केंद्रीय विद्यालय, बेंगलुरु संभाग

KENDRIYA VIDYALAYA SANGATHAN, BENGALURU REGION

प्रथम प्री-बोर्ड परीक्षा २०२४-२५

FIRST PRE-BOARD EXAMINATION (2024-25)

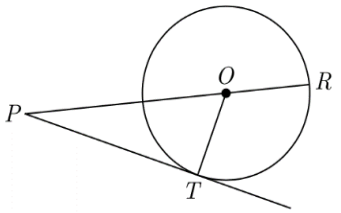
CLASS : X **MAX MARKS :80**
SUBJECT: MATHEMATICS (BASIC) **TIME : 3 hrs.**
CODE : 241

General Instructions:

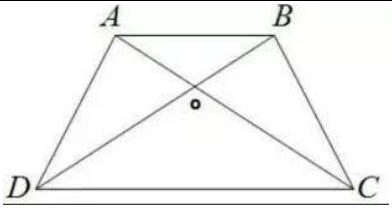
Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 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, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 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. All Questions are compulsory. However, an internal choice in 2 Questions of section B, 2 Questions of section C and 2 Questions of section D has been provided. And internal choice has been provided in all the 2 marks questions of Section E.

	SECTION A	
1.	If a =$x^1y^2z^2$, b= $x^2y^2z^3$, and c=$x^ny^1z^5$ and the LCM (a,b,c) = $x^3y^2z^5$ then the value of n is: a) 3 b) 2 c) 5 d) 1	1
2.	The system of linear equations represented by the lines x=2 and y= 3 are a) consistent with unique solution b) inconsistent c) consistent with three solutions d) consistent with many solutions	1
3.	The value of k for which the quadratic equation $kx^2 - 4x + 3 = 0$ has real and equal roots, is a) 0 b) $\frac{3}{4}$ c) $\frac{4}{3}$ d) 9	1
4.	The distance between the point (-4, 3) and the origin is a) 6 b) 5 c) 4 d) 3	1

5.	In figure, on a circle of radius 7 cm, tangent PT is drawn from a point P such that PT = 24 cm. If O is the centre of the circle, then the length of PR is  a)28cm b)25cm c) 32cm d) 30cm	1
6.	If in two triangles ABC and DEF such that $\frac{AB}{DF} = \frac{BC}{FE} = \frac{CA}{ED}$, then a)ΔABC ~ ΔDEF b)ΔABC ~ ΔEDF c)ΔABC ~ ΔEFD d)ΔABC ~ ΔDFE	1
7.	The ratio between LCM and HCF of the least composite number and the least prime number is: a) 1: 3 b) 2:1 c) 3:2 d) 1:2	1
8.	If the numbers n – 2, 4n – 1 and 5n + 2 are in AP, then the value of n is a)1 b) 2 c) 3 d) 4	1
9.	If two tangents inclined at an angle of 60° are drawn to a circle of radius 3cm, then the length of each tangent is equal to a) 3√2 cm b) 3cm c) 6cm d) 3√3cm	1
10.	A pole 3 m high casts a shadow √3 m long on the ground, then the Sun's elevation is a) 60° b) 45° c) 30° d) 90°	1
11.	What is the quadratic polynomial whose sum and the product of zeroes is √2 and ⅓ respectively? a) $3x^2-3\sqrt{2}x+1$ b) $3x^2+3\sqrt{2}x+1$ c) $3x^2+3\sqrt{2}x-1$ d) None of the above	1
12.	If the vertices of a parallelogram PQRS taken in order are P(3,4), Q(-2,3) and R(-3,-2), then the coordinates of its fourth vertex S are a) (-2,-1) b) (-2,-3) c) (2,-1) d) (1,2)	1
13.	If x tan 60° cos 60°= sin60° cot 60°, then x = a) cos30° b) tan30° c) sin30° d) cot30°	1
14.	A card is selected at random from a well shuffled deck of 52 cards. The probability of its being a red face card is a) $\frac{3}{26}$ b) $\frac{3}{13}$ c) $\frac{2}{13}$ d) $\frac{1}{2}$	1
15.	If $\Delta PQR \sim \Delta ABC$, PQ =12 cm, AB = 16 cm and perimeter of ΔABC is 72 cm then perimeter of ΔPQR is a) 54 cm b)27 cm c)48 cm d) 64 cm	1

16. In given figure, ABCD is a trapezium in which diagonals intersect at O. If AO = 3 cm, BO = 4 cm and CO =5 cm then DO is



a) 5cm b) 7.5 cm

c)15 cm d) $\frac{20}{3}$ cm

1

17. Two cubes each of volume 216 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

a) 95 cm^2 b) 360 cm^2 c) 250 cm^2 d) 125 cm^2

1

18. For the following distribution :

Class	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25
Frequency	10	15	12	20	9

the sum of upper limit and lower limit of the modal class is

a) 10 b) 15 c) 20 d) 35

1

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

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.

