

# केन्द्रीय विद्यालय संगठन, राँची संभाग

KENDRIYA VIDYALAYA SANGATHAN, RANCHI REGION

प्री-बोर्ड परीक्षा / Pre-Board Examination

सत्र / SESSION 2024-25

कक्षा / CLASS X

गणित / MATHEMATICS BASIC (241)

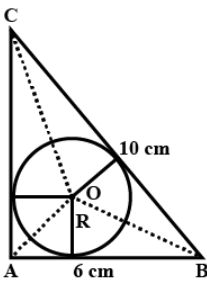
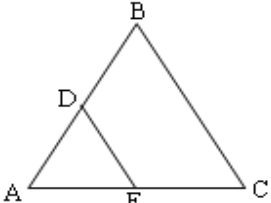
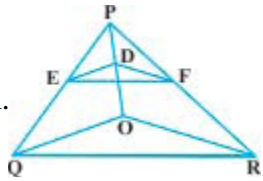
**Time Allowed: 3 Hours**

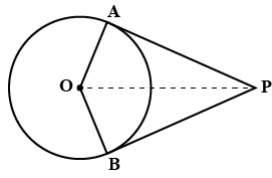
**Maximum Marks: 80**

1. This question paper contains 38 questions. All questions are compulsory.
2. Question paper is divided into FIVE sections-SECTION A, B, C, D and E.
3. In section A, question number 1 to 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion -Reason based questions of 1 marks each.
4. In section B, questions number 21 to 25 are very short answer (VSA) type questions of 2 marks each.
5. In section C, questions number 26 to 31 are short answer (SA) type questions carrying 3 marks each.
6. In section D, questions number 32 to 35 are long answer (LA) type questions carrying 5 marks each.
7. In section E, question number 36 to 38 are case based integrated units of assessment questions carrying 4 marks each. Internal choice is provided in 2 marks question in each case study. In case study.
8. There is no overall choice. However, and 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.
9. Draw neat figures wherever required. Take  $\pi=22/7$  wherever required in stated.
10. Use of calculators is NOT allowed.

Q.No	SECTION A	
1	The HCF of $(2^3 \times 3^2 \times 5)$ , $(2^2 \times 3^3 \times 7)$ and $(2 \times 5^2 \times 7^2)$ is: (A) 630 (B) 70 (C) 210 (D) 2	1
2	A quadratic polynomial whose zeros are 3 and -2 is: (A) $x^2 - x - 6$ (B) $x^2 + x - 6$ (C) $x^2 - x + 6$ (D) $x^2 + x + 6$	1
3	The system of equations $3x + 4y = 5$ and $6x + 8y = 10$ represents: (A) Infinite solutions (B) Unique solution (C) No solution (D) None of these	1
4	The L.C.M and H.C.F of two numbers are 180 and 6 respectively. If one of the numbers is 30, the other number is (A) 60 (B) 36 (C) 30 (D) 48	1
5	If $5 \tan \theta = 12$ , where $0^\circ < \theta < 90^\circ$ , then the value of $\sec \theta$ is: (A) 13/5 (B) 5/13 (C) 13/12 (D) 5/12	1
6	For the quadratic equation $3x^2 - 6x + k = 0$ to have real and equal roots, the value of k must be: (A) 3 (B) 6 (C) 9 (D) 4	1
7	The total surface area of sphere of radius $r$ is (A) $\pi r^2$ (B) $2\pi r^2$ (C) $3\pi r^2$ (D) $4\pi r^2$	1
8	A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Length PQ is : (A) 12 cm (B) 13 cm (C) 8.5 cm (D) $\sqrt{119}$ cm.	1
9	If the angle between two radii of a circle is $110^\circ$ , then the angle between the tangents at	1

