



# ANNUAL PLANS –LESSON PLANS AND TEACHING STRATEGIES

## INTRODUCTION:

- What is a plan? And why is it needed?
- What should be the parts of teaching strategies?
- When we look at the plans in teacher's preparation, what we come to know about plans?
- What should be preparation of a teacher to have a comprehensive understanding on a concept by the student?

Large percentage of teachers have been writing the concepts, contents of teaching and teaching strategies in the form of teaching notes or teaching dairy. But, researches at state level and national level revealed that the strategies become helpless in providing fruitful learning to the students. These become to show to officers of the monitoring teams.

We observe the limitations in teaches preparation such as his readiness and planning, implementation of learning activities in the classroom as reasons for ineffective teaching strategies in the class room learning. We have to realise that the textbook is meant for students and it is meant for their self-learning and understanding concepts through experience in activities for the successful learning of the concept. This should encourage the child to construct the knowledge.

The development of the units in the textbook is also helpful in learning as it follows a systematic and logical sequence of concepts. We, the teachers can understand the sequences of learning when we understand each and every concept by reading and understanding them. And hence the teaching learning strategies will be successful. Sometimes the activities, examples, additional information and additional problems may not be sufficient for extensive understanding of the concept. Therefore, we should not confine to teach only the textbook. We ought to refer the materials like reference books, internet or attending seminars and gather additional information pertaining to the concept and realise the importance of it. Let's discuss about them now.

Planning is required to achieve specified objectives in the specified time. A plan helps us in utilising human as well as material resources successfully and in overcoming obstacles and failures.

We need to plan to conduct Independence Day celebrations or a seminar or to perform a marriage. Then, is a plan needed to implement teaching learning activities in the classroom or not? As teaching learning process is so equalled important as earlier.

Let's look at the plans we need to prepare as teachers.

We have misconceptions that a month wise division of chapters in textbook is a year plan and a period wise division of a chapter is only the unit plan.

A plan which guides us to achieve the objectives in a child by the end of the year, to divide the chapters monthly, to collect resources for implanting classroom processes and to conduct extra-curricular activities in each month is termed as "year plan" of a teacher. This gives us a perspective over the competency wise objectives to be achieved in an year and facilitates to overcome obstacles. This also guides us in conducting evaluation processes as per the expected objectives set at the beginning of the year.

Is it enough preparing a year plan for a teacher to conduct successful classroom activities though it provides us objectives? Can we achieve expected objectives on the basis of this year plan? Therefore we need another plan to prepare. i.e. a unit plan or a lesson plan. We term it as a unit plan for mathematics. It is a similar kind of plan with year plan. It decides the objectives to be achieved by the completion of a unit and it contains period wise plan for a whole unit. Besides all these, it guides us in preparing TLM and enterprise learning strategies in the class room. It also indicates our professional development in the form of additional information gathered and teacher's reflections. It also helps in evaluating a child formatively as well as summatively. Therefore, it is very much important to prepare a unit plan for a teacher.

Is there any need for a teacher write a lesson plan? Can anyone carryout a successful classroom transaction by following it exactly? If we cannot implement it successfully in a classroom, why should we write it? Do children answer our questions which are written in the period plan as we expected? Therefore, even a teacher writes a lesson plan, it won't help us in the class room. But, it does not mean that we need not plan. We should realise the need of designing teaching learning strategies and implementing them to achieve expected competencies of the class room. We have to design classroom strategies as per our objectives set by a unit plan. We carryout objective motivated activities in the classroom as per our classroom strategies designed.

We have discussed the need and importance of planning and types plans to be prepared by a teacher. Let's know the formats of the plans now.

### YEAR PLAN

We have discussed the need and importance of a year plan and what it should contain. An year plan should be in the following format.

- I. Class :**
- II. Subject :**
- III. Required no. of periods :** instructional periods + practice periods  
+ project presentation periods
- IV. Expected learning outcomes (Academic standards):** ( these should be clear statements and written under competencies such as problem solving, reasoning and proof, communication, connections, representation and visualisation)
- V. Month wise planning:**

MONTH	UNIT	REQUIRED NO. OF PERIODS	TLM/ RESOURCES	PROGRAMS TO BE CONDUCTED

- VI. Reflections of the teacher :**(we should write our reflections on unit wise classroom transaction )

- VII. Suggestions and reflections of head master:**

## MODEL YEAR PLAN

- I. Class** : 10<sup>th</sup> class
- II. Subject** : Mathematics
- III. Required no. of periods** : a) total periods : 290  
b) Instructional periods: 180 + project presentation: 32

**IV. Expected learning outcomes :**

**1) Problem solving:**

Students can

- Find the values of given rational and irrational numbers and write in finite and infinite decimals (recurring and non-recurring)
- Solve problems of logarithms with the help of laws logarithms.
- Solve problems on basic operations on sets.
- Solve problems related to zero values of polynomials of various types (linear, quadratic and cubic)
- Solve linear equations of various types (consistent and inconsistent) in different methods and apply them in daily life situations.
- Find the roots of a quadratic equation in three methods and nature of roots.
- Find nth term and sum of the terms in arithmetic and geometric progressions
- Find the distance between the given points, the required ratio or points using section formula, area of the triangle and the slope of a line.
- Solve the problems by using concepts of similar triangles, basic proportionality theorem and Pythagoras theorem.
- Solve geometric problems on tangents and secants of a circle.
- Finds the area of a given segment of a circle and areas of different designs involving combination of segments of circles.
- Find surface areas and volumes of combinations of solids like sphere, cone, cylinder, hemisphere, pyramid, cube, etc.
- Solve the problems based of basic trigonometric ratios, identities and complementary angles.
- Solve problems related to applications of trigonometry involving single and two right triangles.
- Find the probability of events by using basic probability, complementary events, and mutually exclusive events.
- Find mean, median and mode of a grouped data by using respective formulae and graphs.

