Maharashtra State Board
Class IX Mathematics
(Algebra) Board Paper 1

Time: 2 hours **Total Marks: 40**

Note: - (1) All questions are compulsory.
(2) Use of calculator is not allowed.

1. Attempt any five sub-questions from the following: **5**

i. If $n(A \cup B) = 40$, $n(A) = 20$ and $n(A \cap B) = 12$, find $n(B)$.

ii. Simplify: $\sqrt{50} - \sqrt{98} + \sqrt{162}$

iii. Factorise: $8y^3 - \frac{125}{y^3}$

iv. In which quadrant does the point lie if its x-co-ordinate is negative and y-co-ordinate is positive?

v. Find the ratio of the first quantity with the second in its simplest form.

2.5 Kg, 8500 gm

vi. The mean of seven numbers is 63. If the six numbers are 65, 70, 68, 59, 73, 55. Find the seventh number.

2. Attempt any four sub-questions from the following: **8**

i. Which of the following sets are empty?

(a) B = {x|x is a capital of India}.

(b) F = {y|y is a point of intersection of two parallel lines}

ii. Rationalize the denominator: $\frac{1}{2\sqrt{3} + \sqrt{7}}$

iii. Find the value of a, if $(x - 2)$ is a factor of $2x^3 - 6x^2 + 5x + a$.

iv. Write the rational number $\frac{27}{99}$ in decimal form.

v. Solve: $2x + y = 5$; $3x - y = 5$

vi. Factorise: $27x^3 + y^3 + z^3 - 9xyz$

3. Attempt any three of the following sub-questions: **9**

i. The mean weight of 25 students of a class is 48 kg. If the mean weight of first 13 students is 50 kg and that of last 13 students is 46 kg. Find the weight of the 13^{th} student.

ii. Divide $12x^3 - 11x^2 + 9x + 18$ by $4x + 3$ and express as Dividend = Divisor × Quotient + Remainder.

iii. Draw the graph of $-3x + 4y = 12$.

iv. Solve by substitution method: $2x - y - 3 = 0$; $4x - y - 5 = 0$

v. If b is the geometric mean of a and c, then show that

$$a^2b^2c^2\left[\frac{1}{a^3} + \frac{1}{b^3} + \frac{1}{c^3}\right] = a^3 + b^3 + c^3$$

4. Attempt any two sub-questions from the following: 8

i. Draw a subdivided bar diagram to denote the following given information:

Number of tourists	Country A	Country B
Jan	2,000	1,500
Feb	3,500	1,000
Mar	4,000	1,200
Apr	2,000	4,500
May	1,000	3,000
Jun	1,000	1,500

ii. Plot the points P (2, 4), Q (−3, 4) and R (0, 4). Are these points collinear? If so, draw the line passing through them. Justify your result.

iii. Draw a Venn diagram showing sub-set relations of the following sets.

A = {2, 4}

B = $\{x|x = 2^n, n < 5, n \in N\}$

C = {x|x is an even natural number ≤ 16}

5. Attempt any two of the following sub-questions: 10

i. If $\frac{\sqrt{7}-1}{\sqrt{7}+1} - \frac{\sqrt{7}+1}{\sqrt{7}-1} = a + b\sqrt{7}$, find the values of a and b.

ii.

(a) Find the zeroes of the quadratic polynomial $x^2 - 4x - 5$ and verify the relationship between the zeroes and the coefficients.

(b) Find the quadratic polynomial, the sum and product of whose zeroes are −11 and 10 respectively.

iii. If a, b, c are in continued proportion, then show that $\frac{(a+b)^2}{(b+c)^2} = \frac{a^2+b^2}{b^2+c^2}$.