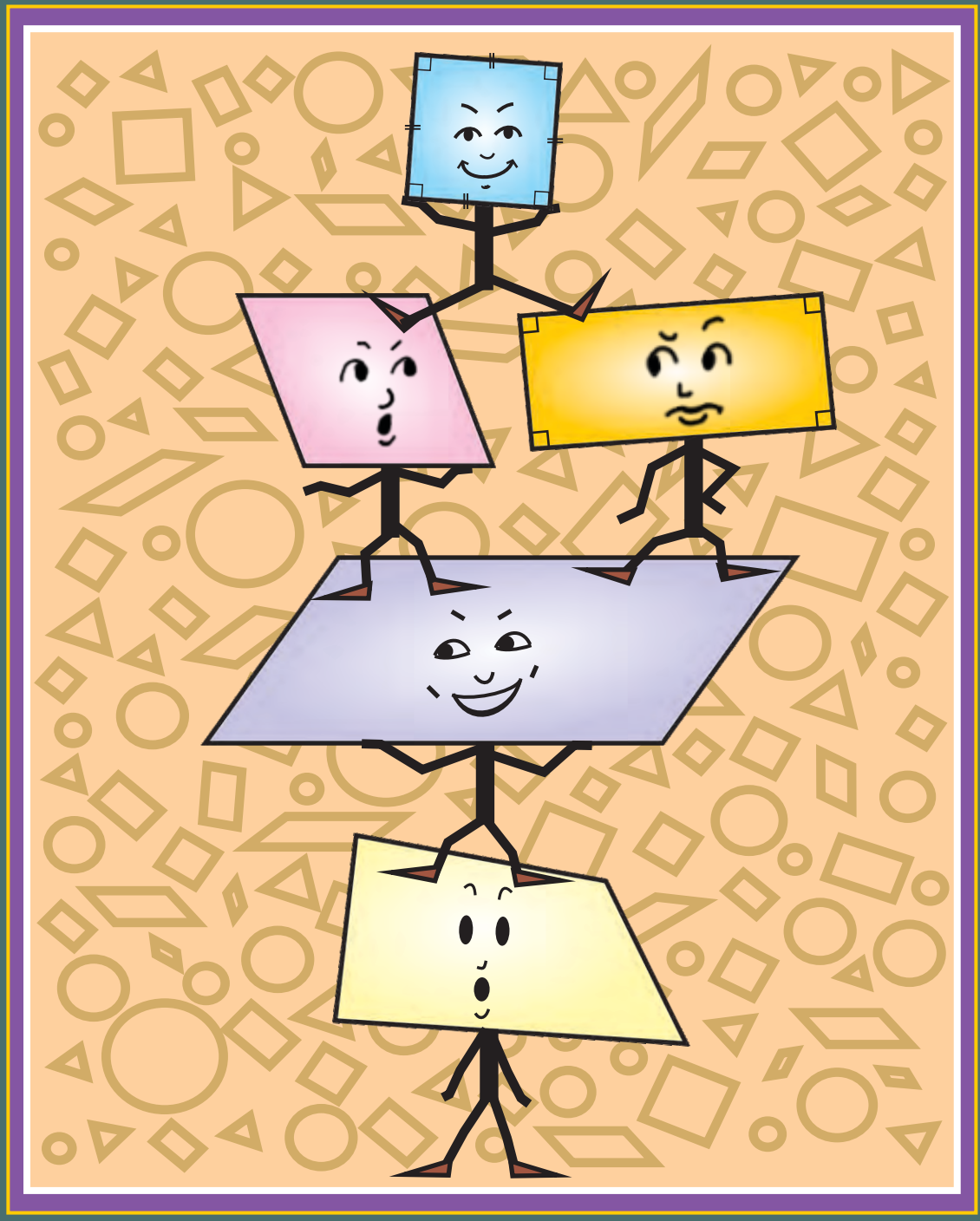
MATHEMATICS

STANDARD EIGHT



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.

The Coordination Committee formed by GR No. Abhyas - 2116/(Pra.Kra.43/16) SD - 4
Dated 25.4.2016 has given approval to prescribe this textbook in its meeting held on
29.12.2017 and it has been decided to implement it from the educational year 2018-19.

Mathematics

STANDARD EIGHT

Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune - 411 004

The digital textbook can be obtained through DIKSHA App on a smartphone by using the Q. R. Code given on title page of the textbook and useful audio-visual teaching-learning material of the relevant lesson will be available through the Q. R. Code given in each lesson of this textbook.

First Edition : 2018
Third Reprint : 2021

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Paper

70 GSM Cream wove

Print Order No.

N/PB/2021-22/1,00,000

Printer

LOKSHAHI OFFSET , JALGAON

Publisher

Vivek Uttam Gosavi, Controller
Maharashtra State Textbook Bureau,
Prabhadevi Mumbai- 400 025

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 in the Eighth standard!

You have studied the text books from standard I to standard VII by now. We are glad to hand over the text book of standard VIII to you.

