

SCIENCE AND TECHNOLOGY

STANDARD NINE



The Constitution of India

Chapter IV A

Fundamental Duties

ARTICLE 51A

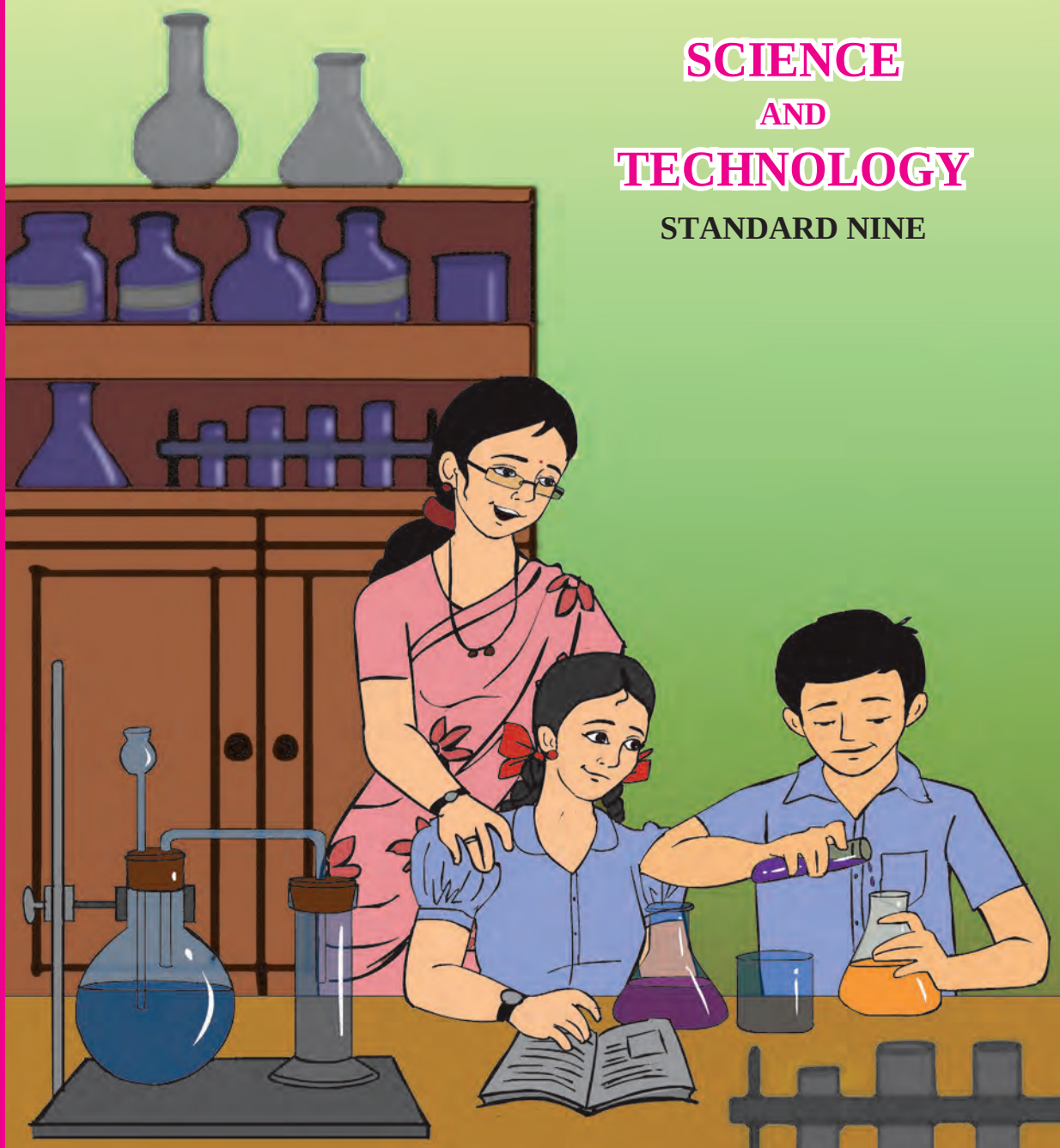
Fundamental Duties- It shall be the duty of every citizen of India—