19. **ASSERTION**: If the HCF of two numbers is 5 and their product is 150, then their LCM is 30.

REASON: For any two positive integers p and q, HCF (p, q) × LCM (p, q) =p × q

1

20. **ASSERTION**: -5, $\frac{-5}{2}$,0, $\frac{5}{2}$ …. is in Arithmetic Progression.

REASON: The terms of an Arithmetic Progression cannot have both positive and negative rational numbers.

1

SECTION B

21. If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\frac{1}{\sqrt{3}}$ where $0^0 < A + B < 90^0$ *and* $A > B$ then find the values of A and B.

2

22. An inter house cricket match was organized by a school. Distribution of runs made by the students is given below. Find the median runs scored.

Runs scored	0 - 20	20 - 40	40 - 60	60 - 80	80 - 100
Number of students	4	6	5	3	4

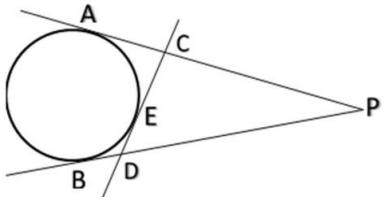
2

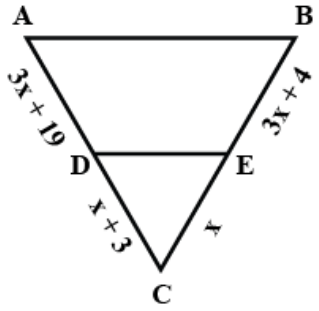
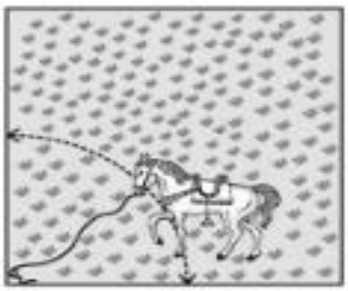
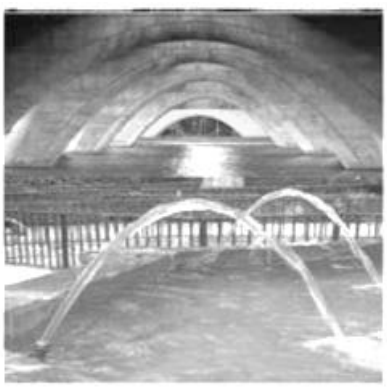
23. If the mid-point of the line segment joining the points A (3, 4) and B (k, 6) is P (x, y) and x + y – 10 = 0, find the value of k.

(OR)

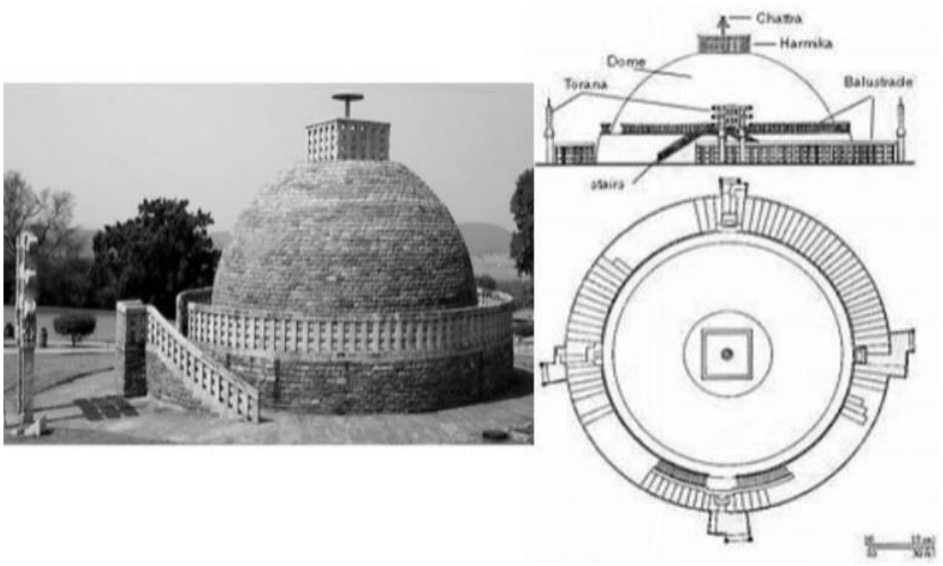
Find the point on x-axis which is equidistant from the points (2,-2) and (-4,2)