## 2) Reasoning and Proof:

Students can

- Decide a number as a rational or irrational with appropriate reasoning ( indirect method)
- Decide whether an element belongs to a particular set or not with reasoning and explain the reasons of various basic conceptual understanding.
- Give the reasons for deciding the zero values of polynomials and generalises the relation between coefficients of a polynomial and its zero values in the form of formulae.
- Decides the linear pairs of equations whether they are consistent or not with reasons.
- Deduces the formulae for roots of quadratic equation, sum of its roots and product.
- Generalises the distance between two points in the form of formulae and deduces section formula, mid-point, trisection points, area of a triangle and slope of line formulae.
- Decides whether the three given points are collinear or not.
- Proves the theorems which explain similarity of two triangles and basic proportionality theorem, Pythagoras theorem.
- Proves the relation between a tangent of a circle and its radius. And proves the theorems on tangents of a circle.
- Finds the relation between the area of segment of a circle and the line segment intersecting it.
- Generalises trigonometric ratios and formulises them and deduces the trigonometric ratios for 0,30,45,60 and 90 degrees angles.
- Deduces the relations between the trigonometric ratios of complementary angles.
- Decides the procedures to find the volume or surface areas of combination of solids.
- Estimates the measures of central tendency with appropriate reasons.
- Gives the reason in estimating the probability of an event. Decides whether two events are mutually exclusive or not with reasons.

## 3) Communication:

Students can

- Represent the rational numbers in recurring and non-recurring decimals to communicate mathematically effectively.
- Convert index form into logarithmic form and explain parts of the forms.

- Represent a set in roster and as well as set builder form. Communicates the mathematical sentences using  $\bar{\emptyset}$ ,  $<$ ,  $=$ ,  $>$ ,  $\varnothing$  etc.
- Use mathematical communication in converting general statements into polynomials, linear equations and quadratic equations.
- Explain the terms in various formulae in all the chapters.
- Explain the reasons by using symbols and vocabulary of mathematics in understanding concepts or problem solving.
- Explain the meanings of trigonometric ratios, mean, median, mode and probability.

#### 4) Connections:

Students can

- Connect logarithms with concepts of other subjects.
- Connect polynomials, linear pair of equations and quadratic equations with daily life situations, concepts of other subjects or other areas in mathematics and solve the problems.
- Connect patterns in nature and forms number patterns and subsequently understand progressions. Solve problems in daily life situations or concepts in other subjects or concepts in other areas of mathematics by using progressions.
- Connect the geometrical concepts with coordinate system to understand concepts.
- Connect concepts of various solids and solve the problems.
- Connect trigonometric concepts and algebraic concepts with daily life situations and apply them to find heights and distances.
- Connect statistical concepts and graphs to find the median.

#### 5) Representation –visualisation:

Students can

- Represent algebraic equations in the form of graphs and solve the problems.
- Represent geometrical shapes into required figures by constructions in geometry.
- Represent daily life situations into figures to find heights and distances of various objects.
- Represent a grouped data into graph to find median.
- Visualise the strategies to solve problems of mensuration, trigonometry, geometry, algebra etc.

**V. MONTH WISE PLANNING**

MONTH	UNIT	REQUIRED NO. OF PERIODS		TLM/ RESOURCES	PROGRAMS TO BE CONDUCTED
		INSTRUC TIONAL	PRAC TICE		
June	Real numbers	8	7	Chart of numbers with special properties	Sharing experiences of children summer vacations with respect to learning in 9 <sup>th</sup> class
July	Sets	6	7	Charts showing Venn diagrams and symbols	Formation of math club
July	Polynomials	8	5	Graph board, graph charts	Collecting resources for maintenance of math club
August	Pair of linear equations in 2 variables	8	9	<ul style="list-style-type: none"> <li>• Materials mentions in the introduction of the chapter.</li> <li>• Graph board</li> </ul>	Conducting math quiz
August	Similar triangles	13	9	<ul style="list-style-type: none"> <li>• Grid paper</li> <li>• Mathematical instrumental box</li> </ul>	Exhibition of collected puzzles.
September	Trigonometry	8	8	<ul style="list-style-type: none"> <li>• Chart of trigonometric ratios</li> <li>• Mathematical instruments box</li> </ul>	Conducting a seminar
September	Statistics	7	8	<ul style="list-style-type: none"> <li>• Data collected in the school or village</li> </ul>	Display of information and analysis
October	Quadratic equations	7	10	<ul style="list-style-type: none"> <li>• Graph board</li> </ul>	Math mela
November	Progressions	6	11	<ul style="list-style-type: none"> <li>• Patterns collected from nature</li> </ul>	Display of projects

MONTH	UNIT	REQUIRED NO. OF PERIODS		TLM/ RESOURCES	PROGRAMS TO BE CONDUCTED
		INSTRUC TIONAL	PRAC TICE		
November	Tangents and secants of a circle	9	6	<ul style="list-style-type: none"> <li>• M.I. box</li> <li>• Collection of designs to find area</li> </ul>	Field trip
December	Coordinate geometry	8	6	<ul style="list-style-type: none"> <li>• Graph papers</li> <li>• Drawing sheets</li> <li>• M.I. box</li> </ul>	
December	Mensuration	6	9	<ul style="list-style-type: none"> <li>• Models of hemisphere, pyramid, cube, cylinder, etc.</li> </ul>	National math day
January	Applications of trigonometry	3	5	<ul style="list-style-type: none"> <li>• Instruments to find angle of elevation and depression</li> </ul>	Math Olympiad
February	Probability	5	6	<ul style="list-style-type: none"> <li>• Pack of cards, coins, dice</li> </ul>	Exhibition of projects
February	Mathematics modelling	6	2		
	<b>Total periods</b>	<b>110</b>	<b>106</b>		

**VI. Reflections of the teacher:**

**VII. Suggestions and reflections of head master:**

**Note:** The above mentioned plan is suggestive plan only. A teacher can adjust these periods and make his own plan. A teacher should prepare a year plan before beginning of an academic year and it should be submitted to HM. The HM should write his suggestions and reflections in the plan. A teacher should allot a note book for a subject and write a year plan and followed by unit plans. For example, if a teacher teaches 4 subjects for 4 classes, he has to maintain 4 subjects plans.



