

Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 2.2- Real Numbers

BOOK SOLUTIONS
CLASS 9
MATHS

CHAPTER 2.2
Real Numbers



Maharashtra Board Solutions→

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Maharashtra Board Solutions Class 9-Maths

(Part 1): Chapter 2.2- Real Numbers

Class 9: Maths Chapter 2.2 solutions. Complete Class 9 Maths Chapter 2.2 Notes.

Maharashtra Board Solutions Class 9-Maths (Part 1): Chapter 2.2- Real Numbers

Maharashtra Board 9th Maths Chapter 2.2, Class 9 Maths Chapter 2.2 solutions

Question 1.

Show that $4\sqrt{2}$ is an irrational number.

Solution:

Let us assume that $4\sqrt{2}$ is a rational number .

So, we can find co-prime integers 'a' and 'b' ($b \neq 0$) such that

$$4\sqrt{2} = ab$$

$$\therefore \sqrt{2} = \frac{ab}{4}$$

Since, a and b are integers, $\frac{ab}{4}$ is a rational number and so $\sqrt{2}$ is a rational number.

Alternate Proof:

Let us assume that $4\sqrt{2}$ is a rational number.

So, we can find co-prime integers 'a' and 'b' ($b \neq 0$) such that

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$$4\sqrt{2} = \frac{a}{b}$$

$$\therefore b(4\sqrt{2}) = a$$

$$\therefore 32b^2 = a^2 \quad \dots (i) \text{ [Squaring both the sides]}$$

$$\therefore b^2 = \frac{a^2}{32}$$

Since, 32 divides a^2 , so 32 divides 'a' as well.

So, we write $a = 32c$, where c is an integer.

$$\therefore a^2 = (32c)^2 \dots \text{[Squaring both the sides]}$$

$$\therefore 32b^2 = 32 \times 32c^2 \dots \text{[From(i)]}$$

$$\therefore b^2 = 32c^2$$

$$\therefore c^2 = \frac{b^2}{32}$$

Since, 32 divides b^2 , so 32 divides 'b'.

$$\therefore 32 \text{ divides both } a \text{ and } b.$$

a and b have at least 32 as a common factor.

But this contradicts the fact that a and b have no common factor other than 1.

$\therefore$ Our assumption that $4\sqrt{2}$ is a rational number is wrong.

$\therefore 4\sqrt{2}$ is an irrational number.

Question 2.

Prove that $3 + \sqrt{5}$ is an irrational number.

Solution:

Let us assume that $3 + \sqrt{5}$ is a rational number.

So, we can find co-prime integers 'a' and 'b' ($b \neq 0$) such that

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$$3 + \sqrt{5} = \frac{a}{b}$$

$$\therefore \sqrt{5} = \frac{a}{b} - 3$$

Since, a and b are integers, $\frac{a}{b} - 3$ is a rational number and so $\sqrt{5}$ is a rational number.

But this contradicts the fact that $\sqrt{5}$ is an irrational number.

$\therefore$ Our assumption that $3 - \sqrt{5}$ is a rational number is wrong.

$3 + \sqrt{5}$ is an irrational number.

Question 3.

Represent the numbers $\sqrt{5}$ and $\sqrt{10}$ on a number line.

Solution:

i. Draw a number line and take point A at 2.

Draw AB perpendicular to the number line such that AB = 1 unit.

In $\triangle OAB$, $m\angle OAB = 90^\circ$

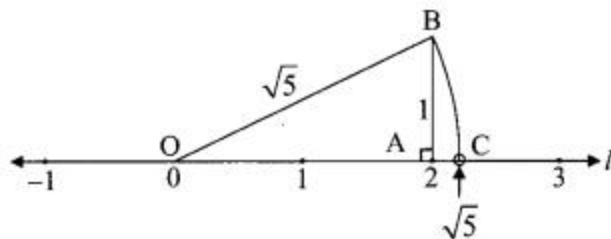
$$\therefore (OB)^2 = (OA)^2 + (AB)^2 \dots [\text{Pythagoras theorem}]$$

$$= (2)^2 + (1)^2$$

$$\therefore (OB)^2 = 5$$

$$\therefore OB = \sqrt{5} \text{ units. } \dots [\text{Taking square root of both sides}]$$

With O as centre and radius equal to OB, draw an arc to intersect the number line at C.



