KENDRIYA VIDYALAYA SANGATHAN, CHENNAI REGION

FIRST PRE-BOARD EXAMINATION: 2024-2025

MATHEMATICS STANDARD (041)

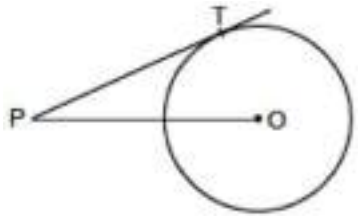
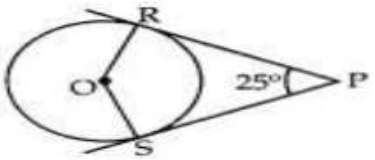
CLASS: X **Time Allowed: 3 Hrs.**

Maximum Marks: 80

General Instructions:

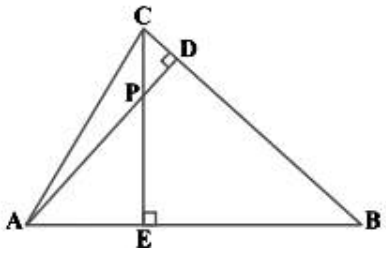
1. This Question Paper has 5 Sections A-E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with subparts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2marks questions of Section E
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated

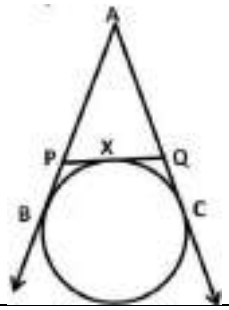
SECTION A		
Q. No.	**Section A consists of 20 questions of 1 mark each.**	**Marks**
1	If the zeroes of the quadratic polynomial $x^2 + (a + 1) x + b$ are 2 and -3, then (a) a = -7, b = -1 (b) a = 5, b = -1 (c) a = 2, b = -6 (d) a = 0, b = -6	1
2	The zeroes of the quadratic polynomial $x^2 + 9x + 18$ are (a) both positive (b) both negative (c) one positive and one negative (d) both equal	1
3	For what value k, do the equations $2x – y + 3 = 0$ and $6x – ky + 9 = 0$ represent coincident lines? (a) 2 (b) – 2 (c) 3 (d) -3	1
4	If the sum and product of the roots of the equation $3x^2 - 8x + 2k = 0$ are equal, then thevalue of k is (a) 4 (b) 3 (c) 6 (d) 8	1

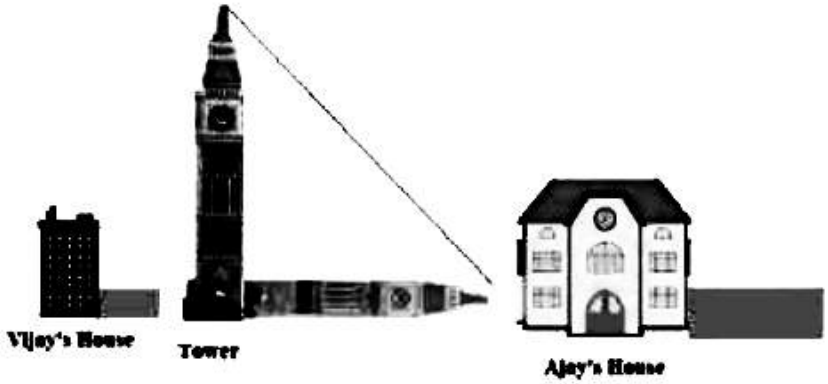
5	If 2x, x + 10, 3x + 2 are in A.P., then x is equal to (a) 0 (b) 2 (c) 4 (d) 6	1
6	The coordinates of a point P, where PQ is the diameter of a circle whose centre is (2, – 3)and Q is (1, 4) is: (a) (3, -10) (b) (2, -10) (c) (-3, 10) (d) (-2, 10).	1
7	If the distance between the points A(2, -2) and B(-1, x) is equal to 5, then the value of x is: (a) 2 (b) -2 (c) 1 (d) -1	1
8	The value of (sin30° + cos30°) – (sin60° + cos60°) is ….. (a) −1 (b) 0 (c) 1 (d) 2	1
9	If 3sec θ – 5 =0 , then cot θ is (a) $\frac{4}{5}$ (b) $\frac{5}{3}$ (c) $\frac{3}{4}$ (d) $\frac{3}{5}$	1
10	In the given below figure, point P is 26 cm away from the centre O of a circle and the length PT of the tangent drawn from P to the circle is 24 cm. Then the radius of the circle is (a) 25 cm (b) 26 cm (c) 24cm (d)10cm 	1
11	The tangents drawn at the extremities of the diameter of a circle are (a) Perpendicular (b) Parallel (c) equal (d) none of these	1
12	In the given figure, if ∠RPS = 25 °, the value of ∠ ROS is (a) 135° (b) 145° (c) 165° (d) 155° 	1
13	The ratio of the total surface area to the curved surface area of a cylinder with base radius 80cm and height 20 cm is (a) 1 : 2 (b) 2 : 1 (c) 3 : 1 (d) 5 : 1	1
14	Volume and total surface area of a solid hemisphere are numerically equal. What is the diameter of hemisphere? (a) 9 units (b) 6 units (c) 4.5 units (d) 18 units	1
15	If mean of a, a+3, a+6, a+9 and a+12 is 10, then a is equal to; (a) 1 (b) 2 (c) 3 (d) 4	1