	the ends of the radii is: (A) $90^\circ$ (B) $50^\circ$ (C) $70^\circ$ (D) $40^\circ$													
10	The distance between the points (2,3) and (-2,0) is (A) 2 units (B) 3 units (C) 5 units (D) 25 units	1												
11	Which of the following is not a similarity criterion for two triangles? (A) AAA (B) SAS (C) SSS (D) ASA	1												
12	In $\Delta ABC$ , right-angled at B, $AB = 24$ cm, $BC = 7$ cm. The value of $\tan C$ is: (A) $12/7$ (B) $24/7$ (C) $20/7$ (D) $7/24$	1												
13	The value of $\sin 60^\circ \cos 30^\circ + \sin 30^\circ \cos 60^\circ$ is: (A) 0 (B) 1 (C) 2 (D) 4	1												
14	In a circle of radius 21 cm, an arc subtends an angle of $60^\circ$ at the centre. The length of the arc is; (A) 20cm (B) 21cm (C) 22cm (D) 25cm	1												
15	If the mean of the following distribution is 2.6, then the value of x is <table border="1" style="margin: 10px auto;"> <tbody> <tr> <td>Variable(x)</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Frequency</td> <td>4</td> <td>5</td> <td>x</td> <td>1</td> <td>2</td> </tr> </tbody> </table> (A) 3 (B) 8 (C) 13 (D) 24	Variable(x)	1	2	3	4	5	Frequency	4	5	x	1	2	1
Variable(x)	1	2	3	4	5									
Frequency	4	5	x	1	2									
16	If the points A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram, taken in order, then the value of p is (A) 4 (B) -6 (C) 7 (D) -2	1												
17	A card is selected at random from a well shuffled deck of 52 cards. The probability of its being queen of heart is (A) $3/13$ (B) $6/52$ (C) $6/13$ (D) $1/52$	1												
18	For the following distribution: <table border="1" style="margin: 10px auto;"> <tbody> <tr> <td>Class</td> <td>0-5</td> <td>5-10</td> <td>10-15</td> <td>15-20</td> <td>20-25</td> </tr> <tr> <td>Frequency</td> <td>10</td> <td>15</td> <td>12</td> <td>20</td> <td>9</td> </tr> </tbody> </table> <b>the modal class is</b> (A) 10-15 (B) 15-20 (C) 20-25 (D) 5-10	Class	0-5	5-10	10-15	15-20	20-25	Frequency	10	15	12	20	9	1
Class	0-5	5-10	10-15	15-20	20-25									
Frequency	10	15	12	20	9									
	<b>DIRECTIONS for (Q.19-Q.20):</b> 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 (A): The sequence 3, 6, 9, 12, ... is an arithmetic progression. Reason (R): In an AP, the difference between any two consecutive terms is always the same	1
20	Assertion(A): $(3+\sqrt{2})\sqrt{2}$ is an irrational number. Reason(R): Product of two irrational numbers is always irrational.	1
SECTION B		
21	If the lines $3x+2ky - 2 = 0$ and $2x+5y+1 = 0$ are parallel, then find the value of k	2
22	If $\sec \theta = \frac{5}{4}$ , then evaluate $\frac{\tan \theta}{1 + \tan^2 \theta}$ .	2
23	A right angle triangle ABC, right angled at A, circumscribes a circle of radius 'r'. If AB & BC are of lengths 6cm and 10cm respectively, find the value of 'r'	2
		
24	In the given figure $DE \parallel BC$ , if $BD = 3\text{cm}$ , $AD = 2\text{cm}$ , $AE = 4\text{cm}$ , then find the value of AC	2
		
	(OR)	
	In the given figure, $DE \parallel OQ$ and $DF \parallel OR$ , Show that $EF \parallel QR$ .	
		
25.	The perimeter of a sector of a circle of radius 5.7 m is 27.2 m. Find the area of the sector. (OR) Find the area of the sector of a circle with radius 4 cm and of angle $30^\circ$ . Also, find the area of the corresponding major sector (Use $\pi = 3.14$ ).	2
SECTION-C		
26.	A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two digit number (ii) a perfect square (iii) a number divisible by 5	3
27	If $\alpha$ and $\beta$ are the zeroes of a polynomial $x^2 - 5\sqrt{3}x + 3$ , then find the value of $\alpha + \beta - \alpha\beta$	3
28	Prove that $3+2\sqrt{5}$ is an irrational number, where $\sqrt{5}$ is an irrational number.	3
29	Prove that the lengths of tangents from an external point to a circle are equal. (OR) If PA and PB are tangents to a circle of radius 5 cm. If line segment joining centre to the external point P is 13 cm. Find the perimeter of quadrilateral OAPB.	3



30. A fraction becomes  $\frac{4}{5}$  if 1 is added to both the numerator and denominator. If 5 is subtracted from both the numerator and denominator, the fraction becomes  $\frac{1}{2}$ . Find the fraction.

31. Prove that  $\frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1} = \frac{1 + \sin \theta}{\cos \theta}$ .

**(OR)**

Prove that  $\sqrt{\frac{1 + \sin A}{1 - \sin A}} = \sec A + \tan A$

**SECTION D (LONG ANSWER TYPE)**

32. The sum of the areas of two squares is  $640 \text{ m}^2$ . If the difference of their perimeters is 64m, find the sides of the two squares.

**(OR)**

The difference of two numbers is 5 and the difference of their reciprocal is  $\frac{1}{10}$ . Find the numbers.

33. Prove that If a line is drawn parallel to one side of a triangle to intersect other two sides in distinct points, the other two sides are divided in the same ratio.

