📘 CLASS 9 MATHEMATICS – GANITA MANJARI

⭐ CHAPTER 3: THE WORLD OF NUMBERS

📝 IMPORTANT QUESTIONS – NEW SYLLABUS 2026–27

These questions are based on the **Chapter 3: The World of Numbers** in the Ganita Manjari textbook, covering natural numbers, zero, integers, rational numbers, irrational numbers, real numbers, number-line representation, decimal expansions and cyclic numbers.

🟢 A. VERY SHORT ANSWER QUESTIONS

1. What are Natural Numbers? Give three examples.
2. What is the smallest Natural Number?
3. What is zero? Why is zero important in the number system?
4. State any three rules involving zero given by Brahmagupta.
5. What are Integers? Give examples of positive and negative integers.
6. What is the result of multiplying:
    - (i) a positive integer by a negative integer?
    - (ii) two negative integers?
7. What is a Rational Number?
8. Write the general form of a rational number.
9. Why can the denominator of a rational number never be zero?
10. What are Irrational Numbers?
11. Give two examples of irrational numbers.
12. What are Real Numbers?
13. What is the relationship between rational and irrational numbers?
14. What is the distance between two numbers a and b on the number line?
15. What is meant by the density of rational numbers?

🟡 B. NATURAL NUMBERS AND INTEGERS

16. Are Natural Numbers closed under addition? Give a reason.
17. Are Natural Numbers closed under subtraction? Give examples.
18. Are Natural Numbers closed under multiplication?
19. Explain why Natural Numbers are not closed under subtraction.
20. Find:

(i) 25 + (−13)
(ii) −18 + 7
(iii) −12 − (−8)
(iv) −15 × 4
(v) −9 × (−6)

21. Simplify:

25 − (−15)

22. Explain with a real-life example why:

a − (−b) = a + b

23. A temperature is 4°C at noon and drops by 15°C by midnight. Find the midnight temperature.
24. A trader has a debt of ₹850, makes a profit of ₹1,200 and then suffers a loss of ₹450. Find his final financial position.

🔵 C. RATIONAL NUMBERS

25. Write the following in p/q form:

(i) 5
(ii) −3
(iii) 0.75
(iv) −2.5

26. Determine whether the following pairs represent equal rational numbers:

(i) 2/3 and 4/6
(ii) 5/4 and 10/8
(iii) 9/3 and 3/1

27. Find:

(i) 2/5 + 3/10
(ii) 7/12 + 5/8
(iii) 5/6 − 1/4

28. Find:

(i) 2/3 × 3/10
(ii) 7/11 × 5/8
(iii) 2/3 ÷ 3/10

29. Explain how you add two rational numbers having different denominators.
30. Verify the distributive law for rational numbers.
31. Find the distance between:

(i) −4 and 3
(ii) −5 and −2
(iii) 3/2 and 5/2

32. Represent the following on a number line:

2/3, −5/4 and 11/2.

33. Find three distinct rational numbers between:

−1/2 and 1/4.

🟣 D. DENSITY OF RATIONAL NUMBERS

34. Find six rational numbers between 3 and 4.
35. Find five rational numbers between 2/5 and 3/5.
36. Find five rational numbers between 1/6 and 2/5.
37. Explain why there are infinitely many rational numbers between any two rational numbers.
38. Find a rational number between 1 and 3/2 using the average method.
39. If a and b are two rational numbers, show that:

(a + b)/2

is a rational number lying between a and b.

🔴 E. IRRATIONAL NUMBERS

40. What is an irrational number?
41. Give three examples of irrational numbers.
42. Explain why √2 is irrational.
43. Is π a rational or irrational number? Give a reason.
44. Write the difference between rational and irrational numbers.
45. Can an irrational number be written in the form p/q? Explain.
46. What type of decimal expansion does an irrational number have?
47. Explain why the rational numbers alone cannot completely fill the number line.
48. Locate √2 on the number line using a suitable geometric construction.

🟠 F. REAL NUMBERS

49. Define Real Numbers.
50. Complete the relationship:

Natural Numbers ⊂ _____ ⊂ _____ ⊂ Real Numbers.