## LESSON PLAN / UNIT PLAN

A unit plan contains following steps

<b>I. Class</b>	:	10 <sup>th</sup>
<b>II. Unit</b>	:	Coordinate Geometry
<b>III. Required no. of periods</b>	:	Instructional Periods + Practice / Exercise
		8 + 6

### IV. Expected academic standards by completion of this unit :

#### 1. Problem solving:

- Find the distance between any two points in between two points and solving related problems.
- Find the area and perimeter of given polygone by given vertices.
- Find the ratio in which a line segment is divided by given point on the line by using sectino formula.
- Find mid point and trisection potals for a line segment and centroid of a triangle.
- Find the slope of line.

#### 2. Reasoning –proof:

- Generalize the ways of finding distance between two points with different properties like segment on axes, segment parrallel to axes, segments whith, end points on the line and give reasons.
- Generalize distance between two point and find formula.
- Generalize the section formula.
- Deduce new formulas like mid point of a segment and centroid of a triangle.
- Deduce the formula for area of the triangle.
- Prove three points are collinear or not with reasons.
- Deduce the formula for slope of a line.

#### 3. Reasoning –proof:

- Express the fomula for distance between given points and variables in it.
- Explain the terms mid point, trisection points, centroid of a triangle and slope of a segment.
- Express the formulae of mid point of a segment and centroid of a triangle and variables in it.
- Express the formulae for slope of line and variables.

**4. Connection:**

- Connect the concept of phythagoros theorem in find distance between two points.
- Connect the are of triangle with concept of area of trepezium in deducing area of triangle.
- Connect algebraic concepts with geometrical concepts on solving problems.
- Use coordinate geometric concepts in finding area of a triangle by using Herone formula.
- Connect the concepts of linear equations in understanding straight lines.

**5. Representation & Visualisation:**

- Represent the given points on a graph with different scales.
- Represent the conceptual understanding of above concepts on graphs.

**V. TLM :** Graph board, Graph paper, Gemetrical box, Char, Chess board.

**VI. Period-wise plan :**

Period no.	Concept to be taught	Strategies	TLM / Resources	Evaluation
1	<ul style="list-style-type: none"> <li>• Introduction</li> <li>• The distance between the two points on a line parallel to any axis</li> </ul>	<ul style="list-style-type: none"> <li>• Introduction of the topic in whole class</li> <li>• Group activity for conceptual understanding</li> <li>• Problem solving strategies in whole class</li> <li>• Model problem solving by students individually</li> </ul>	<ul style="list-style-type: none"> <li>• Graph sheets</li> <li>• Graph board</li> </ul>	<ul style="list-style-type: none"> <li>• What is the distance between (0,-3) and (0.-8)?</li> <li>• What is the distance between (4,3) and (8,3)?</li> </ul>
2	<ul style="list-style-type: none"> <li>• The distance between any two points</li> </ul>	<ul style="list-style-type: none"> <li>• Solving problems individually</li> </ul>	<ul style="list-style-type: none"> <li>• Graph sheets</li> <li>• Graph board</li> </ul>	<ul style="list-style-type: none"> <li>• What is the distance between (7,8) and (-2,3)?</li> </ul>
3	<ul style="list-style-type: none"> <li>• Exercise 7.1 problems 1 to 8</li> </ul>	<ul style="list-style-type: none"> <li>• Strategies of problem solving in whole class and solving the problems individually</li> </ul>		

Period no.	Concept to be taught	Strategies	TLM / Resources	Evaluation
4	<ul style="list-style-type: none"> <li>Exercise 7.1 problems 9 to 15</li> </ul>	<ul style="list-style-type: none"> <li>Strategies of problem solving in whole class and solving the problems individually</li> </ul>		
5	<ul style="list-style-type: none"> <li>Section formula</li> </ul>	<ul style="list-style-type: none"> <li>Understanding the concept in whole class</li> <li>Group activity for conceptual understanding</li> <li>Problem solving strategies in whole class</li> <li>Model problem solving by students individually.</li> </ul>	<ul style="list-style-type: none"> <li>Graph sheets</li> <li>Graph board</li> </ul>	<ul style="list-style-type: none"> <li>Which point divides the segment joined by (3,5) and (8,10) in the ratio 2:3?</li> </ul>
6	<ul style="list-style-type: none"> <li>Mid-point and points of trisection of a segment</li> </ul>	<ul style="list-style-type: none"> <li>Understanding the concept in whole class</li> <li>Group activity for conceptual understanding</li> <li>Problem solving strategies in whole class</li> <li>Model problem solving by students individually</li> </ul>	<ul style="list-style-type: none"> <li>Graph sheets</li> <li>Graph board</li> </ul>	<ul style="list-style-type: none"> <li>Find the mid-point of AB if <math>A=(2,7)</math> and <math>B=(-1,3)</math></li> <li>What are points of trisection of the segment joining (2,-6) and (-4,8)?</li> </ul>
7	<ul style="list-style-type: none"> <li>Centroid of a triangle</li> </ul>	<ul style="list-style-type: none"> <li>Understanding the concept in whole class</li> <li>Group activity for conceptual understanding</li> <li>Problem solving strategies in whole class</li> <li>Model problem solving by students individually</li> </ul>	<ul style="list-style-type: none"> <li>Drawing sheet</li> <li>Graph board</li> </ul>	<ul style="list-style-type: none"> <li>Find the centroid of the triangle with vertices (3,-5), (-7,4) and (10,-2).</li> </ul>
8	<ul style="list-style-type: none"> <li>Exercise 7.2 problems 1 to 5</li> </ul>	<ul style="list-style-type: none"> <li>Strategies of problem solving in whole class and solving the problems individually</li> </ul>		

