

MATHEMATICS

Part - II

STANDARD NINE



The Constitution of India

Chapter IV A

Fundamental Duties

ARTICLE 51A

Fundamental Duties- It shall be the duty of every citizen of India—

- (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities, to renounce practices derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers and wild life and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievement;
- (k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

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MATHEMATICS

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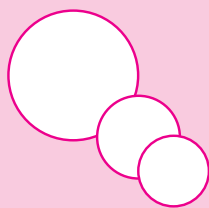


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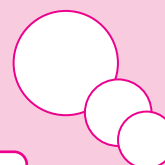
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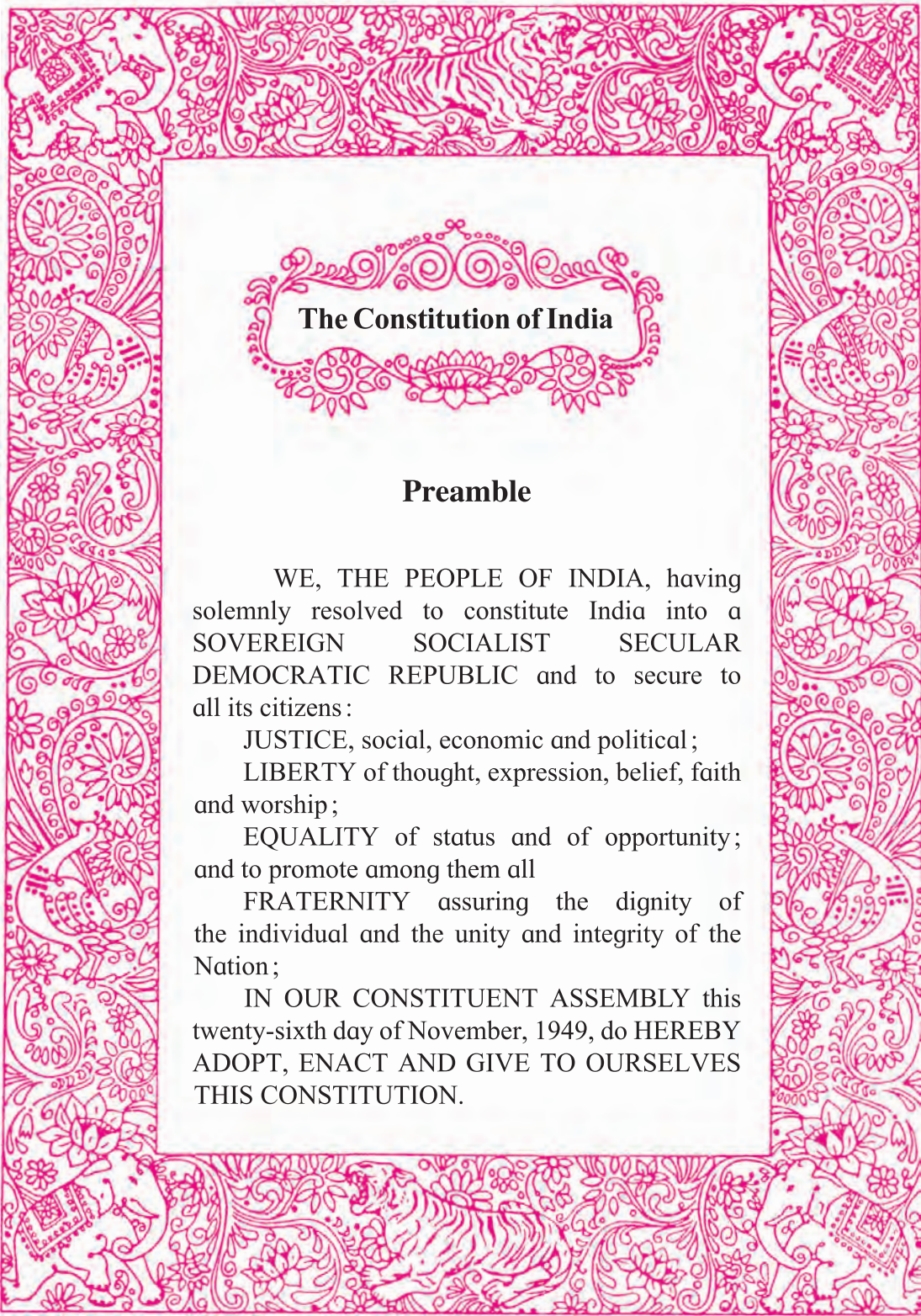
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The Constitution of India

Preamble

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC and to secure to all its citizens :

JUSTICE, social, economic and political ;

LIBERTY of thought, expression, belief, faith and worship ;

EQUALITY of status and of opportunity ; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation ;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

NATIONAL ANTHEM

Jana-gana-mana-adhināyaka jaya hē
Bhārata-bhāgya-vidhātā,

Panjāba-Sindhu-Gujarāta-Marāthā
Drāvida-Utkala-Banga

Vindhya-Himāchala-Yamunā-Gangā
uchchala-jaladhi-taranga

Tava subha nāmē jāgē, tava subha āsisa māgē,
gāhē tava jaya-gāthā,

Jana-gana-mangala-dāyaka jaya hē
Bhārata-bhāgya-vidhātā,

Jaya hē, Jaya hē, Jaya hē,
Jaya jaya jaya, jaya hē.

