CHAPTER TEST: NUMBER SYSTEM
Mathematics | Class IX (2026/NUMSYS/09/002)
Time: 1.5 Hours **Max. Marks: 40**

GENERAL INSTRUCTIONS

– All questions are compulsory.

– The question paper consists of **five sections: A, B, C, D, and E**.

– Section A contains **8 Multiple Choice Questions (MCQs)** of **1 mark each**.

– Section B contains **4 Very Short Answer questions** of **2 marks each**.

– Section C contains **3 Short Answer questions** of **3 marks each**.

– Section D contains **2 Long Answer questions** of **5 marks each**.

– Section E contains **1 Case Study–based question** of **5 marks**.

– Use of calculators or any electronic devices is **not permitted**, unless stated otherwise.

– All necessary working steps must be clearly shown for full marks.

– The use of appropriate units and correct mathematical symbols is compulsory.

Section A (Multiple Choice Questions)

1. Every point on a number line represents:
   (a) a unique natural number
   (b) a unique rational number
   (c) a unique real number
   (d) a unique irrational number

2. The decimal expansion of π is:
   (a) 3.1416
   (b) Terminating
   (c) Non-terminating recurring
   (d) Non-terminating non-recurring

3. Which of the following is an irrational number?
   (a) $\sqrt{225}$
   (b) 0.3796
   (c) 7.478478...
   (d) 1.1010010001...

4. A rational number between $\sqrt{2}$ and $\sqrt{3}$ is:

(a) 1.5

(b) $\frac{\sqrt{2}+\sqrt{3}}{2}$

(c) 1.9

(d) 1.1

5. The value of $0.\overline{23} + 0.\overline{22}$ is:

(a) 0.45

(b) $0.\overline{45}$

(c) $\frac{45}{100}$

(d) $\frac{9}{20}$

6. If x is a non-zero rational number and y is an irrational number, then xy is:

(a) Always rational

(b) Always irrational

(c) Sometimes rational, sometimes irrational

(d) An integer

7. The standard form of the rational number $\frac{-48}{72}$ is:

(a) $\frac{-4}{6}$

(b) $\frac{-8}{12}$

(c) $\frac{-2}{3}$

(d) $\frac{2}{-3}$

8. Which of the following numbers can be represented as a terminating decimal?

(a) $\frac{1}{3}$

(b) $\frac{3}{11}$

(c) $\frac{7}{20}$

(d) $\frac{2}{7}$

Section B (Very Short Answer Questions)

1. Find two rational and two irrational numbers between 0.1 and 0.12. (2)

2. Represent $\sqrt{2}$ on the number line using a compass and a ruler. (Show construction steps briefly). (2)

3. Express $0.5\overline{7}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$. (2)

4. Examine whether $(2 - \sqrt{3})^2$ is a rational or an irrational number. Justify. (2)

Section C (Short Answer Questions)

1. Prove that $\sqrt{3}$ is an irrational number. (3)
2. State whether the following statements are true or false. Justify your answers:
   (a) Every irrational number is a real number.
   (b) Every point on the number line is of the form $\sqrt{m}$, where m is a natural number.
   (c) Every real number is an irrational number.

   (3)
3. Visualise 3.765 on the number line using successive magnification. (3)

Section D (Long Answer Questions)

1. Construct a square root spiral up to $\sqrt{5}$. Explain how the length of each new segment is determined using the Pythagorean Theorem. (5)
2. Let $x = 0.\overline{6}$ and $y = 0.4\overline{7}$.
   (a) Express x and y as fractions in simplest form.
   (b) Find $x + y$ and determine if the result is a terminating or non-terminating decimal.
   (c) Find a rational number and an irrational number between x and y.

   (5)

Section E (Case Study Based Question)

Case Study: The Land Surveyor's Calculation
A land surveyor, Mr. Sharma, is tasked with mapping a heritage site that contains several triangular plots. While measuring the boundaries, he encounters dimensions that are not easily represented by simple whole numbers. He finds that the diagonal of a square storage room with a side of 1 unit is exactly $\sqrt{2}$ units. His assistant, who only understands rational numbers, argues that $\sqrt{2}$ must be exactly 1.41. Mr. Sharma explains that while 1.41 is a useful approximation for construction, it is not the exact value. He demonstrates that real numbers comprise both rational numbers, which can be expressed as ratios of integers, and irrational numbers, which cannot. To ensure the blueprints are precise, Mr. Sharma must convert all recurring decimal readings from his digital sensors into standard rational forms. He explains that understanding the distinction between terminating, recurring, and non-recurring decimals is vital for the architectural integrity of the site.

Based on the above information, answer the following questions:

1. Which of the following best describes the number $\sqrt{2}$ mentioned by Mr. Sharma?
   (a) A terminating decimal
   (b) A non-terminating recurring decimal
   (c) A non-terminating non-recurring decimal
   (d) A rational number

2. If a digital sensor gives a reading of 0.123123123..., this number is:

   (a) Rational
   (b) Irrational
   (c) Not a real number
   (d) An integer

3. Mr. Sharma's assistant used 1.41 as an approximation for $\sqrt{2}$. The number 1.41 is:

   (a) Rational
   (b) Irrational
   (c) Not a real number
   (d) A natural number

4. The collection of all rational and irrational numbers mentioned in the case study is called:

   (a) Integers
   (b) Natural numbers
   (c) Real numbers
   (d) Whole numbers

5. If the side of the square room was 2 units instead of 1, the diagonal would be $\sqrt{8}$ units. The number $\sqrt{8}$ is:

   (a) Rational
   (b) Irrational
   (c) A whole number
   (d) Terminating