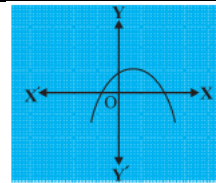
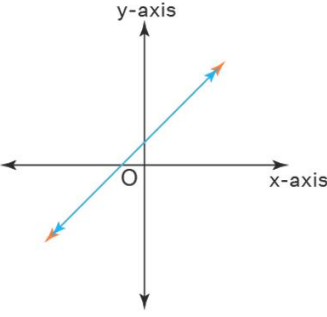


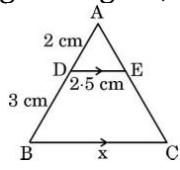
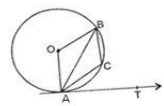
**ALL KERALA COMMON MODEL EXAMINATION****MATHEMATICS****CLASS X [2023-24]****Time Allowed** : 180 mins**Maximum Marks** : 80**General Instructions:**

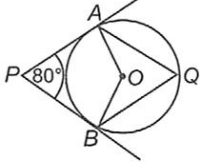
1. This Question Paper has 5 Sections A, B, C, D and E.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based integrated units of assessment (04 marks each) with sub - parts 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  $\pi = \frac{22}{7}$  wherever required if not stated.

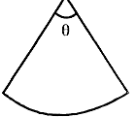
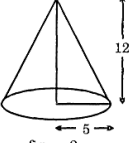
<b>Section A</b>		
1	If the HCF of 360 and 64 is 8, then their LCM is: a) 2880 b) 2780 c) 2480 d) 512	<b>[1]</b>
2	Find the number of zeroes of $p(x)$ in the graph given below. a) 3	<b>[1]</b>

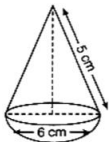


	b) 0 c) 2 d) 1	
3	<p>The number of solutions of two linear equations representing coincident lines</p>  <p>is/are</p> <p>a) infinite solution          b) 0          c) 1          d) 5</p>	[1]
4	<p>Determine the value of k for which the quadratic equation <math>2x^2 + 3x + k = 0</math> has real roots.</p> <p>a) <math>k \geq \frac{9}{8}</math>          b) <math>k \leq \frac{8}{9}</math>          c) <math>k \leq \frac{9}{8}</math>          d) <math>k = \frac{8}{9}</math></p>	[1]
5	<p>If the distance between the points <math>(2, -2)</math> and <math>(-1, x)</math> is 5, one of the values of x is</p> <p>a) - 2          b) - 1          c) 1          d) 2</p>	[1]
6	<p>Which term of the A.P. 121, 117, 113, ... is its first negative term?</p>	[1]

	<p>a) 32</p> <p>b) 33</p> <p>c) 30</p> <p>d) 31</p>	
7	<p>The midpoint of segment AB is P(0,4). If the coordinates of B are (-2,3), then the coordinates of A are</p> <p>a) (-2, -5)</p> <p>b) (2, 9)</p> <p>c) (-2, 11)</p> <p>d) (2, 5)</p>	[1]
8	<p>In the given figure, AD = 2 cm, DB = 3 cm, DE = 2.5 cm and DE    BC. The value of x is:</p>  <p>a) 7.5 cm</p> <p>b) 3.75 cm</p> <p>c) 6.25 cm</p> <p>d) 6 cm</p>	[1]
9	<p>In figure, AB is a chord of a circle and AT is a tangent at A such that <math>\angle BAT = 60^\circ</math>, measure of <math>\angle ACB</math> is :</p>  <p>a) <math>120^\circ</math></p> <p>b) <math>150^\circ</math></p> <p>c) <math>90^\circ</math></p> <p>d) <math>110^\circ</math></p>	[1]
10	<p>If <math>x = a \cos \theta</math> and <math>y = b \sin \theta</math>, then <math>b^2 x^2 + a^2 y^2 =</math></p> <p>a) <math>a^2 + b^2</math></p>	[1]

	<p>b) <math>ab</math></p> <p>c) <math>a^4 b^4</math></p> <p>d) <math>a^2 b^2</math></p>	
11	<p>In the given figure, <math>O</math> is the centre of the circle. If <math>PA</math> and <math>PB</math> are tangents, then</p>  <p>the value of <math>\angle AQB</math> is</p> <p>a) <math>80^\circ</math></p> <p>b) <math>60^\circ</math></p> <p>c) <math>50^\circ</math></p> <p>d) <math>100^\circ</math></p>	[1]
12	<p><math>\sqrt{\frac{1+\sin\theta}{1-\sin\theta}}</math> is equal to</p> <p>a) <math>\tan\theta - \sec\theta</math></p> <p>b) <math>-\sec\theta - \tan\theta</math></p> <p>c) <math>\sec\theta + \tan\theta</math></p> <p>d) <math>\sec\theta - \tan\theta</math></p>	[1]
13	<p>A pole 6 m high casts a shadow <math>2\sqrt{3}</math> m long on the ground, then the sun's elevation is</p> <p>a) <math>30^\circ</math></p> <p>b) <math>60^\circ</math></p> <p>c) <math>45^\circ</math></p> <p>d) <math>90^\circ</math></p>	[1]
14	<p>If the area of a sector <math>POK</math> is <math>100\pi</math> sq.units and angle <math>POK = 49^\circ</math>, then find the radius of sector</p> <p>a) <math>\frac{60\sqrt{10}}{7}</math> units</p> <p>b) <math>\frac{5\sqrt{10}}{7}</math> units</p>	[1]

