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Candidates must write the Set No on the title page of the answer book.

SAHODAYA PRE-BOARD EXAMINATION – 2024-25

CLASS – X

SUB: MATHEMATICS BASIC(241)

Time Allowed: 3 hours

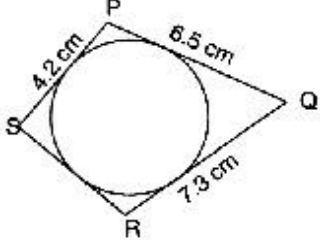
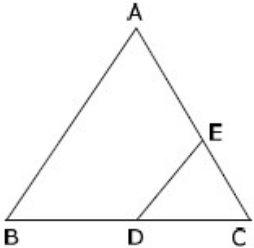
Maximum Marks : 80

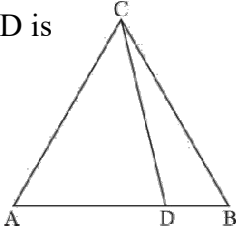
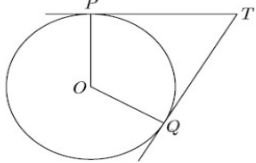
General Instructions :

Read the following instructions carefully and follow them :

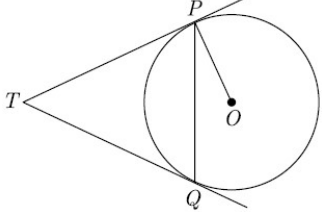
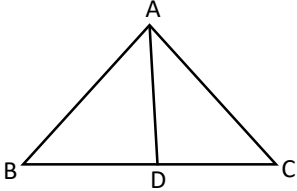
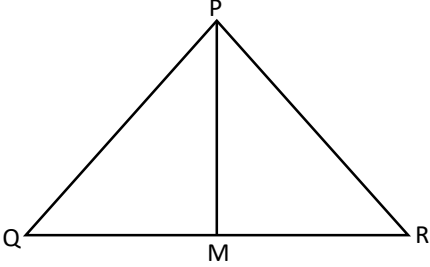
1. This question paper contains 38 questions. All questions are compulsory.
2. Question paper is divided into **FIVE** sections – **SECTION A, B, C, D and E.**
3. In **section A**, question number 1 to 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion – Reason based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



SECTION A		
Q. No. 1 to 20 are Multiple Choice Questions of 1 mark each.		
1	The HCF of two consecutive natural numbers is (A) 1 (B) 2 (C) 3 (D) 4	1
2	<p>In the following diagram the system of linear equations represented by the lines</p> <div style="text-align: center;"> </div> <p>(A) consistent with unique solution (B) inconsistent (B) consistent with three solutions (D) consistent with many solutions</p>	1

3	<p>If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is</p> <p>(A) 2 (B) -2 (C) $\frac{1}{4}$ (D) $\frac{1}{2}$</p>	1
4	<p>If $P(\frac{a}{3}, 2)$ is the mid-point of line segment joining the points $Q(-5, 4)$ and $R(-1, 0)$, then value of a is</p> <p>(A) 9 (B) 2 (C) -2 (D) -9</p>	1
5	<p>In figure, if a circle touches all four sides of a quadrilateral PQRS, whose sides are $PQ = 6.5$ cm, $QR = 7.3$ cm and $PS = 4.2$ cm. Then $RS =$</p>  <p>(A) 4.7 cm (B) 5.3 cm (C) 5 cm (D) 7.3 cm</p>	1
6	<p>In the figure, $\Delta ABC \sim \Delta EDC$, if $AB = 4$ cm, $ED = 3$ cm, $CE = 4.2$ cm and $CD = 4.8$ cm, then the values of CA is:</p>  <p>(A) 6cm (B) 4.8cm (C) 5.4cm (D) 5.6cm</p>	1
7	<p>If $2 \sin 2\theta = \sqrt{3}$, such that $0^\circ < \theta < 90^\circ$, then the value of θ is</p> <p>(A) 60° (B) 45° (C) 30° (D) 15°</p>	1
8	<p>If $\Delta ABC \sim \Delta DEF$ such that $AB = 9.1$ cm and $DE = 6.5$ cm. If the perimeter of ΔDEF is 25 cm, then the perimeter of ΔABC is</p> <p>(A) 36 cm (B) 30 cm (C) 34 cm (D) 35 cm</p>	1
9	<p>If two positive integers p and q can be expressed as $p = ab^2$ and $q = a^3b$; where a, b being prime numbers, then LCM (p, q) is equal to</p> <p>(A) ab (B) a^2b^2 (C) a^3b^2 (D) a^3b^3</p>	1
10	<p>The 21st term of the A.P. whose first two terms are -3 and 4 is</p> <p>(A) 17 (B) 137 (C) 143 (D) -143</p>	1

