Class- X Session- 2024-25

Subject- Mathematics (Standard)
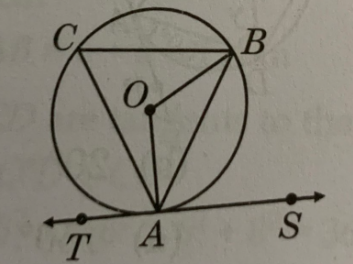
SP3

Time Allowed: 3 Hrs.   **Maximum Marks : 80**

General Instructions:

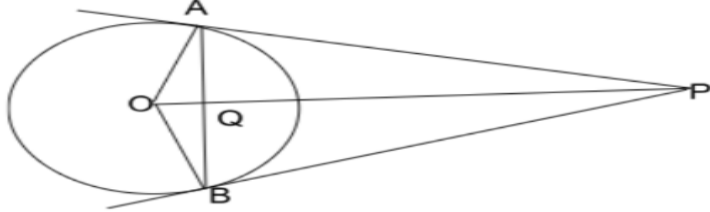Read the following instructions carefully and follow them:
1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 markseach.
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 have been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take π =22/7 wherever required if not stated.
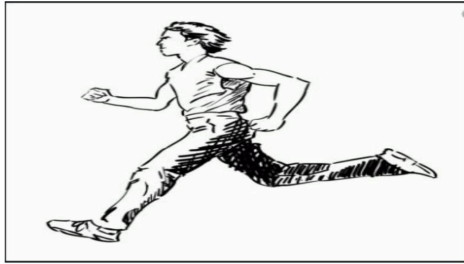11. Use of calculators is not allowed.

S.NO	SECTION A **Section A consists of 20 questions of 1 mark each**
1	In the given figure TAS is a tangent to a circle with center O,at the point A ,if $\angle$AOB = 116° ,then $\angle$BAS is a)32° b)64° c)58° d)116°
2	How many tangents can be drawn to a circle from a point on it ? a)one b)two c)infinite d)zero

3	A card is drawn from a deck of 52 cards. The event E is that the card is not an ace of hearts. The number if outcomes favorable to E is a) 4 b) 13 c) 48 d) 51
4	The zeros of the polynomial $x^2 - 3x - m(m + 3)$ are (a) $m, m + 3$ (b) $- m, m + 3$ (c) $m, -(m + 3)$ (d) $- m, -(m + 3)$
5	Find the value of $\dfrac{sin\ 30° - sin\ 90° + 2\ cos\ 0°}{tan\ 30°\ tan\ 60°}$ a) $\dfrac{3}{2}$ b) $\dfrac{5}{2}$ c) $\dfrac{2}{3}$ d) $\dfrac{7}{2}$
6	If $tan\ θ = \dfrac{3}{4}$, $0 < θ < 90°$, then the value of $sin\ θ\ cos\ θ$ is a) $\dfrac{3}{5}$ b) $\dfrac{4}{5}$ c) $\dfrac{12}{25}$ d) $\dfrac{16}{25}$
7	Which of the following cannot be the probability of an event ? a)0.1 b)$\dfrac{5}{3}$ c)3% d)$\dfrac{1}{3}$
8	The mean of 15 numbers is 25.If each number is multiplied by 4 the new mean is a) 125 b) 30 c) 100 d) 25
9	Which term of the AP 21,18,15,.......... Is $- 81$? a)33 b)34 c)35 d)36
10	The value of p if $A(- 1, 7), B(- 5, 6), C(6, 7)\ and\ D(p, 4)$ are vertices of a parallelogram will be $a)10$ $b)14$ $c)4$ $d)8$
11	The coordinates of the points P and Q are respectively $(4, -3)$ and $(-1, 7)$. Then the abscissa of a point R on the line segment PQ such that PR : PQ= 3 : 5 is a) $\dfrac{18}{5}$ b) $\dfrac{17}{5}$ c) $\dfrac{17}{8}$ d) 1
12	If ABC and DEF are similar such that 2AB = DE and BC = 8 cm, then EF =_____ (a) 16 cm (b) 112 cm (c) 8 cm (d) 4 cm
13	A quadratic polynomial having zeros $\sqrt{\dfrac{5}{2}}$ ans $-\sqrt{\dfrac{5}{2}}$ is (a)$x^2 - 5\sqrt{2}x + 1$ (b)$2x^2 - 5$ (c)$15x^2 - 6$ (d)$x^2 - 2\sqrt{5}x - 1$
14	Which of the following equations has no real roots? a) $x^2 - 4x + 3\sqrt{2} = 0$ b) $x^2 + 4x - 3\sqrt{2} = 0$ c) $x^2 - 4x - 3\sqrt{2} = 0$ d) $3x^2 + 4\sqrt{3}x + 4 = 0$

