

**SYLLABUS PLAN FOR THE SESSION 2020-2021**  
**SUBJECT – MATHEMATICS**  
**CLASS-X**

MONTH	CHAPTER	SUB TOPICS	INNOVATIVE PEDAGOGIES	LEARNING OUTCOMES	MATHS LAB ACTIVITY
March/ April	Polynomials	<ul style="list-style-type: none"> <li>• Geometric representation of polynomials</li> <li>• Relation between zeroes and coefficients of a polynomial</li> <li>• Forming quadratic polynomial when the zeros are given.</li> </ul>	<b><u>Mind Mapping Activity:</u></b> Summarise the topic by Mind mapping which includes the General form of a Quadratic Polynomial, Zeroes and relationship between zeroes and coefficients.	<b>Students would be able to</b> i) Recall the concept of polynomials . ii) Compare the relation between zeroes and coefficients of a polynomial iii) Comprehend the method to form a polynomial.	To obtain the condition for consistency for the system of equation in two variables by graphical method.
	Pair of linear Equations in two Variables	<ul style="list-style-type: none"> <li>• Solving a pair of linear equations algebraically by substitution and elimination method.</li> <li>• Solution by graphical method.</li> <li>• Word problems on linear equations</li> <li>• Conditions for consistency of a system of linear equations</li> </ul>	<b><u>Worksheets</u></b> to solve the pair of equations by Elimination method, substitution method.	<b>Students would be able to</b> – i) Recall the concept Linear equation and its solution. ii) Compare the consistency for different equations. iii) To develop the skill of drawing graphs.	To obtain the condition for consistency for the system of equation in two variables by graphical method.

	<p>Real Numbers</p> <p>Quadratic Equation</p>	<ul style="list-style-type: none"> <li>Fundamental theorem of Arithmetic</li> <li>Proofs of irrationality of <math>\sqrt{2}</math>, <math>\sqrt{3}</math>, <math>\sqrt{5}</math></li> <li>Standard form of a Quadratic equation</li> <li>Solution by Factorization method and by quadratic formula</li> <li>Nature of roots.</li> </ul>	<p><b>Quiz</b> on HCF and LCM of numbers.</p> <p><b><u>Mind Mapping Activity:</u></b> Summarise the topic by Mind mapping which includes the General form of a Quadratic equation, solution by factorization and by Quadratic formula.</p>	<p><b>Students would be able to</b> Recall different number System and to apply HCF and LCM in different situations.</p> <p><b>Students would be able to –</b> i) Recall the concept of Quadratic Polynomial and correlate with linear equation and Quadratic equation. ii) Explore different methods to solve Quadratic equation and apply it in different situations.</p>	
May	<p>Introduction to Trigonometry</p> <p>Application of Trigonometry</p>	<ul style="list-style-type: none"> <li>Introduction to trigo - ratios</li> <li>Trigonometric ratios of <math>30^\circ, 45^\circ, 60^\circ</math>.</li> <li>Trigonometric identities- Proof and applications of the identity <math>\sin^2 A + \cos^2 A = 1</math>.</li> <li>Heights and Distances</li> <li>Angles of elevation / depression should be only <math>30^\circ, 45^\circ, 60^\circ</math>.</li> <li>Word problems on Heights and Distances.</li> </ul>	<p>i) <b><u>Grid activity</u></b> Making different Grids and to write the values of trigonometric ratios of specific angles.</p> <p><b><u>Problem solving:</u></b> ii) Solving daily life situation related problem using Trigonometric ratios. <b>Solving Picture worksheets</b> from smart class modules.</p>	<p><b>Students would be able to –</b> i) To prove Trigonometric identities. ii) Compare, explore and estimate trigonometric ratios &amp; values of specific angles</p> <p><b>Students would be able to –</b> i) Apply Trigonometric ratios in solving day to day life situation. ii) develop problem solving skills.</p>	