16	Consider the following frequency distribution of the heights of 60 students of a class: **Height (in cm)** | **150 – 155** | **155 – 160** | **160 – 165** | **165 – 170** | **170 – 175** | **175 – 180** **Number of students** | **15** | **13** | **10** | **8** | **9** | **5** The sum of the lower limit of the modal class and upper limit of the median class is (a) 310 (b) 315 (c) 320 (d) 330	1
17	Cards are marked with numbers 1 to 50 are placed in the box and mixed thoroughly. One card is drawn at random from the box. What is the probability of getting a prime number? (a) 1 (b) $\frac{4}{10}$ (c) $\frac{1}{2}$ (d) $\frac{3}{10}$	1
18	A school has five houses A, B, C, D and E. One class has 23 students, 4 from house A, 8 from house B, 5 from house C, 2 from house D and the rest from house E. A single student is selected at random to be the class monitor. The probability that the selected student is not from houses A, B and C is: (a) $\frac{4}{23}$ (b) $\frac{6}{23}$ (c) $\frac{8}{23}$ (d) $\frac{17}{23}$	1
19	***DIRECTION:*** In the question number (19) and (20), a statement of assertion (A) is followed by a statement of Reason (R). ***Choose the correct option*** ***Statement A (Assertion)***: The HCF of two numbers is 15 and their product is 2250. Then their LCM is 150. ***Statement R(Reason)*** : If a, b are two positive integers, then HCF x LCM=a x b. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1

20	***Statement A (Assertion)***:If the perimeter of a circle is equal to that of a square, then the ratio of their areas is 14:11 ***Statement R (Reason)***: If the perimeter of a circle is equal to that of a square, then their areas are equal (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A) (b) Both assertion (A) and reason (R) are true and reason (R) is not the correct **explanation** of assertion (A) (c) Assertion (A) is true but reason (R) is false. (d) Assertion (A) is false but reason (R) is true.	1
SECTION B		
Section B consists of 5 questions of 2 marks each.		
21	Given that $\sqrt{3}$ is irrational, prove that $2 + 5\sqrt{3}$ is irrational. **(or)** Given that $\sqrt{7}$ is irrational, prove that $3\sqrt{7}$ is an irrational number.	2
22	Find the distance between the following pairs of points : (a, b), (– a, – b)	2
23	Find the ratio in which the y-axis divides the line segment joining the points (5, – 6) and (–1, – 4).	2
24	If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$; $0° < A + B \leq 90°$; $A > B$, find A and B.	2
25	A bag contains 24 balls of which x are red, 2x are white and 3x are blue. Find x. A ball is selected at random. What is the probability that (i) it is red (ii) it is blue (iii) neither red nor blue **(or)** One card is drawn from a well-shuffled deck of 52 cards. Calculate the probability that the card will be (i) an ace, (ii) not be an ace.	2
SECTION C		
Section C consists of 6 questions of 3 marks each.		
26	Prove that $\sqrt{5}$ is an irrational number	3