51. Are all rational numbers real numbers?
52. Are all irrational numbers real numbers?
53. Explain why every point on the real number line represents a real number.
54. Classify the following numbers as rational or irrational:

(i) 3/5
(ii) √2
(iii) π
(iv) −7
(v) 0.25
(vi) √9

🟤 G. DECIMAL EXPANSIONS

55. What are the two possible decimal expansions of a rational number?
56. What is a terminating decimal?
57. What is a repeating decimal?
58. Determine whether the following have terminating or repeating decimal expansions:

(i) 7/20
(ii) 4/15
(iii) 13/250

59. Without performing long division, determine whether 18/125 has a terminating decimal expansion.
60. A rational number in lowest form has denominator $2^3 \times 5$. How many decimal places will its decimal expansion have?
61. Explain the condition for a rational number to have a terminating decimal expansion.
62. Why does an irrational number have a non-terminating, non-repeating decimal expansion?
63. Convert a repeating decimal into a fraction.

Example:

x = 0.333...

⭐ H. CYCLIC NUMBERS

64. What is a cyclic number?
65. Write the decimal expansion of 1/7.
66. What is the repeating block in:

1/7 = 0.142857142857...

67. What happens when 142857 is multiplied by 1, 2, 3, 4, 5 and 6?
68. Explain the cyclic pattern in the decimal expansion of 1/7.
69. Why are cyclic numbers associated with repeating rational decimals?

⭐ I. HIGHER-ORDER THINKING QUESTIONS

70. Natural Numbers are closed under addition but not under subtraction. Explain with examples.
71. Why is the product of two negative integers positive?
72. Without assigning numerical values, let a and b be non-zero rational numbers such that:

$a/b + b/a = 0$

Determine whether ab is positive or negative and justify your answer.

73. A rational number has a terminating decimal expansion whose last non-zero digit occurs in the fourth decimal place. Explain why it can be written in the form:

$p/10^4$

where p is not divisible by 10.

74. Explain why there are infinitely many rational numbers between any two rational numbers, even if they are extremely close.
75. Three rational numbers x, y and z satisfy:

$x + y + z = 0$

$xy + yz + zx = 0$

Show that x, y and z must all be zero.

🏆 MOST IMPORTANT QUESTIONS FOR YOUR PDF

If you want to keep the **Important Questions PDF concise**, I recommend giving ⭐ priority to these:

1. ⭐ Explain the number-system hierarchy.
2. ⭐ State and apply Brahmagupta's rules involving zero.
3. ⭐ Solve problems involving positive and negative integers.
4. ⭐ Explain why Natural Numbers are not closed under subtraction.
5. ⭐ Perform operations on rational numbers.
6. ⭐ Represent rational numbers on a number line.
7. ⭐ Find the distance between two rational numbers.
8. ⭐ Find rational numbers between two given rational numbers.
9. ⭐ Explain the density of rational numbers.
10. ⭐ Prove that $\sqrt{2}$ is irrational.
11. ⭐ Explain the difference between rational and irrational numbers.
12. ⭐ Locate $\sqrt{2}$ geometrically on the number line.
13. ⭐ Determine whether a rational number has a terminating or repeating decimal.
14. ⭐ State the condition for terminating decimal expansion.

15. ⭐ Convert a repeating decimal into a fraction.
16. ⭐ Explain cyclic numbers using 1/7.
17. ⭐ Classify numbers as natural, integer, rational, irrational and real.
18. ⭐ Solve application-based problems involving integers and rational numbers.
19. ⭐ Prove that there are infinitely many rational numbers between two rational numbers.
20. ⭐ Solve higher-order problems involving rational numbers.

📌 QUICK REVISION BOX

🔢 **Natural Numbers:** 1, 2, 3, ...

➕ **Integers:** ..., −2, −1, 0, 1, 2, ...

➗ **Rational Numbers:** p/q, where q ≠ 0

√ **Irrational Numbers:** Cannot be written as p/q

🌍 **Real Numbers:** Rational + Irrational numbers

📍 **Distance between a and b:** |a − b|

🔁 **Rational decimal:** Terminating or repeating

♾️ **Irrational decimal:** Non-terminating and non-repeating

📊 **Number hierarchy:**

Natural Numbers ⊂ Integers ⊂ Rational Numbers ⊂ Real Numbers

The textbook specifically highlights rational-number density, irrational numbers such as √2 and π, real numbers, and terminating/repeating decimal expansions as major Chapter 3 ideas.