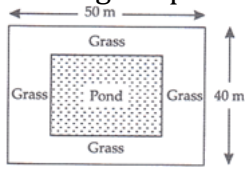
	<p>c) <math>\frac{6\sqrt{10}}{9}</math> units</p> <p>d) <math>\frac{9\sqrt{10}}{7}</math> units</p>	
15	<p>A piece of paper in the shape of a sector of a circle (see figure 1) is rolled up to form a right - circular cone (see figure 2). The value of angle <math>\theta</math> is:</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>figure 1</p> </div> <div style="text-align: center;">  <p>figure 2</p> </div> </div> <p>a) <math>\frac{5\pi}{13}</math></p> <p>b) <math>\frac{6\pi}{13}</math></p> <p>c) <math>\frac{10\pi}{13}</math></p> <p>d) <math>\frac{9\pi}{13}</math></p>	[1]
16	<p>A bag contains 3 red, 5 black and 7 white balls. A ball is drawn from the bag at random. The probability that the ball drawn is not black, is:</p> <p>a) <math>\frac{5}{10}</math></p> <p>b) <math>\frac{2}{3}</math></p> <p>c) <math>\frac{1}{3}</math></p> <p>d) <math>\frac{9}{15}</math></p>	[1]
17	<p>If <math>P(E)</math> denotes the probability of an event <math>E</math> then</p> <p>a) <math>0 \leq P(E) \leq 1</math></p> <p>b) <math>- 1 \leq P(E) \leq 1</math></p> <p>c) <math>P(E) &lt; 0</math></p> <p>d) <math>P(E) &gt; 0</math></p>	[1]

18	The median of first 8 prime numbers is a) 9 b) 11 c) 13 d) 7	[1]
19	<p><b>Assertion (A):</b> The given figure represents a hemisphere surmounted by a conical block of wood. The diameter of their bases is 6 cm each and the slant height of the cone is 5 cm. The volume of the solid is <math>196\text{cm}^3</math></p>  <p><b>Reason (R):</b> The volume hemisphere is given by <math>\frac{2}{3}\pi r^3</math></p> <p>a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.</p>	[1]
20	<p><b>Assertion (A):</b> Common difference of the AP - 5, - 1, 3, 7, ... is 4. <b>Reason (R):</b> Common difference of the AP a, a + d, a + 2d, ... is given by d = 2nd term - 1st term.</p> <p>a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A. c) A is true but R is false. d) A is false but R is true.</p>	[1]
<b>Section B</b>		
21	Show that $5 - 2\sqrt{3}$ is an irrational number.	[2]
22	A and B are respectively the points on the sides PQ and PR of a triangle PQR such that PQ = 12.5 cm, PA = 5 cm, BR = 6 cm and PB = 4 cm. Is AB    QR? Give reasons for your answer.	[2]
23	Prove that in two concentric circles, the chord of the larger circle, which touches the smaller circle is bisected at the point of contact.	[2]
24	Find the value of x if $\cos 2x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$	[2]

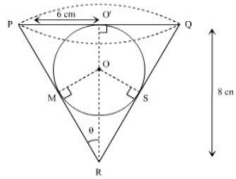
	<p><b>OR</b></p> <p>Prove that <math>\frac{1+\tan^2 A}{1+\cot^2 A} = \sec^2 A - 1</math></p>	
25	<p>A horse is tethered to one corner of a field which is in the shape of an equilateral triangle of side 12 m. If the length of the rope is 7 m, find the area of the field which the horse cannot graze. Take <math>\sqrt{3} = 1.732</math>. Write the answer correct to 2 places of decimal.</p> <p><b>OR</b></p> <p>What is the angle subtended at the centre of a circle of radius 6 cm by an arc of length <math>3\pi</math> cm?</p>	[2]
	<b>Section C</b>	
26	<p>Mrs. Gupta arranged some snacks for her child's birthday party. After the guest left she had some food left over. She did not want to waste food and so she contacted a local NGO. She gave 60 pieces of pastries, 168 pieces of cookies, and 330 chocolate bars to the team. Now the NGO workers want to make the maximum number of packets with those foods so that no food is left for distributing to the beggars at the roadside. Find the greatest number of packets that they can make.</p>	[3]
27	<p>Write the family of quadratic polynomials having <math>-\frac{1}{4}</math> and 1 as its zeros.</p>	[3]
28	<p>Solve the system of equations graphically: <math>3x - 4y = 7</math> <math>5x + 2y = 3</math> Shade the region between the lines and the y - axis</p> <p><b>OR</b></p> <p>The ratio of incomes of two persons is 9 : 7 and the ratio of their expenditures is 4 : 3. If each of them manages to save ₹ 2000 per month, then find their monthly incomes.</p>	[3]
29	<p>Prove that the tangent drawn at the midpoint of an arc of a circle is parallel to the chord joining the end points of the arc.</p> <p><b>OR</b></p> <p>Prove that the tangents drawn at the ends of a chord of a circle make equal angles with chord.</p>	[3]
30	<p>If <math>\sin \theta + \cos \theta = \sqrt{2}</math>, then evaluate <math>\tan \theta + \cot \theta</math>.</p>	[3]