PLEDGE

India is my country. All Indians
are my brothers and sisters.

I love my country, and I am proud
of its rich and varied heritage. I shall
always strive to be worthy of it.

I shall give my parents, teachers
and all elders respect, and treat
everyone with courtesy.

To my country and my people,
I pledge my devotion. In their
well-being and prosperity alone lies
my happiness.

Preface

Dear Students,

Welcome to the ninth standard!

You are now going to begin your studies at the secondary level after completing your primary education curriculum. You had only one Mathematics textbook up to the eighth standard, now you will use two textbooks – Mathematics Part-I and Mathematics Part-II.

Up to the eighth standard you have verified the properties of lines, triangles, quadrilaterals, circles, etc. given in the textbook. Now you are going to give logical proofs of these and some more properties. The skill of logical reasoning is of utmost importance in all fields of life. This textbook gives you an opportunity to learn the skill gradually.

Different activities are given in the textbook to help you understand different concepts. Other activities have been provided for revision and additional practice. You are expected to do all these and learn the proofs of properties. Discuss the reason behind every step of a proof and learn the property.

In this textbook, Mathematics-Part II, two new topics namely Trigonometry and Co-ordinate Geometry are introduced. These topics will provide a foundation for higher studies. The study of Surface Area and Volume will be useful in day to day life.

Use of internet will also help you to understand the subject. You will get through the course joyfully if you follow the three point plan of – a deep study of the textbook, activity-based learning and ample practice.

So come on! Let us study Mathematics in the company of our teachers, parents, friends and the internet. Best wishes to you for your studies!



(Dr Sunil Magar)

Director

Pune

Date : 28 April, 2017

Akshaya Tritiya

Indian Solar Year :

8 Vaishakh 1939

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It is expected that students will develop the following competencies after studying Mathematics Part II syllabus in Standard IX.

Area	Topic	Competency statement
1. Geometry	1.1 Euclidean Geometry	The students will be able to – ● write ‘what is given’ and ‘what is to be proved’ from the given statement. ● write the proof of the given statements by using logical conclusions. ● identify the pairs of angles made by a transversals of parallel lines. ● understand the properties of pairs of angles and make use of them. ● write ‘Given’ ‘To prove’ and ‘proof’ of the statements. ● identify similar triangles and write the ratios of corresponding sides. ● prove the properties of chord of circle using tests of congruence of triangles. ● draw incircle and circumcircle. ● construct triangles if different type of information is given. ● write proofs of the properties of different types of quadrilaterals. ● use ICT tools to verify the properties of triangle, quadrilateral and circle.
	1.2 Parallel lines and pairs of angles	
	1.3 Theorems on angles and sides of a triangle.	
	1.4 Similar triangles	
	1.5 Circle	
	1.6 Geometric constructions	
	1.7 Quadrilateral	
2. Co-ordinate Geometry	2.1 Basics of co-ordinate Geometry	● explain the meaning of co-ordinates of a point in a plane. ● describe a point by its co-ordinates. ● use ICT tools to find the co-ordinates of a point.
3. Mensuration	3.1 Surface Area and Volume	● find the surface area and volume of a sphere and a cone.
4. Trigonometry	4.1 Introduction to trigonometry	● tell the different trigonometric ratios using similar triangles and Pythagoras theorem and make use of it.

Instructions for teachers

It is expected that the teachers should go through the textbook of Mathematics Part-II for std IX thoroughly. The book contains many activities and practicals. Try to understand the purpose behind them.

The activities are of two types, (1) to write the proofs and (2) practical verification of properties and theorems. A teacher should make use of discussion, question-answers, group activities etc. to carry out the activities and make the textbook more useful. A teacher is also expected to encourage the students to do the activities in the book and help them to invent new ones.

It is more important to write the proofs pursuing logical thinking than doing them by heart. The textbook contains a variety of examples to enhance students' logical thinking. Teachers should construct more such examples with the help of students. Examples, which require a little higher thinking ability, are star-marked. Teachers should encourage the students who write proofs logically correct but thinking in a different way.

In the process of evaluation, it is advised to make use of open ended questions and of activity-sheets. Teachers should endeavour to develop such methods of evaluation.

The list of practicals given in the textbook should be considered as specimen. Teachers can frame different practicals as well as teaching aids of their own using available material. Different activities given in the textbook are included in the practicals. We hope that the evaluation method based on all these will be helpful to develop different competencies for further studies.

List of some practicals (specimen)

- (1) To find the distance between two points on a number line.
- (2) To verify the properties of angles made by a transversal of parallel lines.
- (3) To verify the properties of sides and angles of a triangle using Geometric instruments.
- (4) To verify the property of median on hypotenuse of a right angled triangle.
- (5) To do the construction of a triangle with given specific conditions.
- (6) An activity is given in the book to derive the formula of the surface area of a cone. Using the same activity, derive the formula for the area of a circle which is πr^2 .
- (7) To draw proportionate map of a room on a graph paper by considering the measurements of the things inside the room.
- (8) By drawing X and Y-axes on the school ground, ask students to tell the co-ordinates of a students' positions on the ground.
- (9) To find the volume of a cylindrical vessel using formula. Then fill the vessel completely with water and find the volume of the water. Compare both the measurements.

Similar activities can be done for different three dimensional objects.

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