	Arithmetic Progression	<ul style="list-style-type: none"> <li>• Definition of A.P.</li> <li>• General term of an A.P.</li> <li>• Sum to n terms of A.P</li> <li>• Application in solving daily life problems based on sum to n terms are to be avoided.</li> </ul>	<p><b>Supplemental activities:</b></p> <p>i) Research on Geometrical Progression and to compare it with A.P.</p> <p>ii) *Art Integrated activity (Detailed description attached)</p>	<p><b>Students would be able to –</b></p> <p>i) Identify the series A.P and to select appropriate formula to find out <math>a_n</math> and <math>S_n</math> of the A.P.</p> <p>ii) To identify the formula to find out <math>a_n</math> and <math>S_n</math> of the A.P.</p> <p>ii) to correlate the subject with Art</p>	<p>To verify that the given sequences are in A.P. or not by paper cutting and pasting method.</p> <p>To verify that the sum of first 'n' natural numbers is <math>\{ n(n+1) \} / 2</math></p>
July	<p>Co – ordinate Geometry</p> <p>Statistics</p>	<ul style="list-style-type: none"> <li>• Distance Formula</li> <li>• Section Formula</li> <li>• Mean, Median, Mode of grouped data.</li> <li>• Mean by Direct method and by Assumed mean method.</li> </ul>	<p><b>Graph Activity:</b></p> <p>Points are to be plotted in Cartesian Plane on a graph paper and find out the distance between them.</p> <p><b>Class activity:</b></p> <ul style="list-style-type: none"> <li>• Students will have to note down the heights of all students of their class to find out the mean , median and mode of this data.</li> <li>• Identify the student whose height is approximately equal to the mean, median and mode.</li> </ul>	<p>i) To select appropriate formula to find out length of a line segment.</p> <p>iii) To apply section formula in different situation</p> <p><b>Students would be able to –</b></p> <p>i) Recall the concept Mean,Mode and Median of raw data.</p> <p>ii) Explore different methods to find out Mean, Median and mode.</p>	
August	Areas related to circle.	<ul style="list-style-type: none"> <li>• Circumference and area of a circle.</li> <li>• Length of an arc of a circle.</li> </ul>	<p>i) <b>Solving picture Work sheet</b> to find out the area of shaded region of the given figure.</p>	<p><b>Students would be able to –</b></p> <p>i) Recall the concept circle and parts of the circle.</p>	

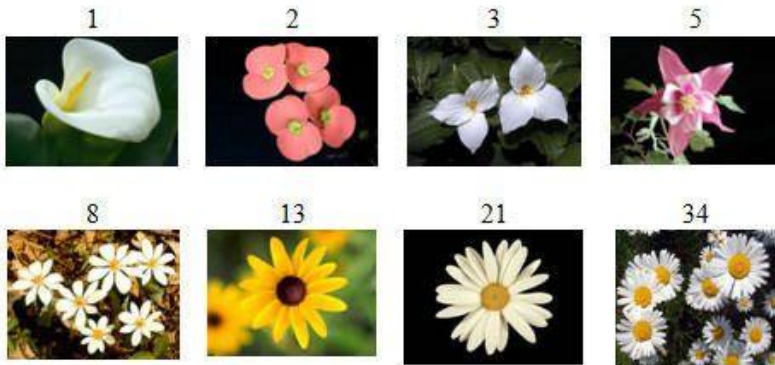
		<ul style="list-style-type: none"> <li>Area of sector and segment of a circle</li> <li>Problems on central angle of <math>120^\circ</math> are to be avoided.</li> </ul>	ii) <b>Art Integrated activity – Project based on the traditional craft of the state Meghalaya</b>	To identify appropriate formula to find Length of an arc, area of sector and segment of a circle ii) To develop computational skill.	
	Probability	<ul style="list-style-type: none"> <li>Probability – The Theoretical Approach.</li> <li>To find the probability of different events.</li> </ul>	<b>Learning by doing:</b> Coin tossing activity (two/ three coins together)	<b>Students would be able to</b> i) To recall the concept experimental probability and to correlate with theoretical probability. ii) To understand the concept by doing hands on activity	To find out the Probability of different events in coin tossing
September	Triangles	<ul style="list-style-type: none"> <li>Introduction of Concept of similar figures</li> <li>Basic Proportionality theorem.</li> <li>Criteria for similarity</li> <li>Pythagoras theorem</li> </ul>	i) Proving Pythagoras theorem and BPT by <b>Inductive – deductive method.</b> ii) <b>*Art Integrated activity – Fractal Geometry (Detailed description attached)</b>	<b>Students would be able to</b> i) Recall different types of triangle and their properties. ii) Explore different methods to prove the theorems. iii) To apply the concept in different situation. iv) To verify the concept by learning by doing. v) To correlate the subject with Art.	To verify that the tangents from an external point to a circle are equal by paper cutting method.  To verify Basic proportionality Theorem by paper cutting activity.

