केंद्रीय विद्यालय संगठन, बेंगलुरु संभाग

KENDRIYA VIDYALAYA SANGATHAN, BENGALURU REGION

प्रथम प्री-बोर्ड परीक्षा २०२५-२६

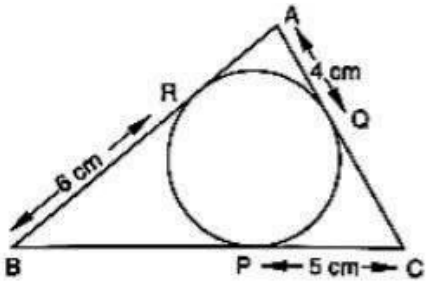
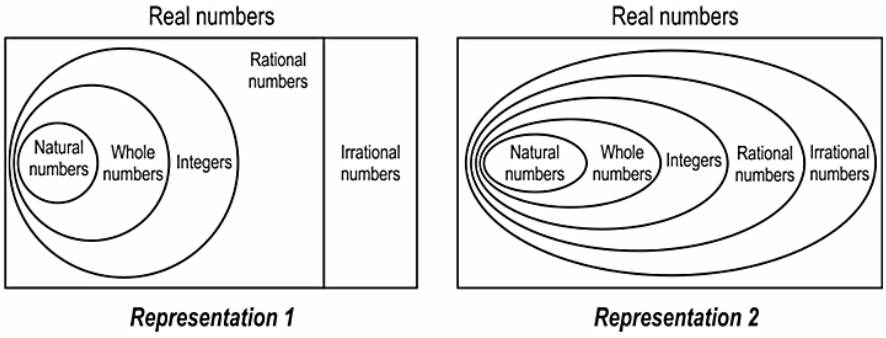
FIRST PRE-BOARD EXAMINATION-2025-26

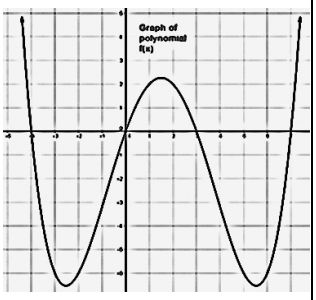
Class: X **Max Marks: 80**
Subject: MATHEMATICS (STANDARD) **Time: 3 hrs**
CODE : 041

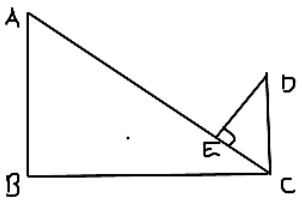
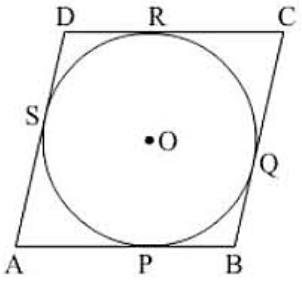
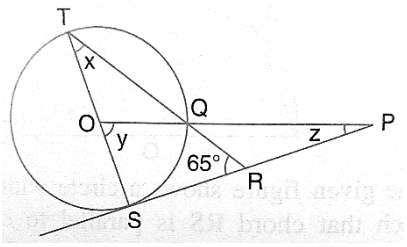
Instructions:

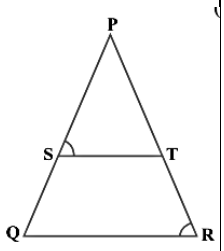
1. **This question paper contains 38 questions. All Questions are compulsory.**
2. **This Question Paper is divided into 5 Sections A, B, C, D and E.**
3. **In Section A, Question numbers 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.**
4. **In Section B, Question numbers 21-25 are very short answer (VSA) type questions, carrying 02 marks each.**
5. **In Section C, Question numbers 26-31 are short answer (SA) type questions, carrying 03 marks each.**
6. **In Section D, Question numbers 32-35 are long answer (LA) type questions, carrying 05 marks each.**
7. **In Section E, Question numbers 36-38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.**
8. **There is no overall choice. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.**
9. **Draw neat and clean figures wherever required. Take $\pi = \frac{22}{7}$**
10. **Use of calculators is not allowed.**