27	If one of the zero of the polynomial $3x^2 + 8x + 2k + 1$ is seven times the other, find the value of 'k'.	3
28	Find the values of k for each of the following quadratic equations, so that they have two equal roots. (i) $2x^2 + kx + 3 = 0$ (ii) $kx(x - 2) + 6 = 0$	3
29	Prove that $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \sec\theta \ \text{cosec}\,\theta$	3
30	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"* (or) In the given figure, altitudes AD and CE of Δ ABC intersect each other at the point P. Show that (i) Δ AEP ~ Δ CDP (ii) Δ ABD ~ Δ CBE (iii) Δ AEP ~ Δ ADB 	3
31	The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes. **(or)** An umbrella has 8 ribs which are equally spaced (see Fig.). Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella. 	3
	SECTION D	
	Section D consists of 4 questions of 5 mark each.	
32	A fraction becomes $\frac{9}{11}$ if 2 is added to both the numerator and the denominator. If 3 is added to both the numerator and the denominator, it becomes $\frac{5}{6}$. Find the fraction **(or)** A train covered a certain distance at a uniform speed. If the train would have been 10km/h faster, it would have taken 2 hours less than the scheduled time. And, if the train were slower by 10km/h, it would have taken 3 hours more than the scheduled time. Find the distance covered by the train.	5

33	Two poles of equal heights are standing opposite each other on either side of the road, which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30°, respectively. Find the height of the poles and the distances of the point from the poles.	5
34	Prove that the lengths of tangents drawn from an external point to a circle are equal. Also If AB, AC, PQ are tangents in below figure and AB = 5 cm, find the perimeter of ΔAPQ 	5
35	The mean of the following frequency table is 53. But the frequencies f1 and f2 in the classes 20−40 and 60−80 are missing. Find the missing frequencies Age (in years) 0-20 | 20-40 | 40-60 | 60-80 | 80-100 | Total No. of people 15 | f1 | 21 | f2 | 17 | 100 (or) The distribution given below shows the number of wickets taken by bowlers in one daycricket matches. Find the mean and median of the number of wickets taken. No. of wickets: 20-60 | 60-100 | 100-140 | 140-180 | 180-220 | 220-260 No. of bowlers: 7 | 5 | 16 | 12 | 2 | 3	5
	SECTION – E : CASE STUDY BASED QUESTIONS.	
	Section E consists of 3 questions of 4 mark each.	
36	In a class the teacher asks every student to write an example of AP. Two boys Aryan andRoshan writes their progressions as -5,-2, 1,4 …… and 187, 184, 181,….. respectively. Now the teacher asks the various students of the class the following questions on this progression. Help students to find the answers of the following.  (i) Find the sum of common difference of the two progressions. 1 (ii) Find the 34^{th} term of the progression written by Roshan. 1 (iii) Find the sum of first 10 terms of the progression written by Aryan. 2 **(OR)**	

	Which term of the two progressions will have the same value?	
37	 Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles.The height of Vijay's house if 20m when Vijay's house casts a shadow 10m long on the ground. At the same time, the tower casts a shadow 50m long on the ground and the house of Ajay casts 20m shadow on the ground. (i) What is the height of the tower? (ii) What is the height of Ajay's house? (iii) What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12m? **(or)** When the tower casts a shadow of 40m, same time what will be the length of the shadow of Vijay's house?	1 1 2
38	On a Sunday, your Parents took you to a fair. You could see lot of toys displayed,and you wanted them to buy a RUBIK's cube and strawberry ice-cream for you. Observe the figures and answer the questions-:   (i) Find the length of the diagonal if each edge measures 6cm ? (ii)Find the volume of the solid figure if the length of the edge is 7cm? (iii)What is the surface area of hemisphere (ice cream) if the base radius is 7cm? **(or)** If the slant height of the conical part is 5 cm, and its radius is 4 cm, find its height.	1 1 2