problem carefully to find what the question is being asked to you to solve.
* Separate what is given and what is to be found.

Think :

* once you have understood the problem, look for strategies and tools.
* your previous knowledge is your great help.

* you can go through your reading material and books.

Try the problem :

* If it is a familiar problem, try if the previous method used works or any modification of the same will work.

Look Back :

* Once you have tried it and found an answer go back to the problem and see if you have really answered the question.

strategies involved in problem solving

⇒ look for a pattern
* draw a diagram or picture
* make a simpler but similar problem
* work backwards
* use a Formula
* guess and check
* make and state assumptions.

Example :

Mohan sold 8 boxes of candy and Gowri sold 3. How many boxes must Gowri sell in order to sell as many as mohan.

Let us discuss how to develop the problem solving processes:

* If the required experiences are provided to the learner.
* First the problem should have few abstract concepts and the child must be able to make connection among the given data.
* Second the problem requires several steps to arrive at a solution.
* Third The ideal problem has multiple answeres rather than one collect answer. The children should be allowed to search those multiple answers.
* Fourth problem required analysis and synthesis of information.

Answer:

No. of boxes Mohan sold = 8

No. of boxes Gowri sold = 3

The Difference between Mohan and Gowri = 8 − 3 = 5

Hence Gowri should sell 5 boxes.

Conclusion:

* The main objective of problem solving method is to stimulate the reflective and creative thinking of the learners.

(11) Teaching Aids : (Audio visual)

Synopsis :

* Teaching Aids
* Need and Importance
* principle of teaching Aids.

Definition of Teaching Aids :

* Teaching Aids are an object or device used by a teacher to stimulate interest in the classroom teaching.

Need and Importance of Teaching Aids :

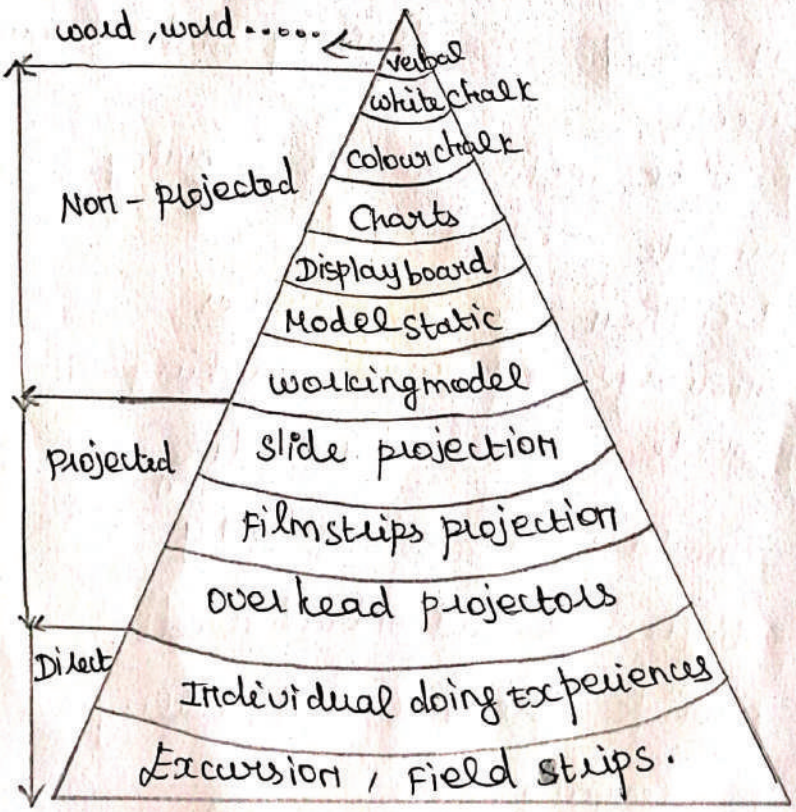
* It helps the teaching and learning process.
* provide motivation for learning
* promote self activity
* strengthen the experiences.
* encourage original thinking
* provide clear understanding
* Stimulate mental activity
* satisfies the individual needs.
* provide freshness and reality to learning

Categories of Teaching Aids :