October	<p>Surface area and Volume.</p> <p>Circles</p>	<ul style="list-style-type: none"> <li>• Surface area and volume of cube, cuboid, cylinder, Cone, sphere and hemisphere.</li> <li>• Volume and surface area of combination of figures.</li> <li>• Conversion of a solid to another type.</li> <li>• Secant and Tangents of a circle.</li> <li>• Theorems on tangents to a circle</li> </ul>	<p><b><u>Problem solving by visualising the question:</u></b></p> <ul style="list-style-type: none"> <li>i) To find out surface area of combination of figures with the help of transparent solid models of cube, cylinder, cone etc.</li> <li>ii) To create combination of solid figures using Geogebra.</li> <li>iii) <b>Sport integrated activity.</b> (Detailed description attached)</li> </ul> <p><b><u>Geo Board activity:</u></b></p> <ul style="list-style-type: none"> <li>i) Verification of properties of circle using Geo board.</li> <li>ii) Learning by doing hands on activity</li> </ul>	<p><b>Students would be able to –</b></p> <ul style="list-style-type: none"> <li>i) To recall different solid shapes and their properties.</li> <li>ii) To identify appropriate formula and to apply them to find out surface area and volume of combination of solids.</li> <li>iii) To develop computational skill.</li> </ul> <p>Develop logical reasoning skill by proving theorem.</p>	<p>Verification of curved surface area of a cone by paper cutting activity.</p>
November	Geometrical Construction	<ul style="list-style-type: none"> <li>• Division of line segment in a given ratio</li> <li>• Construction of tangents to a given circle.</li> </ul>	Demonstration method using basic geometrical instruments.	<p><b>Students would be able to –</b></p> <p>Develop the skill of drawing figures using geometrical instruments.</p>	

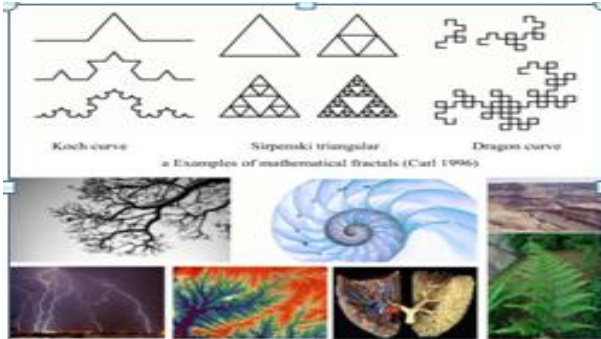
- Text Books : 1. NCERT for class X 2. Mathematics exemplar problems for class X, NCERT publication.
- Reference books:
  1. Mathematics for class X by R.D.Sharma & by R.S.Agarwal
  2. Exam idea- Complete course
  3. Sample papers – U like Sample papers and Sample papers for class X by Oswaal Publication.

**\*Art Integrated Activities**


**1.Topic: Algebra**

<b>Chapter Topic</b>	Arithmetic Progression(A.P) Fibonacci sequence in nature.
<b>Subject integrated</b>	Maths and Visual art.
<b>Art form integrated</b>	Sketching from nature and surroundings
<b>Learning objectives</b>	Students will be able to <ul style="list-style-type: none"> <li>➤ understand the sequences and the terms of an A.P</li> <li>➤ Find out the existence of Fibonacci sequence in nature.</li> <li>➤ Integrate the Mathematical concepts with Art.</li> </ul>
<b>Procedure</b>	<ul style="list-style-type: none"> <li>➤ Observe the pattern of flower petals which follows Fibonacci sequence and observe its beauty in different flowers.</li> <li>➤ Draw beautiful sketches of the flower patterns observed and identify the Fibonacci numbers in it.</li> </ul> <div style="text-align: center;">  </div>

