Art Room

Code N0: 10HYE25MATS03 QP

KENDRIYA VIDYALAYA SANGATHAN, ERNAKULAM REGION

HALF YEARLY EXAMINATION : 2025 – 26

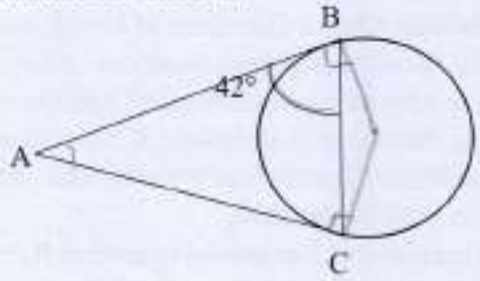
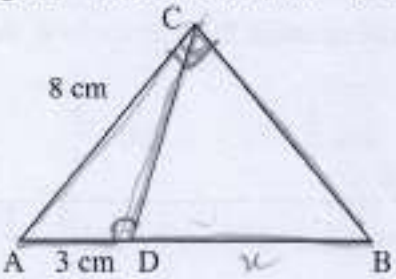
CLASS : X, MATHEMATICS STANDARD (Code: 041)

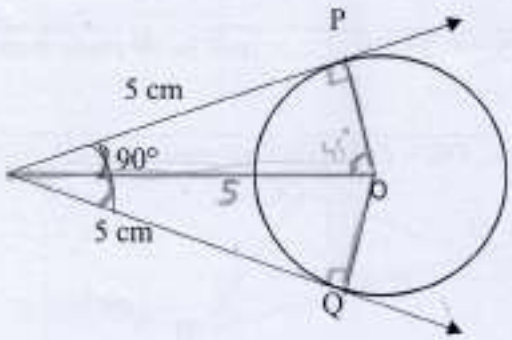
DURATION : 03 HOURS **MAX.MARKS : 80**

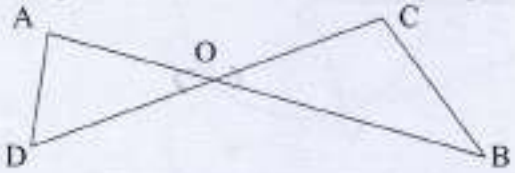
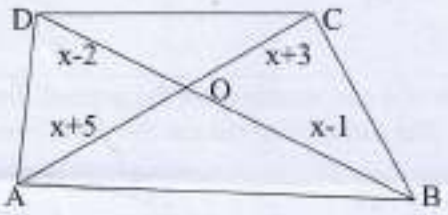
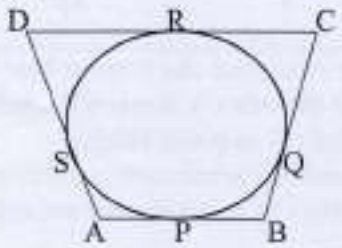
GENERAL INSTRUCTIONS:

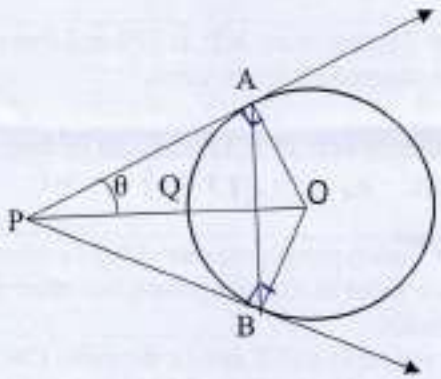
i. This question paper contains 38 questions.
ii. This question paper is divided into 5 sections – A, B, C, D and E.
iii. In Section A, there are 20 Multiple Choice Questions of 1 mark each.
iv. In Section B, there are 5 Very Short Answer type questions of 2 marks each.
v. In Section C, there are 6 Short Answer type questions of 3 marks each.
vi. In Section D, there are 4 Long Answer type questions of 5 marks each.
vii. In Section E, there are 3 Case Based Questions of 4 marks each. Internal choice is provided in 2 marks questions in each case study.
viii. An internal choice has been provided in 2 questions in section B, 2 questions in Section C, 2 questions in Section D and 3 questions in Section E.
ix. Draw neat diagrams wherever required.

SL.No.	SECTION - A (1 x 20 = 20)	MARKS
1.	If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM (a,b,c) = 3780, then x is equal to: (a) 1 (b) 2 (c) 3 (d) 0	1
2.	The graph of a polynomial p(x) cuts the x-axis at 3 points and touches it at 2 other points. The number of zeroes of p(x) is: (a) 1 (b) 2 (c) 3 (d) 5	1
3.	If the lines represented by equations $3x + 2my = 2$ and $2x + 5y + 1 = 0$ are parallel, then the value of m is: (a) $\frac{2}{5}$ (b) $-\frac{5}{4}$ (c) $\frac{3}{2}$ (d) $\frac{15}{4}$	1
4.	If $x = -\frac{1}{2}$ is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, then the value of k is: (a) $-\frac{9}{4}$ (b) $\frac{9}{4}$ (c) $\frac{3}{4}$ (d) $-\frac{3}{4}$	1
5.	If α, β are the zeroes of the polynomial $f(x) = x^2 + x + 1$, then $\frac{1}{\alpha} + \frac{1}{\beta} =$ (a) 0 (b) 1 (c) -1 (d) 2	1
6.	The values of x and y satisfying the two equations $32x + 33y = 34$ and $33x + 32y = 31$ respectively, are: (a) -1 & 2 (b) -1 & 4 (c) 1 & -2 (d) -1 & -4	1