📘 Class 9 Maths – Chapter 3

📝 IMPORTANT QUESTIONS – ANSWER KEY

🌍 The World of Numbers

🟢 A. VERY SHORT ANSWERS

1. Natural Numbers = counting numbers starting from 1.
👉 1, 2, 3, 4, ...

2. 👉 1

3. Zero represents the absence of a quantity and is a number in the number system.

4.
👉 a + 0 = a
👉 a − 0 = a
👉 a × 0 = 0

5. Integers = ..., −3, −2, −1, 0, 1, 2, 3, ...

6.
(i) Positive × Negative = **Negative**
(ii) Negative × Negative = **Positive**

7. A rational number is a number that can be written as **p/q**, where p and q are integers and q ≠ 0.

8. 👉 p/q, q ≠ 0

9. Division by zero is not defined.

10. Irrational numbers cannot be expressed in the form p/q.

11. 👉 √2, √3, π

12. Real Numbers = Rational Numbers + Irrational Numbers.

13. Rational and irrational numbers together form the real numbers.

14. 👉 |a − b|

15. There are infinitely many rational numbers between any two rational numbers.

🟡 B. NATURAL NUMBERS & INTEGERS

16. Yes. The sum of two natural numbers is always a natural number.

17. No.
Example: 3 − 5 = −2, which is not a natural number.

18. Yes. Natural numbers are closed under multiplication.

19. Because subtracting a larger natural number from a smaller one can give a negative number.

20.
(i) 25 + (−13) = **12**
(ii) −18 + 7 = **−11**
(iii) −12 − (−8) = **−4**
(iv) −15 × 4 = **−60**
(v) −9 × (−6) = **54**

21.
25 − (−15) = **40**

22.
Subtracting a negative is equivalent to adding a positive:
👉 a − (−b) = a + b

23.
4 − 15 = **−11°C**

24.
−850 + 1200 − 450 = **−100**
👉 Final position = **₹100 debt**

🔵 C. RATIONAL NUMBERS

25.
(i) 5 = **5/1**
(ii) −3 = **−3/1**
(iii) 0.75 = **3/4**
(iv) −2.5 = **−5/2**

26.
(i) 2/3 = 4/6 ✅
(ii) 5/4 = 10/8 ✅
(iii) 9/3 = 3/1 = 3 ✅

27.
(i) 2/5 + 3/10 = **7/10**
(ii) 7/12 + 5/8 = **29/24 = 1 5/24**
(iii) 5/6 − 1/4 = **7/12**

28.
(i) 2/3 × 3/10 = **1/5**
(ii) 7/11 × 5/8 = **35/88**
(iii) 2/3 ÷ 3/10 = **20/9**

29. Find the LCM of the denominators, convert the fractions to equivalent fractions with the common denominator, and then add/subtract.

30.
👉 a(b + c) = ab + ac
The distributive law holds for rational numbers.

31.
(i) Distance between −4 and 3 = **7 units**
(ii) Distance between −5 and −2 = **3 units**
(iii) Distance between 3/2 and 5/2 = **1 unit**

32. Plot **2/3, −5/4 and 11/2** at their corresponding positions on the number line.

33. Examples:
👉 −1/4, −1/8, 0

🟣 D. DENSITY OF RATIONAL NUMBERS

34. Six rational numbers between 3 and 4:
👉 31/10, 32/10, 33/10, 34/10, 35/10, 36/10

35. Five rational numbers between 2/5 and 3/5:
👉 21/50, 22/50, 23/50, 24/50, 25/50

36. Five rational numbers between 1/6 and 2/5:
👉 11/60, 12/60, 13/60, 14/60, 15/60

37. The average of two rational numbers is another rational number between them. This process can be repeated infinitely.

38.
(1 + 3/2) ÷ 2 = **5/4**

39.
(a + b)/2 is rational because the sum and division of rational numbers by a non-zero rational number remain rational. It lies between a and b.

🔴 E. IRRATIONAL NUMBERS

40. A number that cannot be expressed as p/q is an irrational number.

41. 👉 √2, √3, π

42. √2 is irrational; it cannot be expressed as the ratio of two integers.