## 2. Geometry

Topic	Fractal Geometry
Subjects integrated.	Maths, Biology and Visual art.
Art form integrated	Photography and Sketching from nature and surroundings
Learning objectives	<p>Students will be able to</p> <ul style="list-style-type: none"> <li>➤ understand the concept Fractal Geometry</li> <li>➤ Find out the existence of self similar figures in nature.</li> <li>➤ Integrate the Mathematical concepts with Art and Science.</li> <li>➤ Attain knowledge about different colour shades.</li> <li>➤ Acquire the skill of making beautiful drawings.</li> </ul>
Procedure	<ul style="list-style-type: none"> <li>➤ Observe the Mathematical concept behind Fractal Geometry.</li> <li>➤ Each group has to create simple Fractal.</li> <li>➤ The Fractals made by each group can be combined together to form a bigger structure.</li> <li>➤ Examples from nature, Architecture, are to be taken for discussion.</li> <li>➤ Pictures of various Fractals in nature and linking it with cell mutation are to be recorded.</li> </ul>  <p>Koch curve      Sierpinski triangular      Dragon curve</p> <p>Examples of mathematical fractals (Carl 1996)</p>

### 3. Sports Integrated activity

Chapter	Area related to circle(A.P)
Subject integrated	Maths, Sports and Visual art.
Learning Objectives	<p>Students will be able to</p> <ul style="list-style-type: none"><li>➤ understand and identify the formula to find out the area and perimeter of a given plane figure.</li><li>➤ To apply the formula in relevant situation.</li><li>➤ Estimate the area and perimeter of the given racing track.</li><li>➤ To develop computation skills.</li><li>➤ Integrate Mathematical concepts with sports related activities.</li></ul>
Procedure	<ul style="list-style-type: none"><li>➤ Draw the sketch of the given racing track.</li><li>➤ Identify the geometrical shapes involved in the problem.</li><li>➤ Complete the figure by making extra construction to apply the required Mathematical concepts.</li><li>➤ Computation of area and perimeter of the racing track by selecting appropriate formula.</li></ul>  <p>Racing track whose left and right ends are semicircular.</p>

	<ul style="list-style-type: none"> <li>➤ The distance between the two inner parallel line segments is 60m and they are each 106 m long. If the track is 10m wide, find             <ul style="list-style-type: none"> <li>(i) The distance around the track along its inner edge.</li> <li>(ii) The area of the track.</li> </ul> </li> <li>➤ Computation of area and perimeter of the given racing track by selecting appropriate formula.</li> </ul>
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### **Art Integrated Project work under Ek Bharat Shrestha Bharat Programme**

State paired with	Meghalaya
Topic of the project	<b><i>Khngeng</i> embroidery</b> - An Ancient craft of Meghalaya and the beautiful Geometrical patterns involved in the design.
Art form of the state	<p>Weaving in Meghalaya: An Ancient craft - <b><i>Khngeng</i> embroidery</b></p> 

Subjects integrated	Maths, Art and History.
Time duration	one month( August)
Learning Objectives	<p>Students will be able to</p> <ul style="list-style-type: none"> <li>➤ understand the diverse culture of our country.</li> <li>➤ create awareness about the different art forms in other States.</li> <li>➤ help students to improve their cognitive abilities.</li> <li>➤ Explore more in the weaving technology and to identify the Mathematical concepts involved in the art form- <i>Khngeng</i> embroidery</li> <li>➤ Integrate Maths with different art forms.</li> </ul>
Basic Knowledge of the project:	Weaving is an ancient craft of the tribal of Meghalaya. It has a rich variety of hand-woven textiles, with unique characteristics that reflect the state and its skilled artisans. <i>Khngeng</i> embroidery is stitched on the Eri fabric to decorate the border of their traditional garments.
Knowledge of the terms:	<ul style="list-style-type: none"> <li>➤ Eri</li> <li>➤ Muga and Mulberry.</li> <li>➤ Traditional embroidery technique of Meghalaya- 'KHNGENG' basically means 'border'</li> </ul>
About the activity	<p>Students should</p> <ul style="list-style-type: none"> <li>➤ Know a brief history of the art form- <i>Khngeng</i> embroidery</li> <li>➤ Find out the village and the people involved in the art form.</li> <li>➤ learn the working of loom.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ explore more about the art of <i>Kheng</i> embroidery</li> <li>➤ Study the Mathematical concept involved in the beautiful design.</li> <li>➤ Find out the Economic benefits of the state out of it.</li> <li>➤ collect all data with photographs to prepare a project report.</li> </ul>
Project Presentation	Presentation of the data collected could be through PPT or by video.