34. Find mode and mean of the following distribution:

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	10	35	52	61	38	29

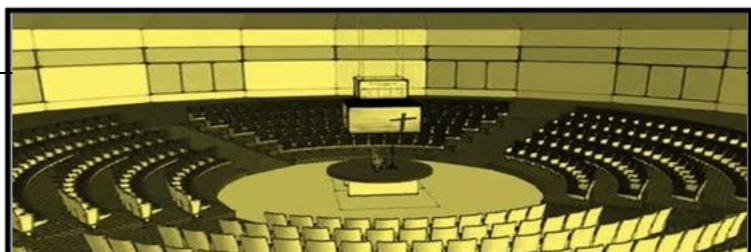
35. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 meters, find the area of canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs.500 per  $\text{m}^2$ .

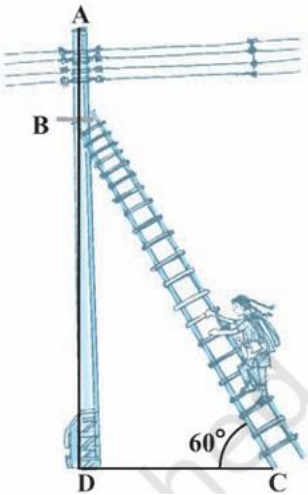
**(OR)**

From a solid cylinder whose height is 8 cm and radius is 6 cm, a conical cavity of height 8 cm and the base radius 6 cm is hollowed out. Find the volume of the remaining solid correct to two places of decimal. Also, find the total surface area of the remaining solid. (Take  $\pi = 3.14$ )

**SECTION E(CASE BASED QUESTIONS)**

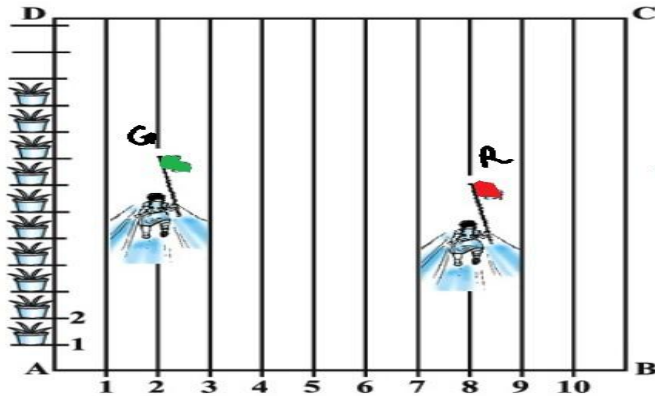
36. The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.



	<p>Now Answer the following questions:</p> <p>(i) If the first circular row has 30 seats, how many seats will be there in the 10th row?</p> <p>(ii) For 1500 seats in the auditorium, how many rows need to be there?</p> <p style="text-align: center;">(OR)</p> <p>If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10th row?</p> <p>(iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?</p>	<p>1</p> <p>2</p> <p>1</p>
<p>37.</p>	<p>Electricians are professionals who <b>design, build and repair electrical systems</b>. An electrician's primary job is to channel electrical power from its source into applications that people use in their daily lives. These systems may include lighting, industrial equipment, motors, electrical appliances, speaker systems and visual displays. An electrician has to repair an electric fault on a pole of height 8 m. She needs to reach a point 2 m below the top of the pole to undertake the repair work (see Fig.).</p> <div style="text-align: center;">  </div> <p>Now Answer the following Questions:</p> <p>(i) What should be the length of the ladder that she should use which, when inclined at an angle of <math>60^\circ</math> to the horizontal, would enable her to reach the required position?</p> <p>(ii) how far from the foot of the pole should she place the foot of the ladder?</p> <p style="text-align: center;">(OR)</p> <p>Find the distance between point A and C</p> <p>(iii) A boy at point C observes a bird on point A at an angle of elevation <math>\theta</math>. Find the value of <math>\tan\theta</math>.</p>	<p>1</p> <p>2</p> <p>1</p>
<p>38.</p>	<p>In order to conduct Sports Day activities in your School, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD, 100 flowerpots have been placed at a distance of 1 m from each other along AD, as shown in given figure below. Niharika runs <math>\frac{1}{4}</math></p>	



th the distance AD on the 2nd line and posts a green flag. Preet runs  $\frac{1}{5}$  th distance AD on the eighth line and posts a red flag.



(i) What are the coordinates of Red flag and Green flag.

(ii) What is the distance between both the flags?

(iii) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?

**(OR)**

If Vaishali runs  $\frac{1}{10}$  th the distance of AD and posts a yellow flag in 4<sup>th</sup> line, then What will be the distance between Green Flag and Yellow Flag.

1  
1  
2

END OF QUESTIONS