2

24.	The nth term of an AP cannot be $n^2 + 1$. Justify your answer. **(OR)** Which term of the A.P. 27, 24, 21,..is zero?	2
25.	From an external point P, two tangents, PA and PB are drawn to a circle with centre O. At a point E on the circle, a tangent is drawn to intersect PA and PB at C and D, respectively. If PA = 10 cm, find the perimeter of ΔPCD.  	2
	SECTION C	
26.	Prove that $\sqrt{3}$ is an irrational number.	3
27.	Seven times a two-digit number is equal to four times the number obtained by reversing the order of the digits. If the difference of the digits is 3, determine the number.	3
28.	Prove that a parallelogram circumscribing a circle is a rhombus. **(OR)** Prove that the lengths of tangents drawn from an external point to a circle are equal.	3
29.	The line segment joining the points A (3, 2) and B (5,1) is divided at the point P in the ratio 1:2 and it lies on the line 3x – 18y + k = 0. Find the value of k. **(OR)** Find the coordinates of the points of trisection of the line segment joining (4, - 1) and (- 2, - 3)	3
30.	Find the value of p if mean of the given data is 15.45 Class: 0 - 6 | 6 - 12 | 12 - 18 | 18 - 24 | 24 - 30 frequency: 6 | 8 | p | 9 | 7	3
31.	Prove that $\frac{1}{1+\sin A} + \frac{1}{1-\sin A} = 2\sec^2 A$	3
	SECTION D	
32.	Had Anisha scored 10 more marks in her mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test? **(OR)** Places A and B are 100 km apart on a highway. One car starts from A and another from B at the same time. If the cars travel in the same direction at different speeds, they meet in 5 hours. If they travel towards each other, they meet in 1 hour. What are the speeds of the two cars?	5

33.	If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. Using above theorem find the value of x for which DE ∥ AB as given in figure.  	5
34.	A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of hill as 30°. Find the distance of the hill from the ship and the height of the hill. **(OR)** From a point P on the ground the angle of elevation of the top of a 10 m tall building is 30°. A flag is hoisted at the top of the building and the angle of elevation of the top of the flagstaff from P is 45°. Find the length of the flagstaff and the distance of the building from the point P. (take $\sqrt{3} = 1.732$)	5
35.	A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find: i) the area of that part of the field in which the horse can graze. ii) the area of the remaining field which the horse can't graze iii) the increase in the grazing area if the rope were 10 m long instead of 5 m. (Use $\pi = 3.14$) 	5
	SECTION E	
36.	The below picture are few natural examples of parabolic shape which is represented by a quadratic polynomial. A parabolic arch is an arch in the shape of a parabola. In structures, their curve represents an efficient method of load, and so can be found in bridges and in architecture in a variety of forms. 	4

	i)What is the name of the graph represented by the quadratic polynomial, $ax^2 + bx + c$, where a, b and c are real numbers and $a \neq 0$? ii)How many zeroes does the polynomial $x^2 + 4$ have? iii)(A)If the zeroes of the quadratic polynomial $2x^2 – x + 8k$ are the reciprocals of each other, then find the value of k. **(OR)** iii)(B)If the sum of the roots is –p and product of the roots is –1/p, then find the quadratic polynomial.	
37.	Four friends Ayush, Minal, Rohan and Shreya are playing a board game called Food master. Shown below are the current positions on the board during the first round. The rules of the game are: • In each chance, two 6-sided fair dice numbered 1 to 6 are rolled by the player. • The number of steps a player moves forward by is the sum of the numbers on the two dice. • Each player gets a restaurant card for their first visit to any of the 16 restaurants. • After 10 rounds, the player with the most number of restaurant cards wins. Now answer the following questions based on the data which is given above. i)What are the chances that Rohan lands on ‘FREE PARKING’ in his next turn? ii)What is the probability of Minal landing on “ROLL AGAIN’ in her next turn? iii)(A)Among Minal and Shreya, who has a higher chance of landing on the Goan restaurant in their next turn? **(OR)** iii)(B)Who among Shreya or Rohan has a higher probability of reaching Ayush at the Jewish restaurant in their next turn?	4

38.	The Great Stupa at Sanchi is one of the oldest stone structures in India, it was originally commissioned by the emperor Ashoka in the 3rd century BCE. It is a perfect example of combination of solid figures. It has a hemispherical dome with a cuboidal structure mounted on it of dimensions 8m x 6m x 4m (take π=22/7)  i) Calculate the volume of the cuboidal shaped top with the above-mentioned dimensions. ii) Write the formula to find volume of the sphere. iv)(A) Find the cloth required to cover the hemispherical dome if the radius of its base is 14m. **(OR)** iii) (B) Calculate the volume of the hemispherical dome if the height of the dome is 21m.	4