	SECTION - A	
	(Multiple Choice Questions)	
1.	The teacher drew a circle on a chart paper and marked a point P on it. Chandana says that there …… tangents/tangent to the circle at the point P. a) are no two b) is only one c) are infinitely many d) are exactly	1
2.	Mrs Saifi wrote $\frac{\cos A}{1-\sin A} + \frac{1-\sin A}{\cos A}$ and asked her students to simplify it. Hrithik solved it using these steps as shown. Identify the step in which he went wrong. a) Step 2 b) Step 1 c) Step 3 d) Step 4 $\frac{\cos A}{1-\sin A} + \frac{1-\sin A}{\cos A}$ $= \frac{\cos^2 A + (1-\sin A)^2}{(1-\sin A)\times\cos A}$ ...(step 1) $= \frac{\cos^2 A + \cos^2 A}{(1-\sin A)\times\cos A}$ ...(step 2) $= \frac{2\cos^2 A}{(1-\sin A)\times\cos A}$ ...(step 3) $= \frac{2\cos A}{1-\sin A}$ ...(step 4)	1

3.	In triangles ABC and DEF, ∠B = ∠E, ∠F = ∠C and AB = 3 DE. Then, the two triangles are …. a) congruent but not similar b) similar but not congruent c) neither congruent nor similar d) congruent as well as similar	1
4.	The points (–4, 0), (4, 0), (0, 3) are the vertices of a/an ….. a) right triangle b) equilateral triangle c) isosceles triangle d) scalene triangle	1
5.	There are 22 observations arranged in increasing order of their values in a data. The median will be the value of …… a) 11th observation b) average of the 11th and 12th observation c) 10th observation d) average of the 10th and 11th observation	1
6.	Pratik made this design on his T-shirt with RB= 6cm, AQ = 4cm, PC = 5cm. The perimeter of ΔABC is ……. a) 91cm b) 52cm c) 30 cm d) 37cm  	1
7.	If θ is the angle (in degrees) of a sector of a circle of radius r, then area of the sector is …. a) $\frac{2\pi r^2\theta}{720}$ b) $\frac{\pi r^2\theta}{180}$ c) $\frac{2\pi r\theta}{360}$ d) $\frac{2\pi r\theta}{180}$	1
8.	Two representations of real numbers are shown below. Which of the following is correct?  a) Representation 1 b) Representation 2 c) Both are correct d) Neither of them	1
9.	Shruthi has a 40 cm long blue and 84 cm long orange ribbon. She cuts each ribbon into pieces such that all pieces are of equal length. What is the length of each piece? a) 4 cm as it is the LCM of 40 and 84 b) 4 cm as it is the HCF of 40 and 84 c) 8 cm as it is the LCM of 40 and 84 d) 8 cm as it is the HCF of 40 and 84	1
10.	On a morning walk, three persons step off together and their steps measure 40 cm, 48 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps? a) 360 cm b) 2520 cm c) 6280 cm d) 720 cm	1
11.	For 0°≤ θ ≤90°, as θ increases, …… also increases. a) sin θ b) cos θ c) cot θ d) cosec θ	1

12.	Volumes of two spheres are in the ratio 64 : 27. The ratio of their radii is …… a) 4 : 3 b) 3 : 4 c) 9 : 16 d)16 : 9	1
13.	Asif says that the graph given here has 3 zeroes. What is the correct answer?  a) 5 b) 1 c)3 d) 4	1
14.	The quadratic equation $3x^2 - \sqrt{5}x + 1 = 0$ has…. a) two distinct real roots b) two equal real roots c) no real roots d) more than 2 real roots	1
15.	The area of the sector of a circle of radius 12 cm is 60π cm. The central angle of this sector is ….. a)120° b) 6° c) 75° d) 150°	1
16.	A die is thrown once. What is the probability of getting a number greater than 4? a) $\frac{4}{5}$ b) $\frac{3}{4}$ c) $\frac{1}{3}$ d) $\frac{1}{2}$	1
17.	The value of (sec 30° − cosec 60°) is …….. a)2 b) $\frac{4}{\sqrt{3}}$ c) 1 d) 0	1
18.	If a pair of linear equations given by $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has a unique solution, then which of the following is true? a) $a_1a_2 = b_1b_2$ b) $a_1b_2 \neq a_2b_1$ c) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ d) $\frac{a_1}{b_2} \neq \frac{b_1}{a_2}$	1
(**Assertion – Reason based questions**) 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 Assertion and Reason are correct and Reason is the correct explanation of Assertion. (b) Both Assertion and Reason are correct but Reason is not correct explanation of Assertion. (c) Assertion is true, Reason is false. (d) Assertion is false, Reason is true.		
19.	STATEMENT-1(Assertion): The coordinates of a point B, where AB is the diameter of a circle whose centre is (2, – 3) and A is (4, −11) is (3, -7) STATEMENT-2 (Reason): The midpoint of the line segment joining points A(a,b) and B(c,d) is given by $\left(\frac{a+c}{2}, \frac{b+d}{2}\right)$	1
20.	STATEMENT-1(Assertion): A box has white and red marbles. The probability of drawing a red marble is double that of drawing a white marble. If there are 8 red marbles, then the total number of marbles is 13 STATEMENT-2(Reason): P(red) + P(white) = 1	1
	SECTION B	
21.	**(a)** If the 9th term of an AP is zero, prove that its 29th term is twice its 19th term. **OR** **(b)** Find the 12th term from the end of the AP: –2, –4, –6, ..., –100	2