<b>Period no.</b>	<b>Concept to be taught</b>	<b>Strategies</b>	<b>TLM / Resources</b>	<b>Evaluation</b>
9	<ul style="list-style-type: none"> <li>Exercise 7.2 problems 6 to 10</li> </ul>	<ul style="list-style-type: none"> <li>Strategies of problem solving in whole class and solving the problems individually</li> </ul>		
10	<ul style="list-style-type: none"> <li>Area of a triangle</li> </ul>	<ul style="list-style-type: none"> <li>Understanding the concept in whole class</li> <li>Group activity for conceptual understanding</li> <li>Problem solving strategies in whole class</li> <li>Model problem solving by students individually</li> </ul>	<ul style="list-style-type: none"> <li>Drawing sheet</li> <li>Graph board</li> </ul>	<ul style="list-style-type: none"> <li>Find the centroid of the triangle with vertices (1,-1), (-4,6) and (-3,-5).</li> <li>Whether (1,-1), (2,3) and (2,0) are collinear? Verify</li> </ul>
11	<ul style="list-style-type: none"> <li>Exercise 7.3</li> </ul>	<ul style="list-style-type: none"> <li>Strategies of problem solving in whole class and solving the problems individually</li> </ul>		
12	<ul style="list-style-type: none"> <li>Slope of a line/segment</li> </ul>	<ul style="list-style-type: none"> <li>Understanding the concept in whole class</li> <li>Group activity for conceptual understanding</li> <li>Problem solving strategies in whole class</li> <li>Model problem solving by students individually</li> </ul>	<ul style="list-style-type: none"> <li>Drawing sheet</li> <li>Graph board</li> </ul>	<ul style="list-style-type: none"> <li>Find the slope of a segment (4,-8) and (5,-2)</li> <li>Find the slope of a segment (-3,-8) and (5,-2)</li> </ul>
13	<ul style="list-style-type: none"> <li>Exercise 7.4</li> </ul>	<ul style="list-style-type: none"> <li>Strategies of problem solving in whole class and solving the problems individually</li> </ul>		
14	<ul style="list-style-type: none"> <li>Optional exercise</li> </ul>	<ul style="list-style-type: none"> <li>Encourage the children to think higher order apply it in problem solving</li> </ul>		

**VII. Teaching notes: (additional information collected by teacher)** \_\_\_\_\_

**VIII. Reflections:** (the reflections of the teacher should be written on how the class room transactions among the students conducted in this column like process of learning, success of strategies, the extent of learning)

- Note: Even though we planned for whole unit, we should carry out the strategies as suggested in the strategies of classroom.
- We can make use of mind mapping, brain storming and concept analysis in the process of understanding a concept.
- The exercises like “Do this”, “Try this” and “Think and discuss” should be solved in the presence of teacher in the classroom only.
- The additional information should be collected and utilised in the teaching learning process.
- Group activities, individual activities, whole class activities can be utilised as the strategies demanded.

It should be noted that above unit plan is tentative only. A teacher can prepare his own plan as flexible as he needed for the success of teaching learning process.

**TEACHING NOTES:** We should collect additional information from additional resources like reference books, internet and conferences. No information should be copied from the textbook. The information can be utilised at the time of teaching learning process. The professional development of a teacher can be judged on the basis of his teaching notes collected. Year plan and unit plan are needed to be written once only further teaching notes and reflections should be continuously written as the transactions in the classroom continued.

**Teaching strategies in mathematics:**

**How to teach math?**

Teaching learning process should be carried out strategically. The learning activities should be carried out as per the steps in strategies designed. Designing no. of periods and strategies to be adopted in each period are parts of a unit plan. Implementation of the strategies should follow a sequence of activities so that the objective set can be achieved. What activities should be carried out in stipulated 45 minutes and what should be practiced are as important as our planning in unit plan. All the children in a class room should participate in the teaching learning process and every student should be made to think. Whenever we adopt a suitable strategy achieve competency in the classroom, it should be helpful to overcome the obstacles that come across in the class room learning process. Let’s discuss the steps should be followed in a class room learning process.

- I. Name of the lesson** :
- II. Period no** : **duration** :
- III. Concept to be taught** :
- IV. Academic standards to be achieved in this class:**

Steps in the class room:

**V. Introduction:**

- i. Greetings and formal cordial chat:
- ii. Testing of previous knowledge: A teacher can make use of mind mapping or brain storming or puzzle or any activity to test as well as guide the classroom towards joyful learning.
- iii. Announcement of the topic:
- iv. Need and relevance of the topic: use of the learning concept should explained or any story related to the concept should be explained to students.

**VI. PRESENTATION:**

**i) Conceptual understanding:**

- a) Reading the text: children should be asked to read the text in the textbook related to the concept to be taught and underline the new words/ symbols/key words/ sentences which are not understood. Teacher should write the words or symbols on the blackboard and should be discussed in the classroom.
- b) Activity for conceptual understanding: for the extensive learning of the concept, an activity should be provided to the students to understand the concept inductively or deductively.

**ii) Problem solving:**

- a) Problem solving by the teacher on the board: main objective of this step is to understand the problem solving strategies.
- b) Model problem solving by the students: Each student in the class is encouraged to think and solve the problem individually. Some students commit some mistakes during substitution or calculation. Those should be rectified in the groups or whole class but inferiority in the students should be minimised as the class goes on.

**VII. RECAPITULATION :** A teacher can make use of mind mapping or brain storming or puzzle or any activity to recapitulate the learnt concepts in the class as well as guide the classroom towards joyful learning

**VIII. HOME WORK :** Whatever the problems left in the exercises like “do this” or “try this” should be given as homework or problems prepared by the teacher on the learnt concept. The solved problems should be observed and corrected on the next day.