15	The radius of the base of a right circular cone and the radius of a sphere are each 5 cm in length. If the volume of the cone is equal to the volume of the sphere then the height of the cone is A) 5cm B) 20 cm C) 10 cm D) 4 cm
16	The value of k for which the system of equations 3x-ky= 7 and 6x+ 10y =3 is inconsistent, is A) -10 B) -5 C) 5 D) 7
17	Which of the following gives the middle most observation of the data? A) Median B) Mean C) Range D) Mode
18	A solid spherical ball fits exactly inside the cubical box of side 2a .The volume of the ball will be A)$\frac{16}{3}\pi a^3$ B)$\frac{1}{6}\pi a^3$ C)$\frac{32}{3}\pi a^3$ D)$\frac{4}{3}\pi a^3$
	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:** The H.C.F. of two numbers is 16 and their product is 3072. Then their L.C.M. = 162. **Reason:** If a and b are two positive integers, then H.C.F. × L.C.M. = a × b
20	Assertion (A): If the outer and inner diameter of a circular path is 10 m and 6 m respectively, then the area of the path is 16π sq.m. Reason (R): If R and r be the radius of outer and inner circular path respectively, then area of circular path $= \pi\left(R^2 - r^2\right)$.
	SECTION B(2 MARKS QUESTIONS)
21	Find the HCF and LCM of 70 and 40 ,hence verify HCF X LCM = product of numbers . <div align=center>OR</div>The LCM of two prime numbers p and q (p > q) is 221. Find the value of 3p – q.
22	Find the coordinates of a point which divides the join of $A(-\,1, 7)$ and $B(4, -\,3)$ in the ratio of 2:3 ?

23	Which quadrilateral is formed by $A(2, -2)$, $B(7, 3)$, $C(11, -1)$ and $D(6, -6)$ taken in order ?justify
24	If $sin\alpha = \frac{1}{2}$ then find the value of $3cos\alpha - 4cos^3\alpha$.
25	In a bag containing 24 balls, 4 are blue, 11 are green and the rest are white. One ball is drawn at random. Then find the probability of a white ball? <center>OR</center> A bag contains 5 red and some blue balls .If the probability of drawing a blue ball is 3 times that of red ball,find the number of blue balls in the bag?
	<center>SECTION C (3 MARKS QUESTIONS)</center>
26	Prove that $3 + 2\sqrt{5}$ is irrational ,given that $\sqrt{5}$ is irrational ?
27	If α and β are the zeroes of the quadratic polynomial $f(x) = 3x^2 + 5x - 2$, then find a quadratic polynomial whose zeroes are 2α and 2β ?
28	The sum of two numbers is 18 and the sum of their reciprocals is 9/40. Find the numbers.
29	Two sides and the perimeter of one triangle are respectively three times the corresponding sides and the perimeter of the other triangle. Are the two triangles similar? Why? <center>OR</center> In $\triangle ABC$, D, E and F are midpoints of BC,CA and AB respectively. Prove that $\triangle FBD \sim \triangle DEF$ and $\triangle DEF \sim \triangle ABC$.
30	Prove that $$\sqrt{\frac{1+COS\theta}{1-COS\theta}} + \sqrt{\frac{1-COS\theta}{1+COS\theta}} = 2cosec\theta$$
31	In a circle of radius 21 cm an arc subtends an angle of 60° at the center .Find the length of arc and area of the sector formed by the arc. <center>OR</center> A chord of a circle of radius 15 cm subtends an angle of 120° at the center .Find the area of the corresponding minor segment .
	<center>SECTION D (5 MARKS QUESTIONS)</center>
32	(A) Solve the following system of linear equations graphically: <center>x+2y = 3, 2x-3y+8 = 0 (2)</center> (B) Places A and B are 180 km apart on a highway. One car starts from A and