22.	In the given figure, if AB ⊥ BC, DC ⊥BC, DE⊥ AC, prove that Δ CED ~ΔABC. 	2
23.	During the festival season Bhaskar made a rangoli which resembled a quadrilateral ABCD circumscribing a circle (see the figure). Prove that AB + CD = AD + BC. 	2
24.	Find the value of 2 tan² 45° + 6 cos²30° – 2 sin²60°	2
25.	**(a)** An arc of a circle is of length 4π cm and the sector it bounds has an area of 16π cm². Find the radius of the circle **OR** **(b)** An arc subtends an angle of 90° at the centre of the circle of radius 14 cm. find the area of the minor segment in terms of π.	2
	SECTION C	
26.	Janet likes to play cards during the Puja holidays with her family. a) Her brother removed a card before the game, after which Janet draws a card from the rest of the well shuffled pack. If P(ace)= $\frac{3}{51}$, P(red card)= $\frac{25}{51}$ and P(a diamond)= $\frac{13}{51}$, then which card did he remove? b) If her brother had removed the king ♥ before the game, and for the cards that remain, the P(red card) = x + $\frac{8}{51}$, then what is the value of x?	3
27.	In the given figure, O is the centre of the circle and SP is a tangent. If ∠ SRT = 65º, find the values of x, y and z 	3
28.	**(a)** Draw the graph of the pair of equations 2x + y = 4 and 2x – y = 4. Write the vertices of the triangle formed by these lines and the y-axis. Also find the area of this triangle. **OR** **(b)** Father's age is three times the sum of the ages of his two children. After 5 years his age will be twice the sum of the ages of two children. Find the age of the father.	3
29.	Find the zeroes of the polynomial $5y^2$ + 12y + 7 by factorisation method and verify the relationship between the zeroes and the coefficients of the polynomials.	3
30.	**(a)** Prove that $(\sin A + \sec A)^2 + (\cos A + \operatorname{cosec} A)^2 = (1 + \sec A \operatorname{cosec} A)^2$ **OR** **(b)** Prove that $\cot^2 A\left(\frac{\sec A - 1}{1 + \sin A}\right) + \sec^2 A\left(\frac{\sin A - 1}{1 + \sec A}\right) = 0$	3

31.	Prove that $\sqrt{5}$ is irrational.	3
	SECTION D	
32.	Two water taps together can fill a tank in $1\frac{7}{8}$ hours. The tap with a longer diameter takes 2 hours less than the tap with the smaller one to fill the tank separately. Find the time in which each tap can fill the tank separately.	5
33.	**If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.** a) In the given figure, $\frac{PS}{SQ} = \frac{PT}{TR}$ and ∠ PST = ∠ PRQ. **Using the above theorem**, prove that PQR is an isosceles triangle.  b) Read the above theorem carefully. Prove the **converse** of the given theorem.	2+3
34.	**(a)** Anaya has a conical vessel open at the top and pointed at the bottom. Its height is 12 cm and the radius of the top is 6 cm. It is completely filled with water. If she drops metal balls, each of which is a sphere of radius 1 cm, into the vessel, and as a result, half the water overflows, how many metal balls were dropped in? **OR** **(b)** Priya runs a bakery that operates in a building shaped like a cuboid surmounted by a half-cylinder. The floor of the building measures 9 m × 20 m, and the height of the cuboidal part is 7 m. The half-cylinder is along the 20 m side and has a diameter equal to the width of the building. i. Calculate the volume of air the bakery can hold. ii. If ovens and shelves take up a space of 450 m³, and there are 10 employees, each of whom occupy about 0.12 m³ space on an average, how much air remains in the bakery?	5
35	**(a)** Consider the following distribution of daily wages of workers of a factory.	5