Note: All of these steps mentioned above should be directed towards the conceptual understanding in the child. Whatever the activity we provide in the class room, it should enhance the inductive or deductive logic in the student. The reasoning in mathematics would strengthen the student's ability of problem solving in daily life. The role of the teacher not only confines to the class room only, his preparation for entering the classroom would enrich the teaching learning process.

### Period plan

We have discussed the steps in the teaching learning process to be implemented in the class room. Besides this, the strategies in each step are important as well. Observing, analysing the contexts and generalising the concepts should be followed by the students only. But the role of the teacher is very important in this process. Sequence of the questions in the process of understanding and guiding it to generalisation of the concept helps the children to understand the concept. We have discussed the teaching steps and strategies till now.

Let's look at a sample of period plan with the above teaching learning process.

Note: A regular teacher need not write this teaching learning process steps but it is suggested to be written by a student teacher while his/ her teaching practice.

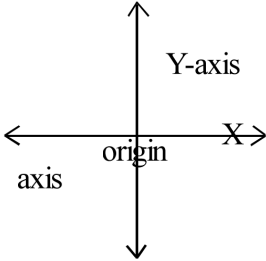
### Sample of a teaching learning process

- I. Class : 10
- II. Unit : 7 (Coordinate geometry)
- III. Period no : 1
- IV. Time duration : 45mins
- V. Concept to be taught : Introduction –the distance between the two points on line parallel to any one of the axes.

#### VI. Academic standards to be achieved :

- a. Problem solving: the student can find the distance between the two given points on a line parallel to any one of the axes
- b. Reasoning-proof: the student can generalise the condition to find the distance between the points and formulise the condition.
- c. Communication: the student can name the coordinates in a point and communicate a point in the coordinate form. The student can express the distance formula for the distance between two points which lie on a line parallel to any one of the axes.
- d. Connection: the student can utilise the learnt concept in other situations such as physics, chemistry, social, etc.
- e. Representation- visualisation: the student can represent a point on a graph paper and distance between two points.

#### VII. STEPS IN THE TEACHING LEARNING PROCESS

STEP	STRATEGY	BB WORK	TLM/ RESOURCES
<p><b>INTRODUCTION</b></p>	<p><b>GREETINGS:</b> Good morning children..!  <b>TESTING PREVIOUS KNOWLEDGE:</b>                      (WHOLE CLASS ACTIVITY)</p> <ul style="list-style-type: none"> <li>You have learnt about coordinate axes in 9th class. Then try to draw rough model of the coordinate axes in your notebook.(After a minute)... Compare your models with your friends' models.</li> <li>What is horizontal line called? Try to name it on your paper.</li> <li>What is vertical line called? Try to name it on your paper</li> <li>Then try to divide X- axis 10 equal parts with 5 parts on each part. And similarly try to divide Y- axis 10 equal parts with 5 parts on each part.</li> <li>What is intersection of the lines called?</li> <li>What is it called?</li> <li>Try to locate (2,3) in the coordinate axes on which you have drawn.</li> <li>Compare it with your friends. (discussion about mistakes done by some students on coordinates of a point)</li> <li>Try to locate (2, 0). Where is it?</li> <li>How far is it from origin?</li> <li>How can you say the distance?</li> </ul>		<ul style="list-style-type: none"> <li>Graph board</li> <li>Graph chart</li> <li>Colour chalks</li> </ul>
<p>Declaration of the topic</p>	<p>Let us discuss today how to find the distance between two points on line which is parallel to any one of the axes?</p>		
<p>Relevance of the topic</p>	<p>Finding the distance between any two points is useful for us to</p> <ul style="list-style-type: none"> <li>Analyse the graphs drawn on any data regarding business, measurements or technology etc.</li> <li>Analyse the motion of a body or graphs in electricity or heat in physics.</li> </ul>		



STEP	STRATEGY	BB WORK	TLM/ RESOURCES
<p><b>Presentation</b> a. Conceptual understanding</p>	<p><b>Reading:</b> Please open the page 159 and read the text from 159, 160, 161 and pages. (individual activity)</p> <p>Underline the new terms or the terms which can't understand/symbols/sentences (teacher discusses in whole class the new terms or symbols in the conceptual understanding)</p> <p>Activity for conceptual understanding: Finding the distance between the two points on line parallel to any one of the axes.</p> <p><b>Activity 1 (individual activity):</b></p> <ul style="list-style-type: none"> <li>• Ask the students to locate A(2, 0), B(4,0) and C(7,0)</li> <li>• Find the distance between                         <ol style="list-style-type: none"> <li>1) A(2,0) and B(4,0)</li> <li>2) B(4,0) and C(7,0)</li> </ol> </li> </ul> <p>Can you find the distance between</p> <ol style="list-style-type: none"> <li>3) D(5,0) and E(8,0)</li> <li>4) H(13,0) and K(19,0)</li> </ol> <p>How can you say?</p> <p>[Finally the teacher ends the discussion with the conclusion distance between <math>(x_1,0)</math> and <math>(x_2,0)</math> in the whole class ]</p> <p>The students will be provided another Similar activity to generalise the distance between <math>(0, y_1)</math> and <math>(0, y_2)</math>.</p> <p><b>Activity 2 (group activity):</b></p> <ul style="list-style-type: none"> <li>• Draw any line parallel to X-axis individually.</li> <li>• Mark any three points on it whose coordinates are integers.</li> </ul>	<p>Distance between the points <math>(x_1,0)</math> and <math>(x_2,0)</math> is <math> x_2 - x_1 </math></p> <p>Distance between the points <math>(0, y_1)</math> and <math>(0, y_2)</math> is <math> y_2 - y_1 </math></p>	<ul style="list-style-type: none"> <li>• Graph board</li> <li>• Graph chart</li> <li>• Colour chalks</li> </ul>