7.	The next(4^{th}) term of the A.P. $\sqrt{7}, \sqrt{28}, \sqrt{63}, \ldots$ is: (a) $\sqrt{70}$ (b) $\sqrt{84}$ (c) $\sqrt{97}$ (d) $\sqrt{112}$	1
8.	The distance between the point P(aCosθ, 0) and Q(0, aSinθ) is: (a) 1 (b) a (c) 2 (d) 2a	1
9.	In ΔABC, D and E are points on side AB and AC respectively such that DE ∥ BC and AD : DB = 3 : 1. If EA = 3.3 cm, then AC = (a) 1.1 cm (b) 4 cm (c) 4.4 cm (d) 5.5 cm	1
10.	In figure, AB and AC are tangents to the circle. If <ABC = 42°, then the measure of <BAC is:  (a) 96° (b) 42° (c) 206° (d) 86°	1
11.	If $5\tan\theta - 4 = 0$, then the value of $\frac{5Sin\theta - 4Cos\theta}{5Sin\theta + 4Cos\theta}$ is: (a) $-\frac{4}{9}$ (b) $\frac{5}{9}$ (c) 0 (d) $\frac{1}{9}$	1
12.	At same time of the day, if the length of the shadow of a vertical pole is equal to its height, the angle of elevation of sun's altitude is: (a) 60° (b) 45° (c) 30° (d) 90°	1
13.	The point of intersection of the line represented by $3x - y = 3$ and y-axis is given by: (a) (0, 3) (b) (1, 0) (c) (0, -3) (d) (-1, 0)	1
14.	In figure, <ACB = <CDA, AC = 8 cm, AD = 3 cm, then BD =  (a) $\frac{22}{39}$ cm (b) $\frac{26}{3}$ cm (c) $\frac{55}{3}$ cm (d) $\frac{64}{3}$ cm	1

15.	The pair of tangents AP and AQ drawn from an external point to a circle with center O are perpendicular to each other and length of each tangent is 5 cm. The radius of the circle is:  (a) 10 cm (b) 7.5 cm (c) 2.5 cm (d) 5 cm	1
16.	If $\sec\theta - \tan\theta = m$, then the value of $\sec\theta + \tan\theta$ is: (a) $1 - \frac{1}{m}$ (b) $\frac{1}{m}$ (c) $m^2 - 1$ (d) $-m$	1
17.	The angle of depression of a car, standing on the ground, from the top of a 75 m tower is 30°. The distance of the car from the base of the tower (in metres) is: (a) $75\sqrt{3}$ (b) $\frac{75}{\sqrt{3}}$ (c) $\frac{75}{\sqrt{2}}$ (d) $75\sqrt{2}$	1
18.	If $\sin\theta = x$ and $\sec\theta = y$, then $\tan\theta$ is equal to: (a) $\frac{x}{y}$ (b) $\frac{y}{x}$ (c) $\frac{1}{xy}$ (d) xy	1
Question numbers 19. And 20. are Assertion and Reason based questions. Two statements are given, one is Assertion (A) and the other is Reason(R). Select the correct answer to these questions from (a), (b), (c) and (d) as given below. (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.		
19.	Assertion(A) : A quadratic polynomial having $2 + \sqrt{3}$ and $2 - \sqrt{3}$ as its zeroes is given by $f(x) = x^2 - 4x + 1$ Reason(R) : Quadratic Polynomials whose two zeroes are α and β are given by $f(x) = k\{x^2 - (\alpha + \beta)x + \alpha\beta\}$, where k is any non-zero real number. A	1
20.	Assertion(A) : The tangents drawn at the end points of a diameter of a circle are parallel. Reason(R) : Diameter of a circle is the longest chord. B	1

SL.No.	SECTION - B (2 x 5 = 10)	MARKS
21.	Given $\sqrt{3}$ is irrational, prove that $5 - 2\sqrt{3}$ is irrational.	2
22.	Which term of the A.P: 3, 14, 25, 36, ...will be 99 more than its 25^{th} term. 366	2
23. (a)	In the given figure, if OA . OB = OC . OD then prove that $\angle A = \angle C$.  **OR**	2
(b)	In the given figure, if AB || DC, find the value of x.  $-\frac{13}{11}$	
24.	In figure, a quadrilateral ABCD is drawn to circumscribe a circle, with centre O, in such a way that the sides AB, BC, CD and DA touch the circle at the points P, Q, R and S respectively. Prove that AB + CD = BC + DA 	2
25. (a)	If $\sqrt{3}\sin\theta - \cos\theta = 0$ and $0° < \theta < 90°$, find the value of θ. **OR**	2
(b)	If $\cos(A - B) = \frac{\sqrt{3}}{2}$ and $\sin(A + B) = 1$, then find the value of A and B. A = 60° B = 30°	