Daily wages in ₹	100-150	150-200	200-250	250-300	300-350
Number of workers	4	5	12	x	2

If the mean daily wages is ₹211, find x, Also find the **mode**.

OR

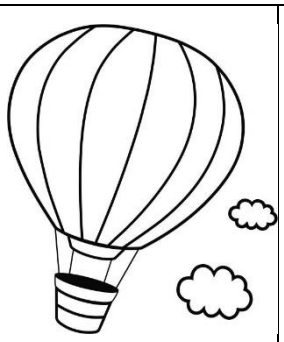
(b) The median for the following data is 50. The total frequency is 90. Find the values of p and q.

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Number of students	5	p	25	20	7	q	10

SECTION E

36 **Case Study**

The Hot Air Balloon Ride



A group of friends go on a hot air balloon ride during a fair. The balloon rises vertically from a point on the ground. A photographer standing 100 meters away from the point of take-off observes the balloon. When the balloon has risen to a certain height, the angle of elevation of the balloon from the photographer's position is 30°. After 2 minutes, the angle of elevation increases to 60° as the balloon continues to ascend vertically.

a) Draw a neat and labeled diagram to represent the situation described here. 1

b) How much vertical distance did the balloon cover in those 2 minutes? 2

OR

b) What is the height of the balloon when the angle of elevation is 30° and after 2 minutes when the angle of elevation is 60°?

c) If the balloon ascended at a constant speed, what was the average speed of the balloon in meters per minute? 1

37 **Case Study**

Fun and Frolic !!

AdventureLand is a popular theme park, and its layout is mapped on a coordinate grid (each unit = 1 meter). The following key locations are marked as coordinates:

Location	Coordinates
Ride A	(10, 10)
Ride B	(50, 10)
Food Stall	(30, 30)
Emergency Exit	(30, 0)
Juice Stand	(50, 30)

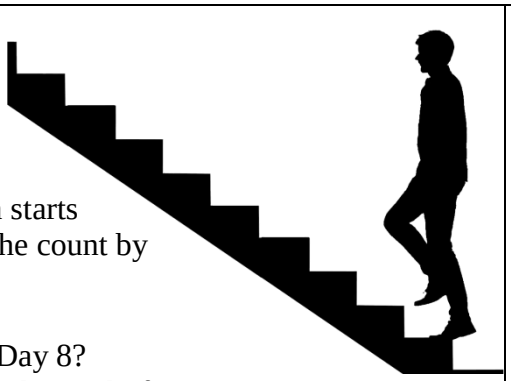
a) Find the distance between Ride A and Food Stall. 1

b) Agnes was curiuos about the emergency exit. Is the Emergency Exit closer to Ride A or Ride B? Show the calculations. 2

OR

b) A security guard needs to move from Food Stall to Juice Stand to Emergency Exit. What is the total distance he will walk?

c) Find the midpoint between Ride B and the Juice Stand. 1

38	**Case study** <u>Stair Climbing Challenge</u>  A fitness app challenges users to climb more stairs each day. Appalled by the rising lifestyle diseases among adults of his age group, Roshan starts by climbing 100 stairs on Day 1 and increases the count by 25 stairs each day. a) How many stairs will Roshan climb on Day 8? b) In how many days would he have climbed a total of 5100 stairs? **OR** b) He went to Mysore for Dusshera celebrations with his parents for 3 days. If he started this challenge on a Sunday, and in between, he gave up the challenge for 3 days, then, on which day of the week would he have completed totally 750 stairs? c) On which day will he first climb more than 400 stairs in a day?	 1 2 1

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