- (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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SCIENCE AND TECHNOLOGY

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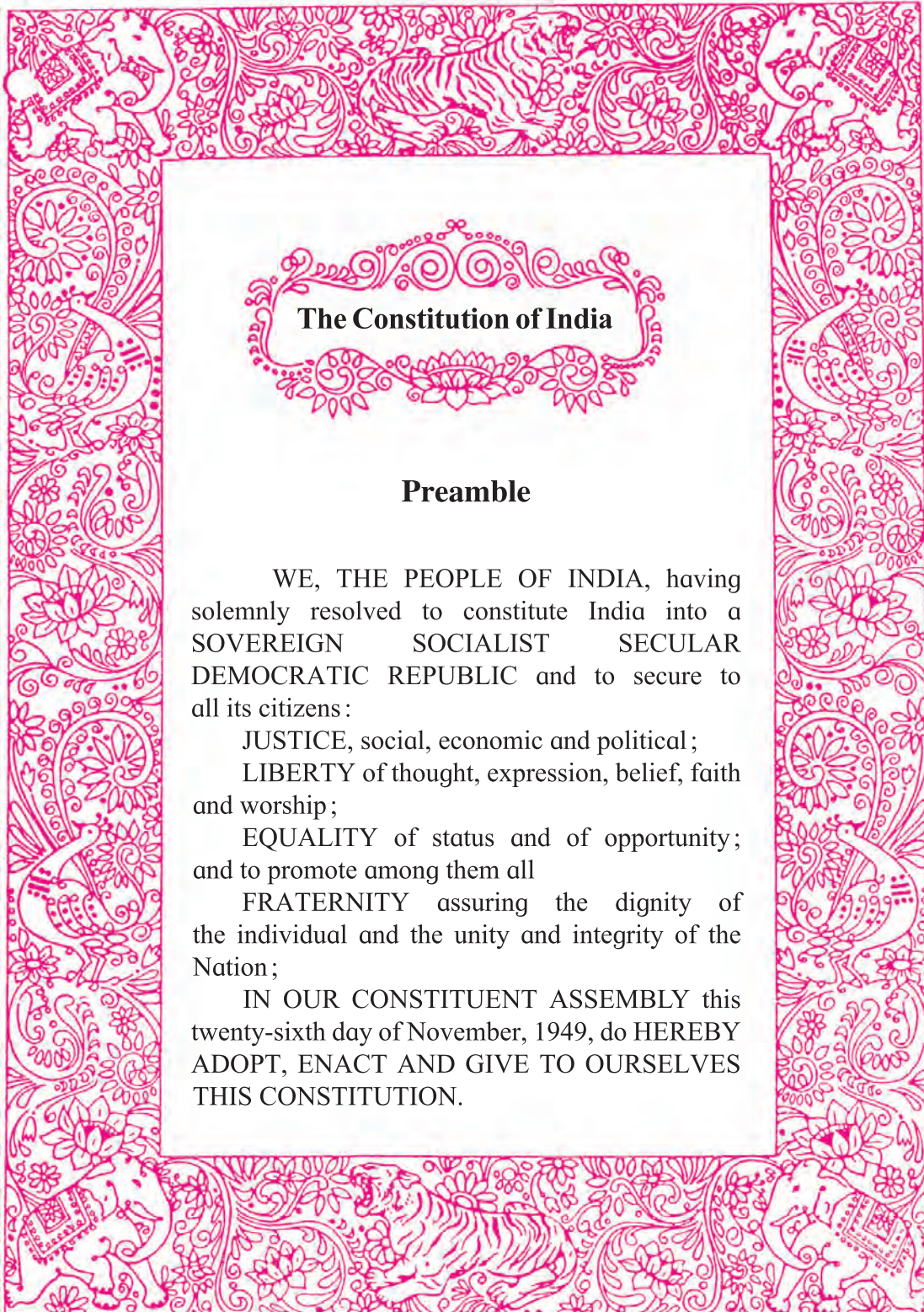
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The Constitution of India

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 Std IX. We have great pleasure in offering to you this Science and Technology textbook based on the new syllabus. From the Primary level till today, you have studied Science from various textbooks. From Std IX onwards, you will be able to study the fundamental concepts of Science and Technology from a different point of view through the medium of the different branches of Science.