SL.No.	SECTION - C (3 x 6 = 18)	MARKS
26.	Find the zeroes of the quadratic polynomial $3x^2 - (1+3\sqrt{3})x + \sqrt{3}$ and verify the relationship between the zeroes and coefficients of the polynomial.	3
27. (a)	The total cost of a certain length of cloth is ₹200. If the piece was 5m longer and each metre of cloth costs ₹2 less, the cost of the piece would have remained unchanged. How longer is the piece and what is its original rate per metre?	3
	OR	
(b)	The perimeter of a rectangular field is 82m and its area is 400 square metre. Find the length and breadth of the rectangle. $l = 16$, $b = 25$	
28.	If (a,b) is the mid point of the line segment joining the points A(10,-6) and B(k,4) and a - 2b = 18, find the value of k and the distance AB. $k = 22$, $AB = \sqrt{221}$	3
29.	In the given figure, OP is equal to the diameter of a circle with centre O and PA and PB are tangents. Prove that ΔABP is an equilateral triangle. 	3
30.	Prove that $\frac{cosA}{1+tanA} - \frac{sinA}{1+cotA} = cosA - sinA$	3
31. (a)	Two ships are approaching a light house from opposite direction. The angle of depression of two ships from top of the light house is 30° and 45° respectively. If the distance between the two ships is 100m, find the height of light house. ($\sqrt{3} = 1.73$)	3
	OR	
(b)	Two poles of equal height are standing opposite to each other on either side of a road, which is 80 m wide. From a point between them on the road, angles of elevation of their tops are 30° and 60°. Find the height of the poles and distance of the point from the poles.	

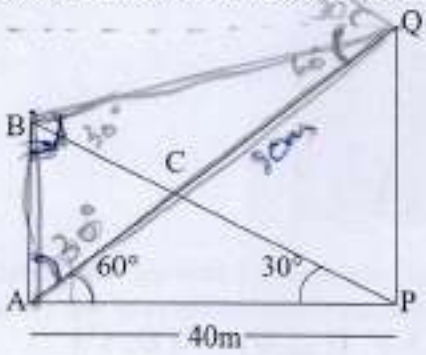
$AB = 80\sqrt{3}$

$DC = 26.67\sqrt{3}$

$AC = 160$

$BD = 53.34\sqrt{3}$

SL.No.	SECTION - D (5 x 4 = 20)	MARKS
32.	Aadya has 143 stamps, she gives away 11 stamps and divides the remaining equally into groups. Sumit has 220 stamps, he gives away 11 stamps and divides the remaining equally into groups. They end up with the same number of groups. (i) What is the number of groups? (ii) What is the number of stamps in Aadya's and Sumit's each group?	5
33. (a)	A railway half ticket cost half the full fare but the reservation charges are the same on a half ticket as on a full ticket. A person reserved a first class ticket from station A to B for ₹2530. Another person reserved a first class ticket and one reserved first class half ticket from station A to B for ₹3810. Find the full first class fare from station A to B and also the reservation charges for a ticket. OR Draw the graphs of the equations $x - y + 1 = 0$ and $3x + 2y - 12 = 0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and also find the area included in the triangular region.	5
34. (a)	If the sum of the first 7 terms of an A.P. is 119 and that of the first 17 terms is 714, find the sum of its first n terms. OR	5
(b)	The sum of three numbers in A.P. is 12 and sum of their cubes is 288. Find the numbers.	
35.	Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. Hence in ΔABC the points D and E are on the sides CA, CB respectively such that $DE \parallel AB$, $AD = 2x$, $DC = x + 3$, $BE = 2x - 1$ and $CE = x$. Then find x.	5

(ii)(a)	Solve the quadratic equations to find the width of the walkway 'x'. OR	2
(ii)(b)	If the cost of paving the walkway at the rate of ₹50 per square metre is ₹12,000, calculate the area of the walkway.	2
(iii)	Find the perimeter of the lawn. 44	1
38.	Two poles of different heights stand on level ground and at a distance of 40m. Both poles are supported by wires attached from the top of each pole to the bottom of the other. A coupling is placed at point C, where the two wires cross. (as shown in the figure)  	
	Based on the above information answer the following questions:	1
(i)	Find the height of pole AB. $13.34\sqrt{3}$	1
(ii)	Find the height of pole PQ. $40\sqrt{3}$	2
(iii)(a)	If the angle of elevation of the top of the pole PQ from the top of the pole AB is 30°, find the distance BQ. 40 m	
	OR	
(b)	If the coupling is at a height of 20m from the ground, how far down the wire from the smaller pole AB is the coupling?	2