Name Sayesha Roll No 35

MID TERM EXAMINATION (2025-2026)

CLASS X

BB

SUBJECT : MATHEMATICS

Time : 3 Hours **M.M. : 80**

General Instructions:

1. This question paper contains **38** questions. All questions are compulsory.
2. This question paper is divided into five Sections—**A, B, C, D** and **E.**
3. **Section A (Q1-Q18)** are Multiple Choice Questions (MCQ) and Questions **19** and **20** are **Assertion-Reason** based questions of 1 mark each.
4. **Section B (Q21-Q25)** are Very Short Answer (VSA) type questions carrying 2 marks each.
5. **Section C (Q26-Q31)** are Short Answer (SA) type questions carrying 3 marks each.
6. **Section D (Q32-Q35)** are Long Answer (LA) type questions carrying 5 marks each.
7. **Section E (Q36-Q38)** are Case Study Based Integrated questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study.
8. There is no overall choice. However, an internal choice has been provided in 2 questions of Section B, 2 question of Section C, 2 questions of Section D and 3 questions 2 marks in Section E.
9. Draw neat diagrams wherever required. Take $\pi = 22.7$ unless stated otherwise.
10. Use of calculators is **not allowed.**

SECTION-A

This section consists of 20 questions of 1 mark each.

Q1 In a right triangle ABC, right angled at A, if $\sin B = \frac{1}{4}$, then what is the value of sec B?

a) 4 b) $\sqrt{\frac{15}{4}}$ c) $\sqrt{15}$ d) $\frac{4}{\sqrt{15}}$

Q2 Find the greatest number which divides 281 and 1249, leaving remainders 5 and 7 respectively.

a) 23 b) 276 c) 138 d) 69

Q3 If α and β are the zeroes of the polynomial $3x^2 + 6x + k$, such that $\alpha + \beta + \alpha\beta = \frac{-2}{3}$, then find the value of k.

a) -8 b) 8 c) -4 d) 4

Q4 Which of the following quadratic equations has real and equal roots?

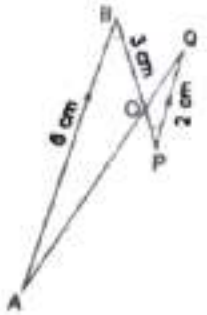
a) $(x+1)^2 = 2x + 1$ b) $x^2 + x = 0$

c) $x^2 - 4 = 0$ d) $x^2 + x + 1 = 0$

Q5 Find the distance between the points $(0, 2\sqrt{5})$ and $(-2\sqrt{5}, 0)$

a) $2\sqrt{10}$ units b) $4\sqrt{10}$ units c) $2\sqrt{20}$ units d) 0

Q6 In the given figure, AB || PQ. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then find the length of OQ.



a) 9 cm b) 3 cm c) 4 cm d) 1 cm

Q7 If $\sin\theta + \cos\theta = \sqrt{2}$, then find the value of $\tan\theta + \cot\theta$.

a) 1 b) 2 c) 3 d) 4

Q8. On walking x m towards a tower in a horizontal line through its base, the angle of elevation of its top changes from 30° to 60°. Find the height of the tower.

a) $(3\sqrt{2})\,x$ m b) $(2\sqrt{3})\,x$ m c) $\frac{\sqrt{3}}{2}\,x$ m d) $\frac{2}{\sqrt{3}}\,x$ m

Q9 If the system of equations $3x + y = 1$ and $(2k-1)x + (k-1)y = 2k+1$ is inconsistent, then find the value of k.

a) −1 b) 0 c) 1 d) 2

Q10 If LCM (x, 18) = 36 and HCF (x, 18) = 2, then what is the value of x?

a) 2 b) 3 c) 4 d) 5

Q11 Find the common difference of the A.P : $\frac{1}{(2x)}, \frac{(1-4x)}{(2x)}, \frac{(1-8x)}{(2x)}, \ldots$

a) −2x b) −2 c) 2 d) 2x

Q12. Point P divides the line segment joining A(4, −5) and B(1, 2) in the ratio 5:2. Find the coordinates of P.

a) $\left(\frac{5}{2}, \frac{-3}{2}\right)$ b) $\left(\frac{11}{7}, 0\right)$ c) $\left(\frac{13}{7}, 0\right)$ d) $\left(0, \frac{13}{7}\right)$

Q13 $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC and ΔPQR respectively and $AB^2 : PQ^2 = 4 : 9$, then find AM : PN.

a) 3 : 2 b) 16 : 81 c) 4 : 9 d) 2 : 3

Q14. If α, β are zeroes of polynomial $P(x) = 4x^2 - 3x - 7$, then find the value of $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$

a) $\frac{7}{3}$ (b) $-\frac{7}{3}$ c) $\frac{3}{7}$ d) $-\frac{3}{7}$

Q15 Find the value of p for which the equations $px + 3y = p - 3$ and $12x + py = p$ have infinitely many solutions.

a) –6 only b) ±6 c) 6 only d) any real no. except ±6

Q16 Find the roots of the equation $x^2 - 3x - m(m+3) = 0$, where m is a constant.