31	A class teacher has the following absentee record of 40 students of a class for the whole term. Find the mean number of days a student was absent	[3]																
	<table border="1"> <tr> <td><b>Number of Days</b></td> <td>0-6</td> <td>6-12</td> <td>12-18</td> <td>18-24</td> <td>24-30</td> <td>30-36</td> <td>36-42</td> </tr> <tr> <td><b>Number of students</b></td> <td>10</td> <td>11</td> <td>7</td> <td>4</td> <td>4</td> <td>3</td> <td>1</td> </tr> </table>	<b>Number of Days</b>	0-6	6-12	12-18	18-24	24-30	30-36	36-42	<b>Number of students</b>	10	11	7	4	4	3	1	
<b>Number of Days</b>	0-6	6-12	12-18	18-24	24-30	30-36	36-42											
<b>Number of students</b>	10	11	7	4	4	3	1											

**Section D**

32	<p>In the centre of a rectangular lawn of dimensions 50 m × 40 m, a rectangular pond has to be constructed so that the area of the grass surrounding the pond would be 1184 m<sup>2</sup>. Find the length and breadth of the pond</p>  <p><b>OR</b></p> <p>Solve the quadratic equation by factorization: <math>\frac{3}{x+1} - \frac{1}{2} = \frac{2}{3x-1}, x \neq -1, \frac{1}{3}</math></p>	[5]
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33	In trapezium ABCD, $AB \parallel DC$ and $DC = 2AB$ . EF drawn parallel to AB cuts AD in F and BC in E such that $\frac{BE}{EC} = \frac{3}{4}$ . Diagonal DB intersects EF at G. Prove that $7FE = 10AB$ .	[5]
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34	<p>A conical vessel of radius 6 cm and height 8 cm is completely filled with water. A sphere is lowered into the water and its size is such that when it touches the sides, it is just immersed as shown in Figure. What fraction of water overflows?</p>  <p><b>OR</b></p> <p>A toy is in the form of a cone mounted on a hemisphere. The diameter of the base of the cone is 7 cm and its height is 15.5 cm. Find the volume of the toy. (Use <math>\pi = 3.14</math>).</p>	[5]
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35	Find the value of p, if the mean of the following distribution is 18.	[5]														
	<table border="1"> <thead> <tr> <th>x</th> <th>f</th> </tr> </thead> <tbody> <tr> <td>13</td> <td>8</td> </tr> <tr> <td>15</td> <td>2</td> </tr> <tr> <td>17</td> <td>3</td> </tr> <tr> <td>19</td> <td>4</td> </tr> <tr> <td>20 + p</td> <td>5p</td> </tr> <tr> <td>23</td> <td>6</td> </tr> </tbody> </table>	x	f	13	8	15	2	17	3	19	4	20 + p	5p	23	6	
x	f															
13	8															
15	2															
17	3															
19	4															
20 + p	5p															
23	6															

**Section E**

36 **Read the text carefully and answer the questions:** Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹ 1,18,000 by paying every month starting with the first instalment of ₹ 1000. If he increases the instalment by ₹ 100 every month , answer the



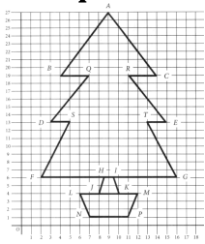
following:

1. Find the amount paid by him in 30<sup>th</sup> installment.
2. Find the amount paid by him in 30 installments.

**OR**

3. Find the 10<sup>th</sup> installment, if the 1<sup>st</sup> installment is of ₹ 2000.
4. If total installments are 40 then amount paid in the last installment?

37 **Read the text carefully and answer the questions:** The design of Christmas tree is shown in the following graph:



tree is shown in the following graph:

1. What is the distance of point A from x - axis?
2. What is the Length of BC?

**OR**

3. What is the perimeter of its trunk LMPN?
4. What is the Length of FG?

38

**Read the text carefully and answer the questions:** An observer on the top of a 40m tall light house (including height of the observer) observes a ship at an angle of depression  $30^\circ$  coming towards the base of the light house along straight line joining the ship and the base of the light house. The angle of depression of ship changes to  $45^\circ$  after 6 seconds.

[4]



1. Find the distance of ship from the base of the light house after 6 seconds from the initial position when angle of depression is  $45^\circ$
2. Find the distance between two positions of ship after 6 seconds?

**OR**

3. Find the distance of ship from the base of the light house when angle of depression is  $30^\circ$ .
4. Find the speed of the ship?