The basic purpose of this textbook can be said to be 'Understand and explain to others' the science and technology that relates to our everyday lives. While studying the concepts, principles and theories in Science, do make the effort to understand their connection with day to day affairs. While studying from this textbook, use the sections 'Can you recall?' and 'Can you tell?' for revision. You will learn Science through the many activities given under the titles such as 'Observe and discuss.' and 'Try this' or 'Let's try this'. Activities like 'Use your brain power!', 'Research', 'Think about it.' will stimulate your power of thinking.

Many experiments have been included in the textbook. Carry out these experiments yourself, following the given procedure and making your own observations. Ask your teachers, parents or classmates for help whenever you need it. Interesting information which reveals the science underlying the events we commonly observe, and the technology developed on its basis, has been explained in this textbook through several activities. In this world of speed and technology, you have already become familiar with computers and mobile phones. While studying the textbook, make full and proper use of the devices of information communication technology, which will make your studies so much easier.

While carrying out the given activities and experiments, take all precautions with regard to handling apparatus, chemicals, etc. and encourage others to take the same precautions.

It is expected that while carrying out activities or observation involving plants and animals, you will also make efforts towards conservation of the environment. You must, of course, take all care to avoid doing any harm or causing injury to any plants or animals.

Do tell us about the parts that you like as well as about the difficulties that you face as you read and study and understand this textbook.

Our best wishes for your academic progress.



(Dr Sunil Magar)
Director

Pune
Date : 28 April 2017
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8 Vaishakh 1939

Maharashtra State Bureau of Textbook
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For teachers

- The real objective of science education is to learn to be able to think about events that are happening around us, logically and with discretion.
- In view of the age group of Std IX students, it would be appropriate now, in the process of science education, to give freedom and scope to the students' own curiosity about the events of the world, their propensity to go looking for the causes behind them and to their own initiative and capacity to take the lead.
- As experimentation is necessary to learn the skills of observation, logic, estimation, comparison and application of available data, which form a part of science education, deliberate efforts must be made to develop these skills while dealing with laboratory experiments given in the textbook. All observations that the students have noted should be accepted, and then they should be helped to achieve the expected results.
- These two years in middle school lay the foundation of higher education in Science. Hence, it is our duty and responsibility to enrich and enhance the students' interest in science. You all will of course always actively pursue the objective of developing their creativity and imbuing them with a scientific temper.
- You can use 'Let's recall' to review the previous knowledge required for a lesson and 'Can you tell?' to introduce a topic by eliciting all the knowledge that the students already have about it from their own reading or experience. You may of course use any of your own activities or questions for this purpose. Activities given under 'Try this' and 'Let's try this' help to explain the content of the lesson. The former are for students to do themselves and the latter are those that you are expected to demonstrate. 'Use your brain power!' is meant for application of previous knowledge as well as the new lesson, and 'Always remember' gives important suggestions/information or values. 'Research', 'Find out', 'Do you know?', 'An introduction to scientists' and 'Institutes at work' are meant to give some information about the world outside the textbook and to develop the habit of doing independent reference work to obtain additional information.
- This textbook is not meant for reading and explaining in the classroom but guiding students to learn the methods of gaining knowledge by carrying out the given activities. An informal atmosphere in the classroom is required to achieve the aims of this textbook. All students should be encouraged to participate in discussions, experiments and activities. Special efforts should be made to organise presentations or report-reading in the class based on students' activities and projects, besides observing of Science Day and other relevant occasions/ days.
- The science and technology content of the textbook has been complemented with Information Communication Technology. These activities are to be conducted under your guidance along with the learning of various new scientific concepts.