a) m, m+3 b) –m, m+3 c) m, –(m+3) d) –m, –(m+3)

Q17. If $\cos\theta = \frac{12}{13}$, find the value of $(5\,\text{cosec}\,\theta - 4\tan\theta)$.

a) $\frac{10}{39}$ b) $\frac{131}{60}$ c) $\frac{31}{3}$ d) $\frac{34}{3}$

Q18. Two A.P.s have the same common difference. The first term of one A.P. is –1 and that of the other is –8. Find the difference between their 4th term.

a) 1 b) –7 c) 7 d) 9

Directions (Q19–Q20): Assertion–Reason

In question numbers 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option.

a) Both **A** and **R** are true, and **R** is the correct explanation of **A**.

b) Both **A** and **R** are true, but **R** is not the correct explanation of **A**.

c) **A is true, but R is false.**

d) **A** is false, but **R** is true.

Q19. **Assertion (A)**: If two triangles are similar, their corresponding angles are equal.

Reason (R): Any two equilateral triangles are always similar.

Q20. **Assertion (A)**: If points A(4, 3) and B(x, 5) lie on a circle with centre O(2, 3), then the value of x is 2.

Reason (R): The centre of a circle is the midpoint of each chord of the circle.

SECTION B

This section consists of 5 questions of 2 marks each.

Q21 Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{-3}{2}$.

Q22 Find the value of k, for which one root of the quadratic equation $kx^2 - 14x + 8 = 0$ is six times the other.

Q23. Prove that $5\sqrt{3} + 2$ is an irrational number, given that $\sqrt{3}$ is irrational.

Q24. Evaluate: $\dfrac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin^2 30° + \cos^2 30°}$

OR

Find an acute angle θ when $\dfrac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \dfrac{1-\sqrt{3}}{1+\sqrt{3}}$

Q25. Determine k so that $k^2 + 4k + 8$, $2k^2 + 3k + 6$, $3k^2 + 4k + 4$ are three consecutive terms of A.P.

OR

If the 10th term of an A.P. is 52 and the 17th term is 20 more than the 13th term, find the A

SECTION C

This section consists of 6 questions of 3 marks each.

Q26. Two people are 16 km apart on a straight road. They start walking at the same time. If th walk towards each other with different speeds, they will meet in 2 hours. Had they walked the same direction with same speed as before, they would meet in 8 hours. Find their walki speeds.

Q27. Find the ratio in which P(4,m) divides the line segment joining the points A(2,3) and B(6,-3 Hence, find 'm'.

OR

If (a,b) is the mid-point of the line segment joining the points A(10,–6) and B(k,4) lies a–2b=18. Find the value of k and the distance AB.

Q28. State and prove Basic Proportionality Theorem.

Q29. Prove that: $\sqrt{\sec^2\theta + \text{cosec}^2\theta} = \tan\theta + \cot\theta$

OR

If $\text{cosec}\,\theta = x + \dfrac{1}{4x}$, prove that : $\text{cosec}\,\theta + \cot\theta = 2x$ or $\dfrac{1}{2x}$

Q30. Is it possible to design a rectangular park of perimeter 80 m and area 400 m²? If so, find length and breadth.

Q31. A tree breaks due to storm and broken part bends so that the top of the tree touches t ground making an angle 30° with it. The distance between the foot of the tree to the poi where the top touches the ground is 8 m. Find the height of the tree.

SECTION D

This section consists of 4 questions of 5 marks each.

Q32. The 3rd and the 14th terms of an A.P. are (–9) and (35) respectively. Which term of this A.P. is 5 times the 6th term? (Show working) q.

Q33. Find the roots of the equation

$$\frac{1}{2x-3}+\frac{1}{x-5}=1, x\neq\frac{3}{2}, 5$$

by using quadratic formula.

OR

A train travelling at a uniform speed for 360 km would have taken 48 min less to travel the same distance if its speed were 5 km/hr more. Find the original speed of the train.

Q34. A pole 6 m high is fixed on the top of a tower. The angle of elevation of the top of the pole observed from a point P on the ground is 60° and the angle of depression of the point P from the top of the tower is 45°. Find the height of the tower and the distance of point P from the foot of the tower. (Use $\sqrt{3}$ = 1.73)

OR

From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30°. Determine the height of the tower.

Q35. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$.

SECTION E

This section consists of 3 case-study based questions of 4 marks each .

Q36. Shruti's father gave her some money to buy kiwi from the market for rupees $p(x) = x^2 - 28x + 160$

Where α, β are the zeroes of p(x).

Based on the above information, answer the following questions:

(i) Find the value α and β where $\alpha < \beta$. **[1]**

(ii) Find a quadratic polynomial, whose zeroes are $\frac{1}{4}$ and -1. **[1]**

(iii) If sum of zeroes of $q(x) = kx^2 + 2x + 3k$ is equal to their product, then what is the value of k?

OR

Write the polynomial whose zeroes are $(3+\sqrt{2})$ and $(3-\sqrt{2})$. **[2]**