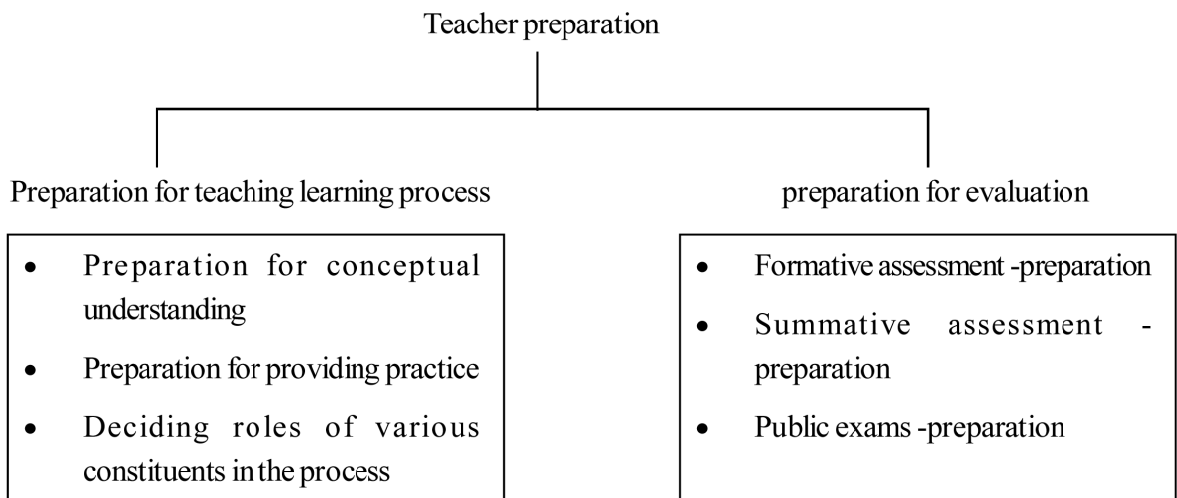
STEP	STRATEGY	BB WORK	TLM/ RESOURCES
<p>b. Problem solving</p> <p>Recapitulation</p> <p>Home work</p>	<ul style="list-style-type: none"> <li>Name them as P, Q and R</li> <li>Then discuss in groups how you would find the distance between P,Q and P,R.</li> </ul> <p>(Discuss the dialogue in the group discussion in whole class and generalise the formula for the distance between two points on a line which is parallel to any one of the axes.)</p> <p><b>Problem solving by the teacher:</b> Teacher writes the problem on the board: Find the distance between A (-4,-5) and B(2, -5)</p> <ul style="list-style-type: none"> <li>Read the problem</li> <li>What are given in the problem?</li> <li>What have you to find?</li> <li>What is the nature of the points?</li> <li>When the points lie on a line parallel to X-axis, how would you find the distance?</li> <li>Then find the distance</li> </ul> <p><b>Model problem solving by the student:</b> (Teacher gives a problem from Do this and asks the students to solve it individually.) Find the distance between the points P (-4, -3) and Q (-8,-3) (Then teacher discusses the mistakes committed by the students in calculations)</p> <p>The teacher discusses the summary of the classroom through mind mapping</p> <p>Teacher gives the home work problems which are to be solved by the students</p>	<p>Distance between the points <math>(x_1,k)</math> and <math>(x_2,k)</math> is <math> x_2 - x_1 </math></p> <p>Distance between the points <math>(k, y_1)</math> and <math>(k, y_2)</math> is <math> y_2 - y_1 </math></p> <p>Find the distance between A (-4,-5) and B(2, -5)</p> <p>Given A(-4, -5) and B(2,-5)</p> <p>Distance <math>= x_2 - x_1 </math>  <math>x_1 = -4</math> and <math>x_2 = 2</math>  then distance <math>= 2 - (-4) </math>  <math>= 2 + 4</math>  <math>= 6</math> units</p> <p>Between 2 points on line // to X-axis</p> <p>axis</p> <p>Distance</p> <p>On line // to Y-axis <math> x_2 - x_1 </math></p>	<ul style="list-style-type: none"> <li>Graph board</li> <li>Graph chart</li> <li>Colour chalks</li> </ul>



# TEACHER PREPARATION

## INTRODUCTION :

We, the teachers have to shift our strategies from teaching a concept in the class to implementing teaching learning strategies in the class room as the new textbooks have been introduced on new syllabus prescribed by APSCF-2011. We have to realise the change of our role from teacher or preacher to facilitator of learning. A teacher need to have better understanding on syllabus, academic standards and modern techniques of evaluation to plan teaching learning strategies. A teacher should be vastly equipped for better achievement of academic standards. Let us discuss the areas in which we should have preparation for betterment of teaching learning strategies.



## TACHING LEARNING PROCESS -PREPARATION :

For achieving success in teaching learning processes, a teacher should have objective based preparation. Selecting the content from the textbook, concept involved in it, designing the strategies and activities for comprehension, achieving academic standards in mathematics are some of the main steps in the preparation of a teacher. These strategies should be prepared so as to encourage children to think while conceptual understanding or problem solving. Reading the whole chapter, preparing plans, gathering TLM, collecting additional information from various resources like reference books, internet, seminars, etc. would be the parts of our preparation before starting teaching of a lesson. Let us discuss how to prepare for conducting the teaching learning process.

## COCEPTUAL UNDERSTANDING -PREPARATION :

Teacher preparation is key factor in the process of teaching learning processes. Preparation of the teacher becomes base for implementing teaching learning processes and involving every child in them. The behavioural changes brought in teaching learning process will be useful for us to assess the children formatively and also for preparation.

The children have to participate in class room learning process as per their needs. There is a need to change our teaching process which does not consider the needs of a child. We should design class room learning processes as per the needs of a child by having a look at our present system of teaching. Since the new textbooks are introduced with new strategies in conceptual presentations, these textbooks won't support our old methods of teaching in the classroom. Let us discuss following points to know the needs of change.