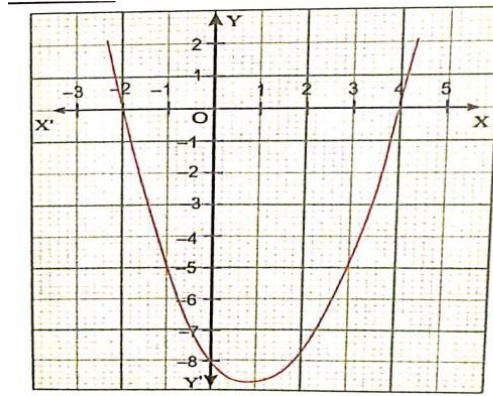
11	<p>In the figure $\angle ACB = \angle CDA$, $AC = 8$ cm, $AD = 3$ cm, then BD is</p> <p>(A) $\frac{22}{3}$ cm (B) $\frac{26}{3}$ cm</p> <p>(C) $\frac{55}{3}$ cm (D) $\frac{64}{3}$ cm</p>		1
12	<p>In the adjoining figure, TP and TQ are the two tangents to a circle with centre O. If $\angle POQ = 120^\circ$, then $\angle PTQ$ is</p> <p>(A) 80° (B) 60° (C) 70° (D) 120°</p>		1
13	<p>If $\tan^2 45^\circ - \cos^2 30^\circ = x \sin 45^\circ \cos 45^\circ$, then $x =$</p> <p>(A) 2 (B) -2 (C) $\frac{-1}{2}$ (D) $\frac{1}{2}$</p>	1	
14	<p>If a sphere is inscribed in a cube, then the ratio of the volume of the cube to the volume of the sphere is</p> <p>(A) $6 : \pi$ (B) $\pi : 6$ (C) $\pi : 4$ (D) $4 : \pi$</p>	1	
15	<p>If a die is thrown once, then the probability of getting a number less than 7 is</p> <p>(A) $\frac{5}{6}$ (B) 1 (C) $\frac{1}{6}$ (D) 0</p>	1	
16	<p>If 2 is a root of the equation $x^2 + bx + 12 = 0$ and the equation $x^2 + bx + q = 0$ has equal roots, then $q =$</p> <p>(A) 8 (B) -8 (C) 16 (D) -16</p>	1	
17	<p>If the mean and median of a data are 10 and 11 respectively, then mode of the data is</p> <p>(A) 12 (B) 8 (C) 20 (D) 13</p>	1	
18	<p>The pair of equations $x = a$ and $y = b$ graphically represents lines which are</p> <p>(A) parallel (B) intersecting at (b, a)</p> <p>(C) coincident (D) intersecting at (a, b)</p>	1	
<p>DIRECTION: In Q. No. 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Select the correct option from the following options:</p> <p>(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)</p> <p>(B) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)</p> <p>(C) Assertion (A) is true but reason (R) is false.</p> <p>(D) Assertion (A) is false but reason (R) is true.</p>			
19	<p>Assertion (A): The n^{th} term of the sequence $-8, -4, 0, 4, \dots$ is $(4n - 12)$</p> <p>Reason (R): The n^{th} term of an AP is determined by $a_n = a + (n - 1)d$.</p>	1	

20	<p>Assertion (A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.</p> <p>Reason (R) : HCF is always a factor of LCM</p>	1														
<p>SECTION B</p> <p>Q. No. 21 to 25 are Very Short Answer Questions of 2 marks each.</p>																
21	<p>(A) Show that the points $(-1, -1)$, $(2,3)$ and $(8, 11)$ are collinear.</p> <p style="text-align: center;">OR</p> <p>(B) Find a point on the x-axis which is equidistant from the points $(-3, 4)$ and $(2, 5)$.</p>	2														
22	<p>(A) The length of a tangent from a point at a distance 25 cm from the centre of the circle is 24 cm, find the diameter of the circle.</p> <p style="text-align: center;">OR</p> <p>(B) Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.</p>	2														
23	The first term of an A.P. is -7 and the common difference 5. Find its 18 th term.	2														
24	<p>If $\tan \theta = \frac{3}{4}$, evaluate</p> $\frac{(1 + \sin\theta)(1 - \sin\theta)}{(1 + \cos\theta)(1 - \cos\theta)}$	2														
25	<p>The following table shows the age distribution of cases of a certain disease admitted during a year in a particular hospital.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td>Age (in years)</td> <td>5-15</td> <td>15-25</td> <td>25-35</td> <td>35-45</td> <td>45-55</td> <td>55-65</td> </tr> <tr> <td>No. Of cases</td> <td>6</td> <td>11</td> <td>21</td> <td>23</td> <td>14</td> <td>5</td> </tr> </tbody> </table> <p>Find the modal age of the above data.</p>	Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65	No. Of cases	6	11	21	23	14	5	2
Age (in years)	5-15	15-25	25-35	35-45	45-55	55-65										
No. Of cases	6	11	21	23	14	5										
<p>SECTION C</p> <p>Q. No. 26 to 31 are Short Answer Questions of 3 marks each.</p>																
26	Prove that $3 + 5\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is an irrational number.	3														
27	Find the ratio in which the y-axis divides the line segment joining the points $(4, -5)$ and $(-1, 2)$. Also find the point of intersection.	3														
28	<p>(A) Prove that :</p> $\sqrt{\frac{1 + \sin\theta}{1 - \sin\theta}} + \sqrt{\frac{1 - \sin\theta}{1 + \sin\theta}} = 2\sec \theta$ <p style="text-align: center;">OR</p> <p>(B) Prove that :</p> $\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan \theta$	3														