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	another from B at the same time. If the car travels in the same direction at different speeds they meet in 9 hours .If they travel in the opposite direction at the same speed as before they meet in 1 hour .Find the speed of the two cars ? (3)
33	As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships are 30∘ and 45∘ . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships (Use $\sqrt{3} = 1.732$).
34	1)In a circle prove that the tangents drawn from an external point are equal in length . (2) 2)In the given figure, PA and PB are tangents to a circle with center at O. Prove that (i) OP bisects ∠APB (ii) OP is the right bisector of AB. (3)
35	Find the mean and mode of the following data 	class	85-90	90-95	95-100	100-105	105-110	110-115
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frequency	15	22	20	18	20	25 | OR Find the missing frequencies in the following data if the median is 28.5 | Class	0-10	10-20	20-30	30-40	40-50	50-60	total
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frequency	5	x	20	15	y	5	60	
	SECTION E (CASE BASED)(4 MARKS EACH)
36	A boy wants to participate in a 200m race .He can currently run a distance in 51 seconds and with each day practice it takes 2 seconds less .He wants to do it in 31 seconds .

Answer the following questions
1)Formulate the AP in the above situation . (1)
2)Find the minimum number of days for him to achieve the goal? (1)
(3)If the nth term of an AP is given by $a_n = 2n + 3$ then find the common
difference . (2)

OR

Find the value of $x\ if\ 2x, x + 10, 3x + 2$ are in AP . (2)

| 37 | Anika is studying in class 10 .She observes 2 poles DC and BA .The heights of these 2 poles are $x\ m\ and\ y\ m$ resp. |
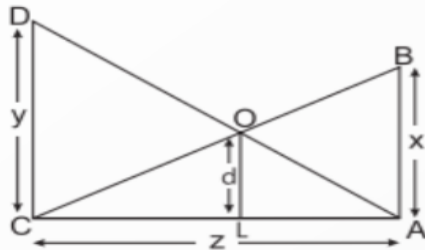
These 2 poles are z m apart and O is the point of intersection of the lines joining the top of the poles to the foot of the opposite pole and distance between point O and L is d .
Answer the following questions
1)Which similarity criteria is applicable for $\triangle ACB\ and \triangle CLO$. (1)
2)If $x = y$ prove that AC : DA=1:1 . (1)
3)If CL=a ,then find a in terms of x ,y and d . (2)

OR

If AL=b then find b in terms of x ,y and d . (2)

| 38 | One day a boy was going back from school to his home .On the way he saw carpenter working on wood .He was carving out a cone from a cylinder of same same height and diameter .The height of the cylinder was 24 cm and the base radius was 7 cm .While watching the boy had a number of questions in his mind .Answer the following questions . |
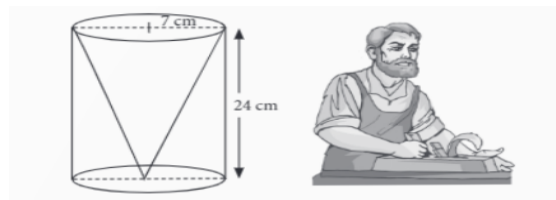
1) Find the slant height of the conical cavity ?   (1)
2) Find the curved surface area of the conical cavity ?   (1)
3) Find the total surface area of the cylinder ?   (2)
                         OR
    Find the volume of the solid ?   (2)