Some activities and constructions are given in the book. These will help you understand the subject and make it interesting. So carry them out earnestly. Discuss them with your friends. This will reveal some new properties in Mathematics.

It is expected that you read each chapter in the text book scrupulously. If a part is not understood, discuss it with teachers, parents or other students and get it cleared. You can also take help of information technology. Use the Q.R.codes given at the end of chapters.

When you understand the content of a unit in a lesson, solve the problems given in the practice sets. It will help you to better understand and remember the points in the unit. You yourself can construct problems similar to those given in the practice sets. The star marked problems in practice sets are a little challenging. Do solve these also.

In mathematics, sometimes the given information seems small but using mathematical argument we can derive more results from it. Tests of congruence of triangles is such an example. You are going to use these tests in your further studies extensively. So study the tests minutely.

In practical life we come across the terms such as compound interest, discount, commission etc. related to monetary transactions. These topics, as well as the topics of variation, areas of regular and irregular shapes, volumes of some three dimensional shapes etc. are explained in the text book.

Study of Mathematics frequently needs the knowledge acquired in previous standards. So important formulae, properties etc. in different units are given under the head 'Now I know'. Commit those to memory.

The eighth standard is the end of primary education. So study sincerely and enter the ninth standard with confidence to start secondary education.

All the best for it !

(Dr. Sunil Magar)
Director
Maharashtra State Bureau of Textbook
Production and Curriculum Research, Pune.

Date : 18 April 2018, Akshayya Tritiya
Indian solar year : 28 Chaitra 1940

English Mathematics - Standard VIII

Suggested Pedagogical Processes	Learning Outcomes
The learner may be provided opportunities in pairs/groups/ individually and encouraged to — • explore examples of rational numbers with all the operations and explore patterns in these operations. • explore patterns in square numbers, square roots, cubes and cube roots of numbers and form rules for exponents as integer. • provide situations that lead to simple equations and encourage them to solve using suitable processes. • multiply/experience two algebraic expressions and different polynomials may be provided based on their previous knowledge of distributive property of numbers and generalise various algebraic identities using concrete examples. • factorise algebraic expressions using relevant activities based on previous knowledge of factorising two numbers. • situation may be provided that involve the use of percentages in contexts like discount, profit and loss, simple and compound interest, etc. • provide various situations to generalise the formula of compound interests through repeated use of simple interest. • a number of situations may be given where one quantity depends on the other, the quantities increase together, or in which while one increases the other decreases. For example, as the speed of a vehicle increases the time taken by it to cover the distance decreases. • measure the angles and sides of different quadrilaterals and let them identify patterns in the relationship among them, let them make hypothesis on the basis of generalisation of the patterns and later on verify through examples. • verify the properties of parallelograms and apply reasoning by doing activities such as constructing parallelograms, drawing their diagonals and measuring their sides and angles.	**The learner —** **08.71.01** generalises properties of addition, subtraction, multiplication and division of rational numbers through patterns. **08.71.02** finds out as many rational numbers as possible between two given rational numbers. **08.71.03** finds squares, cubes and square roots and cube roots of numbers using different methods. **08.71.04** solves problems with integral exponents. **08.71.05** solves puzzles and daily life problems using variables. **08.71.06** multiplies algebraic expressions. For example, expands $(2x-5)(3x^2+7)$. **08.71.07** uses various algebraic identities in solving problems of daily life. **08.71.08** applies the concept of percent in profit and loss situation in finding discount and compound interest. **08.71.09** calculates discount percent when marked price and actual discount are given or finds profit per cent when cost price and profit in a transaction are given. **08.71.10** solves problems based on direct and inverse proportions. **08.71.11** solves problems related to angles of a quadrilateral using angle sum property. **08.71.12** verifies properties of parallelograms and establishes the relationship between them through reasoning. **08.71.13** constructs different quadrilaterals using compasses and straight edge. **08.71.14** verifies Euler's relation through pattern.

• demonstrate the construction of various quadrilaterals using geometric kit. • sketch the figure of trapezium and other polygons in the given graph paper and ask students to estimate their areas using counting of unit square. • derive the formula for calculating area of trapezium using the areas of triangle and rectangle. (square) • identify that surfaces of various 3-D objects like cubes, cuboids and cylinder. • derive formulae for surface area of cubes and cuboids using the formulae for areas of rectangles, squares and circles. • demonstrate to find volume of a given cube and cubiod using unit cubes. • collect data, organise it into groups and represent it into bar graphs/ pie chart. • establish congruence criterion and later on verify the property by superimposing one above the other. • find a representative value of data, for example, mean, mode or median of ungrouped data. Encourage them to arrange it in a tabular form and represent it by bar graphs.	**08.71.15** estimates the area of shapes like trapezium and other polygons by using square grid/graph sheet and verifies using formulas. **08.71.16** finds the area of a polygon. **08.71.17** finds surface area and volume of cuboidal and cylindrical object. **08.71.18** draws and interprets bar charts. **08.71.19** verifies the properties of angles formed by the transversal of two parallel lines. **08.71.20** Uses, SSS, SAS, ASA, Hypo-side tests of congruence of triangles. **08.71.21** estimates the area of closed figures using graph paper or grid paper. **08.71.22** computes mean of the data used in day-to-day life. **08.71.23** constructs parallel line to the given line.