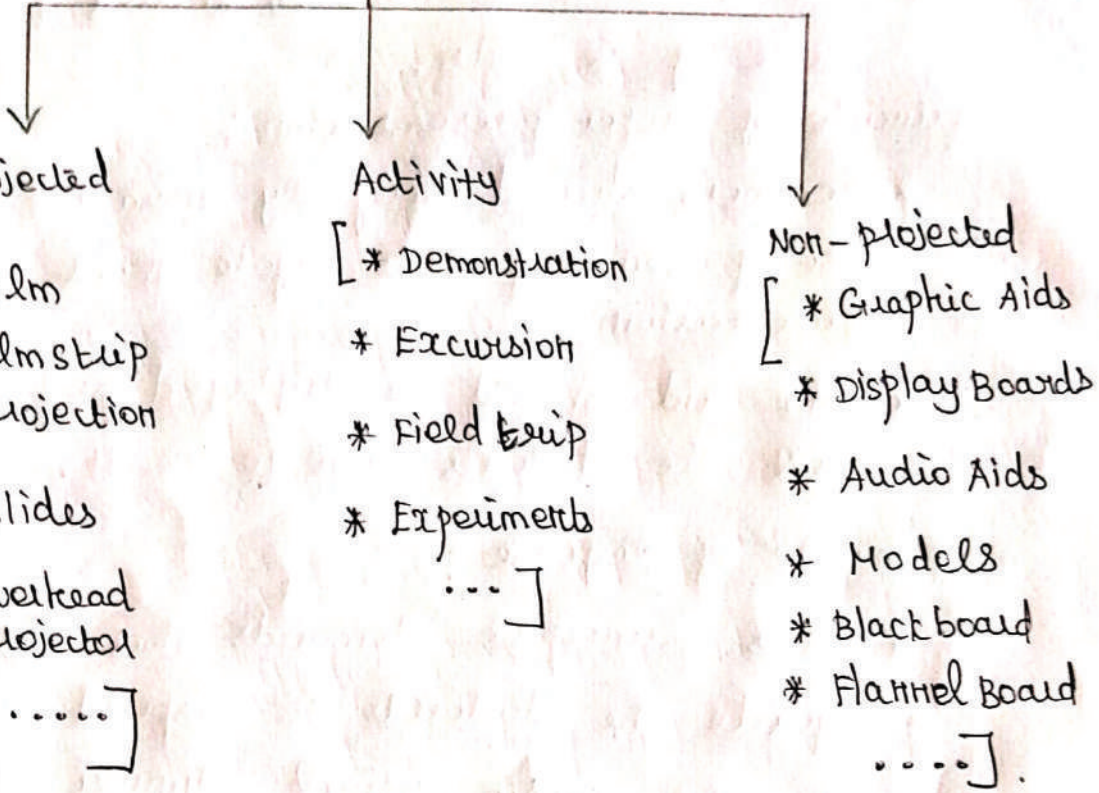
* There are 3 categories
  (1) Audio Aids
  (2) Visual Aids
  (3) Audio - Visual Aids.

* Audio - visual aid is, " Anything by means of which learning process may be encouraged or carried on through the sense of hearing or the sense of sight.

Edgar Dale's cone of Experience [classification of A-V Aid]



Teaching Aids (A-V Aids)



Principle of Teaching Aids:

(i) principle of selection
(ii) principle of preparation
(iii) principle of proper presentation
(iv) principle of response
(v) principle of physical control.

(i) principle of selection:

* They should suit the age-level, grade-level and should help in the realization of desired learning objectives.

principle of preparation :

* The teachers should receive some training in the preparation of the aids.
* The teachers themselves should prepare some of the aids.

principle of proper presentation :

* Teachers should carefully visualise the use of teaching aids before their actual presentation
* The aid should be displayed properly so that all the students able to see it.

principle of Response :

* This principal demands that the teachers guide the students to respond actively to the audio-visual stimuli so that they drive the maximum benefit of learning.

principle of physical control :

* principle of physical control relates to the arrangement of keeping aids safety and also to facilitate their lending to the teachers for use.

(4) Organisation of curriculum in Mathematics:

Synopsis:

* curriculum
* purpose of curriculum
* Organisation of curriculum → spiral method / Topical method.
* conclusion.

Curriculum:

* The word curriculum is derived from a Latin word "Currere" which means to "Run" or "Race course".

* Curriculum is not merely the course of study but it is the sum total of experiences of a pupil that he receives through various activities.