43. 👉 π is **irrational**.

44.

Rational	Irrational
Can be written as p/q	Cannot be written as p/q
Decimal terminates or repeats	Decimal never terminates or repeats

45. No. An irrational number cannot be expressed as p/q.

46. Non-terminating and non-repeating.

47. Rational numbers do not account for irrational numbers, which also lie on the real number line.

48. √2 can be constructed geometrically and then marked on the number line.

🟠 F. REAL NUMBERS

49. Real Numbers consist of all rational and irrational numbers.

50.
👉 Natural Numbers ⊂ Integers ⊂ Rational Numbers ⊂ Real Numbers

51. 👉 Yes ✅

52. 👉 Yes ✅

53. The real number line contains both rational and irrational numbers.

54.
(i) 3/5 → **Rational**
(ii) √2 → **Irrational**
(iii) π → **Irrational**
(iv) −7 → **Rational**
(v) 0.25 → **Rational**
(vi) √9 = 3 → **Rational**

🟤 G. DECIMAL EXPANSIONS

55.
👉 Terminating
👉 Repeating/non-terminating repeating

56. A decimal that ends after a finite number of digits.

57. A decimal in which a digit or group of digits repeats indefinitely.

58.
(i) 7/20 → **Terminating**
(ii) 4/15 → **Non-terminating repeating**
(iii) 13/250 → **Terminating**

59. 18/125 → **Terminating**
👉 18/125 = 0.144

60. $2^3 \times 5 = 40$.
👉 Decimal expansion has **3 decimal places**.

61. In lowest form, the denominator must have no prime factors other than **2 and/or 5**.

62. Because irrational numbers cannot be represented as fractions and their decimal expansions neither terminate nor repeat.

63. Example:
x = 0.333...
10x = 3.333...

10x − x = 3
9x = 3
👉 **x = 1/3**

⭐ H. CYCLIC NUMBERS

64. A cyclic number is a number whose digits show a repeating cyclic pattern under multiplication.

65.
1/7 = **0.142857142857...**

66. Repeating block = **142857**

67.

142857 × 1 = **142857**
142857 × 2 = **285714**
142857 × 3 = **428571**
142857 × 4 = **571428**
142857 × 5 = **714285**
142857 × 6 = **857142**

The same six digits shift cyclically.

68. The digits 142857 appear in different cyclic orders when multiplied by 1–6.

69. Cyclic patterns occur in the repeating blocks of certain rational decimals, such as 1/7.

🏆 I. HIGHER-ORDER THINKING

70. Natural numbers are closed under addition but not subtraction.
Example:
3 + 5 = 8 ✅
3 − 5 = −2 ❌

71. Two negatives multiplied together give a positive:
👉 (−) × (−) = (+)

72. ⚠️ No non-zero rational numbers a and b satisfy the given condition.

Given:
$a/b + b/a = 0$

Multiplying by ab:

$a^2 + b^2 = 0$

For rational numbers, this is possible only when:

👉 a = 0 and b = 0

But the question states that a and b are non-zero. Therefore, **no such rational numbers exist**.

73. If the last non-zero digit is at the fourth decimal place, the number can be expressed as:

👉 $p/10^4$

where p is an integer not divisible by 10.

74. Between any two rational numbers a and b, their average:

👉 $(a + b)/2$

is another rational number. Repeating this process gives infinitely many rational numbers.

75. Given:

$x + y + z = 0$
$xy + yz + zx = 0$

Now,

$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx)$

Therefore:

$0 = x^2 + y^2 + z^2$

Since x, y and z are rational numbers, each square is non-negative.

Hence:

👉 **x = 0, y = 0, z = 0**

📌 ANSWERS AT A GLANCE

20. 12, −11, −4, −60, 54
21. 40
23. −11°C
24. ₹100 debt
27. 7/10, 29/24, 7/12
28. 1/5, 35/88, 20/9
31. 7, 3, 1 units
33. −1/4, −1/8, 0
34. Any six rationals between 3 and 4
35. Any five rationals between 2/5 and 3/5
38. 5/4
54. R, I, I, R, R, R
58. Terminating, repeating, terminating
59. 0.144
60. 3 decimal places
65. 0.142857...
66. 142857
75. x = y = z = 0