Guidlines for Teachers

It is expected that the text book of standard VIII should be used to establish dialogue with students. Tools such as question-answers, discussions, activities, etc. should be used to serve the purpose. This will be possible by reading the book throughly. While reading, underline the important sentences. Read the books of previous and next standards and other books also for reference. The matter on Q. R. code will also be useful.

In the book attempt is made to correlate mathematics with other subjects such as Environment, Geography, Science, Economics etc. Bring the fact to the notice of students. Encourage students to work out projects, activities and practicals. This will help students to understand the use of mathematics in practical life. In the text book, mathematical concepts are explained in simple language. It is expected that teachers should construct examples similar to those in practice sets and ask the students to solve them. Encourage the students also to construct and solve examples of their own.

The star-marked questions are a little challenging. The matter given under the head 'For more information' will definitely be useful to students for further studies.

We hope, you will definitely appreciate the book.

Index

Part 1

Part 2

Part 1

1 Rational and Irrational numbers

Let's recall.

We are familiar with Natural numbers, Whole numbers, Integers and Rational numbers.

Natural numbers

1,2,3,4,...

Whole numbers

0,1,2,3,4, ...

Integers

...,−4,−3,−2,−1, 0, 1, 2, 3,...

Rational numbers

$\frac{-25}{3}$, $\frac{10}{-7}$, -4, 0, 3, 8, $\frac{32}{3}$, $\frac{67}{5}$, etc.

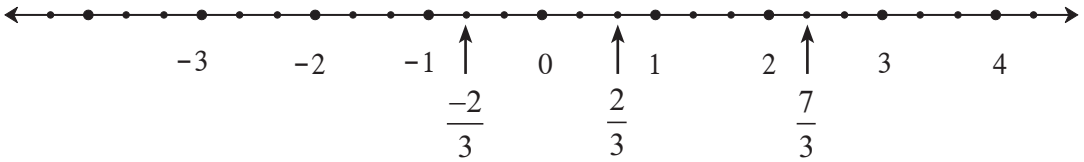
Rational numbers : The numbers of the form $\frac{m}{n}$ are called rational numbers. Here, m and n are integers but n is not zero.
We have also seen that there are infinite rational numbers between any two rational numbers.

Let's learn.

To show rational numbers on a number line

Let us see how to show $\frac{7}{3}$, 2, $\frac{-2}{3}$ on a number line.

Let us draw a number line.



- We can show the number 2 on a number line.
- $\frac{7}{3} = 7 \times \frac{1}{3}$, therefore each unit on the right side of zero is to be divided in three equal parts. The seventh point from zero shows $\frac{7}{3}$; or $\frac{7}{3} = 2 + \frac{1}{3}$, hence the point at $\frac{1}{3}$ rd distance of unit after 2 shows $\frac{7}{3}$.

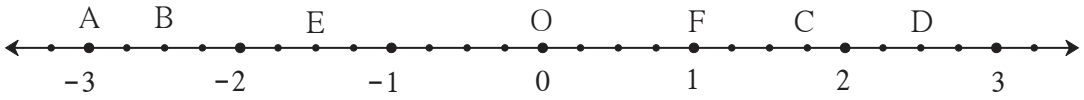
- To show $\frac{-2}{3}$ on the number line, first we show $\frac{2}{3}$ on it. The number to the left of 0 at the same distance will show the number $\frac{-2}{3}$.

Practice set 1.1

1. Show the following numbers on a number line. Draw a separate number line for each example.

(1) $\frac{3}{2}, \frac{5}{2}, -\frac{3}{2}$ (2) $\frac{7}{5}, \frac{-2}{5}, \frac{-4}{5}$ (3) $\frac{-5}{8}, \frac{11}{8}$ (4) $\frac{13}{10}, \frac{-17}{10}$

2. Observe the number line and answer the questions.



(1) Which number is indicated by point B?

(2) Which point indicates the number $1\frac{3}{4}$?

(3) State whether the statement, 'the point D denotes the number $\frac{5}{2}$' is true or false.

Let's learn.

Comparison of rational numbers

We know that, for any pair of numbers on a number line the number to the left is smaller than the other. Also, if the numerator and the denominator of a rational number is multiplied by any non zero number then the value of rational number does not change. It remains the same. That is, $\frac{a}{b} = \frac{ka}{kb}$, $(k \neq 0)$.

Ex. (1) Compare the numbers $\frac{5}{4}$ and $\frac{2}{3}$. Write using the proper symbol of <, =, >.

Solution : $\frac{5}{4} = \frac{5\times3}{4\times3} = \frac{15}{12}$ $\quad\quad$ $\frac{2}{3} = \frac{2\times4}{3\times4} = \frac{8}{12}$

$\frac{15}{12} > \frac{8}{12}$ $\quad\quad$ $\therefore \frac{5}{4} > \frac{2}{3}$