The coordinate of the point C is $\sqrt{5}$.

ii. Draw a number line and take point P at 3.

Draw PR perpendicular to the number line such that $PR = 1$ unit.

In $\triangle OPR$, $m\angle OPR = 90^\circ$

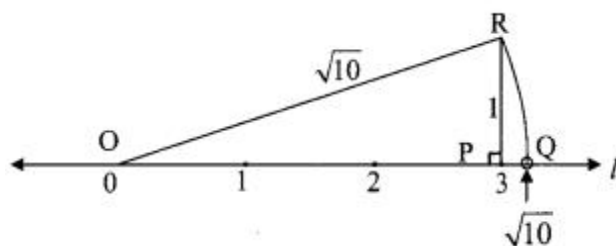
$\therefore (OR)^2 = (OP)^2 + (PR)^2 \dots$ [Pythagoras theorem]

$= (3)^2 + (1)^2$

$\therefore (OR)^2 = 10$

$\therefore OR = \sqrt{10}$ units. ... [Taking square root of both sides]

With O as centre and radius equal to OR, draw an arc to intersect the number line at Q.



The coordinate of the point Q is $\sqrt{10}$.

Question 4.

Write any three rational numbers between the two numbers given below.

i. 0.3 and -0.5

ii. -2.3 and -2.33

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iii. 5.2 and 5.3

iv. -4.5 and -4.6

Solution:

i. $0.3 = 0.30$ and $-0.5 = -0.50$

We know that,

$$0.30 > 0.29 > \dots > 0.10 > \dots > -0.10 > \dots > -0.30 > \dots > -0.50$$

$\therefore$ the three rational numbers between 0.3 and -0.5 are -0.3 , -0.1 and 0.1 .

Alternate Method:

A rational number between two rational numbers a and b

$$\begin{aligned} &= \frac{a + b}{2} \\ \frac{0.3 + (-0.5)}{2} &= \frac{0.3 - 0.5}{2} \\ &= \frac{-0.2}{2} \\ &= -0.1 \end{aligned}$$

$$\begin{aligned} \frac{0.3 + (-0.1)}{2} &= \frac{0.3 - 0.1}{2} \\ &= \frac{0.2}{2} \\ &= 0.1 \end{aligned}$$

$$\begin{aligned} \frac{-0.1 + (-0.5)}{2} &= \frac{-0.1 - 0.5}{2} \\ &= \frac{-0.6}{2} \\ &= -0.3 \end{aligned}$$

$\therefore$ the three rational numbers between 0.3 and -0.5 are -0.3 , -0.1 and 0.1 .

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ii. $-2.3 = -2.300$ and $-2.33 = -2.330$

We know that,

$-2.300 > -2.301 > \dots > -2.310 > \dots > -2.320 > \dots > -2.330$

$\therefore$ the three rational numbers between -2.3 and -2.33 are -2.310 , -2.320 and -2.325 .

iii. $5.2 = 5.20$ and $5.3 = 5.30$

We know that,

$5.20 < 5.21 < 5.22 < 5.23 < \dots < 5.30$

$\therefore$ the three rational numbers between 5.2 and 5.3 are 5.21 , 5.22 and 5.23 .

iv. $-4.5 = -4.50$ and $-4.6 = -4.60$ We know that,

$-4.50 > -4.51 > -4.52 > \dots > -4.55 > \dots > -4.60$

$\therefore$ the three rational numbers between -4.5 and -4.6 are -4.51 , -4.52 and -4.55 .



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- Chapter 1.2- Sets
- Chapter 1.3- Sets
- Chapter 1.4- Sets
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- Chapter 7.5- Statistics

About About Maharashtra State Board (MSBSHSE)

The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the

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concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

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FAQs

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As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

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