Purpose of curriculum:

* To develop knowledge, various skills, judgement abilities, interest, critical thinking, reasoning we need a curricalum.

Organisation of curriculum :

* while organizing the curriculum in any subject generally two methods are adopted. They are

(1) Topical Method

(2) spiral Method.

Topical Method :

* topical arrangements means that a topic should be finished entirely at one stage.
* It takes the topic as a unit.
* topical arrangement requires that easy and difficult portions of a topic should be dealt with one stage only which is not psychological.
* the main defect in the topical method is that it introduces in the curriculum a large mass of irrelevant material for which the pupil finds no time and no immediate need or the use of which cannot be appreciated by the pupil at that stage.

Spiral Method :

* Spiral method of curriculum organisation is based on the principle that the subject can not be given an exhaustic treatment at the first stage.
* This method demands the division of the topic or the subject into a number of smaller independent units to be dealt with in order of difficulty suiting the mental capacities of the pupils.
* Spiral method has got the advantage of providing opportunities for revision.
* If topics are taught thoroughly before going on to the next orest.
* Each part should be introduced at a stage when it is needed.

Conclusion :

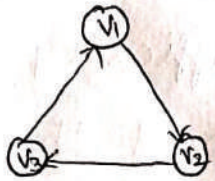
* the main purpose of curriculum is to make pupil capable of understanding their national heritage and having faith in it.

part – A

(15) **Graph :**

* Graph is a mathematical representation of a network and it describes the relationship between lines and points.

* A graph consists of some points and lines between them.



(16) **Need of curriculum development :**

* curriculum development implies the planning of these learning experiences, the aims of which are to bring about some derived change in the students and the assessment of the extent to which these changes have taken place.

* The Mathematics curriculum should be in harmony with the cultural experiences the children have at home and outside the school.

(17) Objectives in Algebra in high school level:

* The first aim of teaching algebra is to help in expression of abstract ideas.
* It should enable the students to use in the solution of some of the stiff problems in arithmetic.
* words and phrases as the instrument of ideas are replaced by symbols helping in clarity and conciseness.
* students will extend their experiences with tables, graphs and equations.

(18) Functions of mathematics library:

* Mathematics Library should contain useful reference books of daily are.
* The selection of the books should be accoding to the needs of the pupil.
* New books properly selectid must be added to the library.
* It plays an importent role in teaching learning process.
* Teacher plans unit plan with the help of the reference books.
* Students get an opportunity to rectify their mistakes with the help of library.

(19) ICT tools in teaching of mathematics :

* Information and communication Technology is basically an umbrella term that encompasses all communication technologies, such as internet, wireless networks, cell phones, etc.,...
* There are radio, television, audio tape, video clips, slide projector, overhead projector are passive learning when interaction of the learner is less.

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(20) problem :

* A Mathematical problem is a problem that is amenable to being represented, analyzed and possibly solved with the methods of mathematics
* This can be a real world problem, such as computing the orbits of the planets in the solar system, or a problem of a more abstract nature.

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(21) Mathematics Olympiad :

* The mathematics olympiad activity was undertaken by NBHM from 1986 onwards.

* The main purpose of this activity is to support mathematical talent among high school students in the country.

* NBHM has taken on the responsibility for selecting and training the Indian team for participation in the International Mathematical olympiad every year.

---

(22) Item Analysis :

* Item Analysis is a process which examines student responses to individual test items in order to assess the quality of those items and of the test as a whole.

* Item analysis is valuable for increasing instructors skills in test construction, and identifying specific areas of course content which need greater emphasis or clarity.

---

(23) Dysgraphia : (problems in writing)

* Learning disabilities in writing can involve the physical act of writing or mental activity of comprehending and synthesizing information.

* Some of the writing problems

(i) Neatness and consistency of writing
(ii) Spelling consistency
(iii) writing organization and coherence.

(24) Reasons for slow learning in Mathematics:

The following are the some of the reasons for slow learning in Mathematics:

(i) Lack of Interest
(ii) Inappropriate learning experiences
(iii) Irregular study habits.
(iv) Lack of Facilities at home
(v) Family back ground and Home Environment
(vi) Teacher's Indifference.
(vii) practice and drill
(viii) Shortspan of attention
(ix) Lacks of imagination.