29	Find the median for the following distribution : <table border="1" data-bbox="277 134 1370 289"> <thead> <tr> <th>Class interval</th> <th>0-10</th> <th>10-20</th> <th>20-30</th> <th>30-40</th> <th>40-50</th> </tr> </thead> <tbody> <tr> <td>Frequency</td> <td>2</td> <td>12</td> <td>22</td> <td>8</td> <td>6</td> </tr> </tbody> </table>	Class interval	0-10	10-20	20-30	30-40	40-50	Frequency	2	12	22	8	6	3
Class interval	0-10	10-20	20-30	30-40	40-50									
Frequency	2	12	22	8	6									
30	(A) Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle. OR (B) In the figure given below, two tangents TP and TQ are drawn to the circle with centre O from an external point T . Prove that $\angle PTQ = 2\angle OPQ$. <div style="text-align: center;">  </div>	3												
31	In a two digit number, the ten's digit number is three times the unit's digit. When the number is decreased by 54, the digits are reversed. Find the number.	3												
SECTION D Q. No. 32 to 35 are Long Answer Questions of 5 marks each.														
32	(A) An express train takes 1 hour less than a passenger train to travel 132 km between Mysore and Bangalore (without taking into consideration the time they stop at intermediate stations). If the average speed of the express train is 11km/h more than that of the passenger train, find the average speed of the two trains. OR (B) Two pipes running together can fill a cistern in $3\frac{1}{13}$ minutes. If one pipe takes 3 minutes more than the other to fill it, find the time in which each pipe would fill the cistern.	5												
33	(A) State and prove Basic Proportionality Theorem. OR (B) Sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of ΔPQR . Show that $\Delta ABC \sim \Delta PQR$. <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: center;">  </div> </div>	5												
34	In a circle of radius 21cm, an arc subtends an angle of 60° at the centre (use $\sqrt{3} = 1.73$). Find <ol style="list-style-type: none"> The length of the arc Area of the minor sector formed by the arc Area of the minor segment Area of the major segment 	5												

35	A statue, 1.6 m tall, stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point the angle of elevation of the top of the pedestal is 45° . Find the height of the pedestal.	5
SECTION E Q. No. 36 to 38 are Case-Based Questions of 4 marks each.		
36	<p>Raghav and his family went for vacation to Rajasthan. They had a stay in tent for a night. Raghav found that the tent in which they had stayed is in the form of a cone surmounted on a cylinder. The total height of the tent is 35 m. Diameter of the base is 56 m and height of the cylindrical part is 14 m.</p> <p>Use the above information to answer the questions that follow:</p> <p>(i) How many persons can be accommodated in the tent, if each person needs 17.6 m^2 of floor area?</p> <p>(ii) Find the Curved Surface Area of conical part of the tent.</p> <p>(iii) (a) How much canvas is needed to make the tent?</p> <p style="text-align: center;">OR</p> <p>(b) Find the volume of air present inside the tent.</p>	 <p style="text-align: right;">1 1 2 2</p>
37	<p>Rahul and Ravi planned to play Business (board game) in which they were supposed to use two dice.</p>  <p>Based on the above information, answer the following questions:</p> <p>(i) Ravi got first chance to roll the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is 8?</p> <p>(ii) Rahul got next chance. What is the probability that he got same number on both the dice?</p> <p>(iii) (A) Now it was Ravi's turn. He rolled the dice. What is the probability that he got the sum of the two numbers appearing on the top face of the dice is less than or equal to 12 ?</p> <p style="text-align: center;">OR</p> <p>(B) What is the probability that Rahul got the product of the two numbers is 12 ?</p>	<p style="text-align: right;">1 1 2 2</p>

38 The International Day of Yoga has been celebrated across the world annually on June 21 since 2015, following its inception in the United Nations General Assembly in 2014. Yoga is a physical, mental and spiritual practice which originated in ancient India. An asana is a body posture, originally and still a general term for a sitting meditation pose, and later extended in hatha yoga and modern yoga as exercise, to any type of pose or position, adding reclining, standing, inverted, twisting and balancing poses. In the figure one can observe that poses can be related to representation of quadratic polynomial.



Based on your understanding of the above case study, answer the following questions.

(i) How many zeros are there in the above graph?

1

(ii) What is the name of the graph?

1

(iii) Find the zeroes of the polynomial $P(x) = 3x^2 - 16x - 12$

2

OR

Find a quadratic polynomial whose zeroes are $(2 + \sqrt{3})$ and $(2 - \sqrt{3})$

2