- Are our teaching methods natural or artificial?
- Are we teaching according to the nature of the child and nature of mathematics?
- Are children collecting information from our teaching or constructing knowledge on their experiences in activities?
- Are students remembering the strategies to solve some particular problems or encouraged to solve the problems on their own?
- What are the behavioural changes brought in the students by mathematics teaching? Can they utilize these problem solving strategies in their real life?
- What may be the reason for the standards in mathematics learning are deteriorating day by day? Is it due to textbooks or teaching or standards of children?

Let us analyse the answers for the above questions and decide some factors of teacher preparation. Textbook is a fundamental tool for us to help in the teaching learning process in the classroom. We use textbook as a basic tool for implementation of classroom learning process. We should understand the connection between the concepts in the textbook. On the basis of understanding, we should prepare "concept mapping" in each unit of the textbook. We should then solve all the problems in the textbook.

We should also prepare strategies for learning of the problem solving skills. Let us observe the changes brought in the textbook.

- The notions (previous concepts) required to learn the new concepts are discussed in the beginning of every chapter. Problems regarding these concepts are also mentioned at various required places.
- Various contexts in the daily life, real life incidents, examples, patterns, activities are used to understand concepts in each chapter.
- Concepts have been divided into some sub-concepts for easy understanding of the concept and "do this" exercise is given subsequently.
- The concepts are given so as to understand them by discussions and by doing activities.
- "try this" exercise is given for developing critical and logical thinking, for extensive understanding of the conceptual understanding by logical usage of mathematical terminology, reasoning and connections in between concepts.
- "think, discuss and write" exercise is given for the child to think hypothetically and analyse the conceptual understanding and thus to develop logical thinking.
- Thus major exercises are given after every two or three concepts.

We have discussed the changes brought in new textbooks from old textbooks, haven't we? Our responsibility is to understand these parts of the textbooks along with the connection between the concepts. When we understand the given activities and their nature, formative exercises and major exercises and their purpose, we can decide roles of students, TLM and teachers. We can also design better classroom activities as group, individual and whole class activities. Thus, we can carry out successful teaching learning activities.

Based upon our above discussion, we can say that we should have better extensive understanding on each chapter in the textbook. We have to think as many as ways to understand a concept in which observation, identifying the general principle and generalising the concept or property plays a dominant role. The teacher has to become a facilitator during these activities are implemented. A teacher has to prepare in the following way for the successful implementation of the strategies.

- Firstly, a teacher should read the complete unit and identify the concepts to be taught and the content involved in it.
- Based upon the thorough understanding of the unit, we have to decide the academic standards.
- We have to prepare a unit plan in which required no. of periods, academic standards, strategies to be implemented in the class room, TLM, etc. are mentioned.
- If we feel the activities or examples given in the textbook are not enough to carry out teaching learning process, we can design more activities or collect more examples. We should test them if we feel necessity of testing.

- We should collect or prepare required TLM or worksheets before carrying out teaching learning process.
- We can gather more information on the subject from reference books, internet, research papers, magazines, dailies, etc. for extensive understanding of the concept.
- We should write the gathered information on the subject in lesson plan.
- As it is mentioned earlier, we should read whole chapter thoroughly and understand logics should be developed by learning that concept. Besides this, we should solve every problem given in the exercises. We can clarify our doubts by discussing with our fellow teachers or subject experts.
- We should design group or individual or whole class activities based on the nature of the exercise and questions involved in it.
- We have to distribute time according to nature of the activity and conceptual understanding. We should plan each activity along with time period.
- We should have complete understanding on concepts and competencies to be developed in the students.
- Therefore, we should have holistic view on the chapter and good aptitude on it.

### TEACHING LEARNING MATERIAL- READINESS :

We have observed the importance of planning teaching learning activities till now. We have to observe the activities, discussions, process of learning and their performance in the class room. All the students should be made sure to participate in learning activities so that every student can learn and enjoy mathematics. They should be made to observe, think, discuss and generalise while participating in the activities. But, success of every activity depends upon the resources or TLM used in that activity. The nature of TLM or resources which will be used in the activities should selected on the basis of availability, easy to handle, effect on learning, nativity, etc.

We use charts, sketch pens, graph sheets, newspapers as TLM commonly. But we can make use of commonly available resources such as school ground, class room, black board, sticks, etc. as resources in teaching learning process. We can also use mathematical instruments box, math kit, geo board, etc. as TLM in the teaching learning process. If we make use of effective TLM or resources, we can achieve objectives effectively.

### EXAMPLES OF TLM

CHARTS	GRID PAPER	TRACING PAPER	GEO BOARD
GEOMETRIC BOX	DICE	COLOUR PAPERS	MATH REFERENCES
ISOMETRIC SHEETS	COINS	SCISSORS	NCERT BOOKS
GRAPH PAPERS	PACK OF CARDS	3-D SHAPES	INTERNET PRINT OUTS, BOOKS OF OTHER STATES

We have seen some of the useful TLM and resources that can be useful in our teaching learning process. We should collect them after planning of the lesson the lesson and try them once before using them in the class room. When we collect them and test them we get enough confidence on the teaching learning process which we have designed. Thus we can be successful in achieving expected objectives in almost every child in the class room.

### **ROLE OF THE TEACHER -READINESS :**

The teacher should prepare or design such activities so that

- The students should co-operate each other in learning and enhance their learning.
- The student should learn mathematics with joy.
- The students could achieve minimum of expected competencies on the concept in the stipulated time. Only then a teacher should go for the next concept.
- The students should be able to solve the problems on their own

Depending on our earlier discussion, a teacher should prepare himself for teaching. He should develop good attitude towards mathematics teaching so-that the students construct their knowledge on their own. The student should be allowed to participate in the activities, to discuss, to think, to ask doubts freely, to enjoy math learning.