Front and back covers : Pictures of various activities, experiments and concepts in the book.

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Competency Statements Standard IX

The living world

1. To distinguish between the life processes of plants and animals.
2. To use the knowledge about chemical control in living organisms and based on that to understand/ explain events in day to day life.
3. To distinguish between the different types of tissue based on their exact structure.
4. To explain the importance/use of micro-organisms in the production of antibiotics.
5. To explain the cause and effect relationship between micro-organisms and the various life processes of living organisms.
6. To explain the various diseases caused by harmful micro-organisms and their remedies and to be able to take care of one's own health and that of society.
7. To classify plants scientifically.
8. To draw a diagram of the excretory system and nervous system of humans correctly and explain their importance in our life.
9. To explain the importance of the hormones secreted by the endocrine glands in the physical development of the body and to explain their causal relationship with problems like over-excitability and over-emotionality.

Diet and nutrition

1. To explain what is tissue culture and its use in agriculture and related occupations and to give information about processes involved in it.
2. To explain convincingly the importance of agriculture-related occupations for development of society.
3. To analyse the inter-relationship between the food chain and the energy pyramid.
4. To find out the reasons for the changes in the various cycles in nature.
5. To analyse the information about the factors that endanger individual and social health and suggest the remedies.
6. To change one's lifestyle by taking into account the effects of the various diseases and disorders.

Energy

1. To explain the inter-relationship between work and energy and to identify the type of work done in everyday instances.
2. To explain the logic involved in examples of work, energy and power from everyday life, and to solve numerical problems.
3. To explain the importance of various sound-related concepts in everyday life and solve various related problems.
4. To draw a diagram of a SONAR station and explain it.
5. To explain the sound-related functions of the human ear with the help of a diagram.
6. To identify the different types of mirrors, to give a scientific explanation of the images formed by them and to draw the related ray diagrams.
7. To find the number of multiple images by experiment.
8. To find out the scientific reasons for the use of the different types of mirrors in our daily life.

Substances

1. To describe the form, structure and shape of the substances of the universe and explain the science behind it.
2. To verify the laws of chemical combination, conservation of mass and constant proportions and to make inferences based on them.
3. To state the meaning of the concepts of molecular mass and mole, to recognise and write some molecular formulae as also to explain them.
4. To classify substances of everyday use with the help of indicators and to explain their uses on the basis of experiments.
5. To verify by experiments the effects of acids and alkalis on metals and non-metals
6. To eradicate superstitions and rigid customs prevailing in society with the help of relationship between indicators, acids and bases.
7. To produce natural indicators.
8. To demonstrate the effectiveness of the chemical substances.

Natural resources and disaster management

1. To explain the application/ relevance of modern science and technology in the work of the meteorological department.
2. To classify garbage generated in the house and in the surroundings.
3. To produce manure from garbage or reuse the waste materials.
4. To undertake activities related to cleanliness of surroundings and motivate others to do the same.
5. To compile information about how the disaster management systems function and make a presentation based on it. Thus to be able to overcome crisis situations in one's own life.

Motion, Force and Machines

1. To write equations of motion and use them to solve numerical problems.
2. To obtain formulae by drawing graphs involving quantities such as displacement, distance, time and velocity.
3. To verify the cause and effect relationships between motion and laws of motion as seen in various events of everyday life.

The Universe

1. To use the telescope for sky watching.
2. To explain the contribution of astronomy and modern technology to human progress.
3. To distinguish between the different types of telescopes.

Information Communication Technology (ICT)

1. To state the fundamental changes that computer technology has brought about in society and the fields of economics, science, industry, etc.
2. To use the computer to search for information in order to solve various problems.
3. To use the computer to explain scientific concepts.
4. To identify problems arising in using computer software and to resolve them.
5. To use different ways of processing the information obtained by using the computer.

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