The teacher should

- Go to the classroom at appropriate time as per time table. He should allot whole time for the learning of the students. After completing the activities, he should come out of the class room.
- Should carry out teaching learning process only after preparing year plan, lesson plan and designing class room strategies in a period.
- Write teachers reflections on the basis of implantation of strategies and achieving standards.
- If the expected standards are not achieved by strategies designed, we should design alternate learning strategies.
- In the process of learning some students achieve standards speedily. A teacher should prepare some extra creative activities for such students.
- A teacher has to prepare special strategies for slow learners in the class room.
- The teacher should identify the misconceptions in the children in the learning process or in solving problems and correct them.
- The teacher should discuss the progress of the students regularly and take some steps for more progress.

- The teacher should gather extra information from various resources as discussed earlier.
- The teacher should design appropriate, effective projects for extensive learning and evaluate it.
- The teacher should prepare himself so as to carryout strategies efficiently.

### **PREPARATION FOR EVALUATION :**

We assess the progress of learning of a student formatively and summatively. Formative assessment is the assessment process which is conducted during teaching learning process. The achievement of academic standards in the students is not only assessed but also their process of learning is assessed. It also enhances the learning in the child. We assess the students by 1) generating new problems 2) written works 3) projects 4) slip tests in formative assessment. A should have comprehensive knowledge on these four tools of assessment for conducting formative assessment. He should prepare well for formative assessment.

### **PREPARATION FOR FORMATIVE ASSESSMENT :**

Formative assessment is conducted to reduce stress and strain produced by exams in the students. Moreover this assessment also assesses the process of learning and the achievement of the students. To conduct formative assessment, a teacher should prepare like this.

- A teacher should know about every tool used in the formative assessment comprehensively.
- The teacher should understand the process of evaluation and allotment of grades.
- The teacher should prepare a register to note down the marks and grades. Tool wise recording and competency wise recording should be maintained in the register.
- A teacher should give place for formative assessment in the lesson plan wherever the projects and slip tests are conducted.
- The recording of the assessment should be impartial and should not deviate from evidences like project reports, slip test answers, written notebooks.
- These records should be kept always available for monitoring.
- Though we maintain evidences in the formative assessment, some important observation in the teaching learning process should be written in the lesson plan so that further learning is improved.
- Such activities should be designed for the teaching learning process which is very useful in assessing all the children easily and more accurately. Group, whole class and individual activities are designed so that they provide learning as well as assess the progress of the students learning.



- 20 marks are allotted for formative assessment in ninth and tenth classes. Performance of the students should be assessed for 5 marks for each tool and  $4 \times 5 = 20$  marks in total should be assessed in the formative assessment. Every student should have comprehensive understanding on formative assessment so as to assess the students learning more accurately.

### **PREPARATION FOR SUMMATIVE ASSESSMENT :**

Summative assessment is intended to assess the achievement of academic standards in students in the stipulated time.

Summative assessment is conducted in two papers namely PAPER-1 and PAPER-2. Each paper is conducted for 40 marks. And result is displayed along with formative assessment in which 80 marks for written papers and 20 marks for formative assessment. Each paper for written examination is conducted for 2 hrs and 45 mins in which 15 mins of the time is allotted for reading the paper and the remaining for writing answers in the examination. The teacher has to assess the academic standards achieved by the students by correcting answer scripts of the students. A teacher has to prepare the students and him in the following way.

- Two summative exams and a public exam is conducted for tenth class students in no questions are asked directly from textbook. A teacher should prepare such question papers in which no questions are asked directly from textbook for each paper for 40 marks each as mentioned earlier.
- 9th class examinations are useful for the students for the preparation of tenth class public examinations. They should be conducted as a practice of public examinations in tenth class.
- Conducting summative examinations in the ninth class and first two summative exams are the responsibility of the school.
- As the answer sheets are not given separately but a single booklet consisting 16 pages will be given to write the answers, the students should be trained to write in a single booklet.
- The students should be given comprehensive idea on paper-1 and paper-2.
- The teacher should explain a model paper so that they understand each section of the paper as per the marks.
- Before preparing a model question paper, the teacher should prepare a blueprint of the papers as per the weightages of types of questions and competencies.
- The teacher should prepare guidelines of correction of the papers.
- The questions in the question papers should allow the students to think and write the answers. Multiple choice questions should be asked to prepare the children for competitive exams.
- The teacher should understand the above discussed points and prepare the students and him as such.

**PREPARATION FOR PUBLIC EXAMS :**

The learning and public exams in tenth class are very much important for a students for their higher studies. The students have to write these public exams and pass them. The public exams should not create stress and strain in the students and the exams should provide the opportunities for students to think and write their own understanding and views. For this, the students and teachers should prepare like this.

- The students or teachers should not depend on any types of guides or study materials which suppress the thinking processes. The students should be allowed to think on their own to solve problems. The children should be practiced problems solving strategies rather than problems form textbook. The students should enjoy solving problems but feel burden or stress in solving problems.
- Various types of problem solving strategies on various concepts should be practiced by the students but the teacher should not encourage the children to copy them from the black board or guide or any study material.
- Inductive and deductive logics should be developed in the students' so that they can give reasons or prove generalisations. The students should be practiced to give reasons with appropriate logics or proving theorems with reason in each step.
- The student s should be trained to use the mathematical language effectively and efficiently.
- Connecting various concepts is very important skill in mathematics which is useful in solving more complex problems. The students should be practiced to solve more complex problems in various chapters by connecting the various concepts.
- Representations skills should be developed in students for better performance on the public examinations.
- The children should be practiced to write the answer as per the nature of the problem or question.
- The students commit some minor mistakes while solving the problems. The teacher should identify them and correct their understanding in applying the logics or calculating.
- The student s should be trained to write in a single booklet containing 16 pages because only 16 pages booklet is given to write the public examination.
- The students should be practiced to write the examination in the stipulated time.