



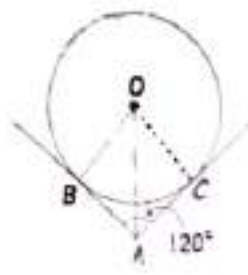
K. R. MANGALAM WORLD SCHOOL, GK-II
PRE-BOARD 1 EXAMINATION (2025-26)
CLASS X / MATHEMATICS / SET 2

M.M. – 80

TIME : 3 Hrs.

General Instructions:

1. This Question Paper has 5 Sections A-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 subparts 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 one part of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

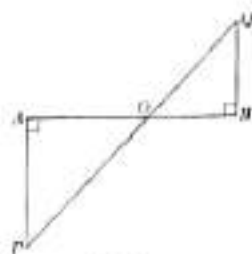
SECTION A		
Q1.	In an AP, if $a = 3.5$, $d = 0$ and $n = 101$, then a_n will be: (a) 0 (b) 3.5 (c) 103.5 (d) 104.5	(1)
Q2.	The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has (a) a unique solution (b) exactly two solutions (c) infinitely many solutions (d) no solutions	(1)
Q3.	The distance between the point $(a \cos \theta + b \sin \theta, 0)$ and $(0, a \sin \theta - b \cos \theta)$ is: (a) $a^2 + b^2$ (b) $a^2 - b^2$ (c) $\sqrt{a^2 + b^2}$ (d) $\sqrt{a^2 - b^2}$	(1)
Q4.	Value(s) of k for which the quadratic equation $2x^2 - kx + k = 0$ has equal roots is/are: (a) 0 (b) 4 (c) 3 (d) 0, 8	(1)
Q5.	If the mean of the numbers $27 + x$, $31 + x$, $89 + x$, $107 + x$, $156 + x$, is 82, then the mean of $130 + x$, $126 + x$, $68 + x$, $50 + x$, and $1 + x$ is: (a) 75 (b) 157 (c) 82 (d) 80	(1)
Q6.	If $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $(\alpha + \beta)$ is: (a) 0 (b) 30° (c) 60° (d) 90°	(1)
Q7.	If the perimeter of the circle and square are equal, then the ratio of area of circle to square is: (a) 14:11 (b) 22:7 (c) 7:22 (d) 11:14	(1)
Q8.	The area of the largest circle that can be inscribed in a square of side 6 cm is: (a) $36\pi \text{ cm}^2$ (b) $8\pi \text{ cm}^2$ (c) $12\pi \text{ cm}^2$ (d) $9\pi \text{ cm}^2$	(1)
Q9.	A letter is chosen at random from the letters of the word ASSASSINATION, then the probability that the letter chosen is a vowel is in the form of $\frac{6}{2x+1}$, then x is equal to: (a) 5 (b) 6 (c) 8 (d) 7	(1)
Q10.	In the given figure, two tangents AB and AC are drawn to a circle with centre O such that $\angle BAC = 120^\circ$, then OA is equal to: <div style="text-align: center;"></div> (a) 2AB (b) 3AB (c) 4AB (d) AB	(1)

- Q11. If $x = p \sec \theta$ and $y = q \tan \theta$, then
 (a) $x^2 - y^2 = p^2 q^2$
 (b) $x^2 q^2 - y^2 p^2 = pq$
 (c) $x^2 q^2 - y^2 p^2 = p^2 q^2$
 (d) $x^2 q^2 - y^2 p^2 = \frac{1}{p^2 q^2}$
- Q12. The following data gives the distribution of total household expenditure.

Expenditure (in ₹)	Frequency
1000-1500	24
1500-2000	40
2000-2500	33
2500-3000	28
3000-3500	30
3500-4000	22
4000-4500	16
4500-5000	07

The upper limit of median class is:

- (a) 3000 (b) 2500 (c) 3500 (d) 4000
- Q13. The probability of getting a bad egg in a lot of 400 is 0.035. The number of bad eggs in the lot is:
 (a) 7 (b) 14 (c) 21 (d) 28
- Q14. If $4 \tan \theta = 3$, then $\left(\frac{4 \sin \theta - \cos \theta}{4 \sin \theta + \cos \theta} \right)$ is equal to:
 (a) $\frac{2}{3}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$
- Q15. If the centre of a circle is (3, 5) and end points of a diameter are (4, 7) and (2, y), then the value of y is:
 (a) 3 (b) 7 (c) 4 (d) -3
- Q16. If α and β are zeroes and the quadratic polynomial, $f(x) = x^2 - x - 4$ then the value of $\frac{1}{\alpha} + \frac{1}{\beta} - \alpha\beta$ is:
 (a) 4 (b) 15 (c) $\frac{15}{4}$ (d) $\frac{-14}{4}$
- Q17. If two solid hemispheres of same base radius r are joined together along their bases, then curved surface area of this new solid is:
 (a) $3\pi r^2$ (b) $2\pi r^2$ (c) $4\pi r^2$ (d) $6\pi r^2$
- Q18. In the given figure, if $\angle A = 90^\circ$, $\angle B = 90^\circ$, $OB = 4.5$ cm, $OA = 6$ cm and $AP = 4$ cm, then find QB.



- (a) 1 (b) 2 (c) 3 (d) 4

DIRECTIONS: In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).

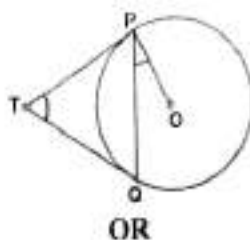
Choose the correct option:

- (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.

- Q19. **Statement A (Assertion):** The HCF of two numbers is 5 and their product is 150, then their LCM is 30
Statement R (Reason): For any two positive integers a and b , $\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b$. (1)
- Q20. **Statement A (Assertion):** Common difference of the AP $-5, -1, 3, 7, \dots$ is 4.
Statement R (Reason): Common difference of the AP $a, a + d, a + 2d, \dots$ is given by $d = a_2 - a_1$. (1)

SECTION B

- Q21. Solve the quadratic equation $4x^2 - 5x - 12 = 0$. (2)
- Q22. A line intersects the y -axis and the x -axis at the points P and Q respectively. If $(2, -5)$ is the midpoint of PQ , then, find the coordinates of P and Q . (2)
- Q23. In the figure, two tangents TP and TQ are drawn to a circle with centre O from an external point T , prove that $\angle PTQ = 2\angle OPQ$. (2)



- A circle touches all four sides of a quadrilateral $ABCD$. Prove that $AB + CD = BC + DA$.
- Q24. A piece of wire 22 cm long is bent into the form of an arc of a circle subtending an angle of 60° at its centre. Find the radius of the circle. (2)
- Q25. If $\sin \theta + \cos \theta = \sqrt{2}$, then prove that $\tan \theta + \cot \theta = 1$. (2)
- OR
- If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = \frac{1}{\sqrt{3}}$, $0^\circ < A + B \leq 90^\circ$, $A > B$, find A and B .

SECTION C

- Q26. Prove that $5 - \sqrt{5}$ is irrational, it is given that $\sqrt{5}$ is irrational. (3)
- Q27. If the equation $(m^2 + n^2)x^2 - 2(mp + nq)x + p^2 + q^2 = 0$ has equal real roots, then prove that $mq = np$. (3)

OR

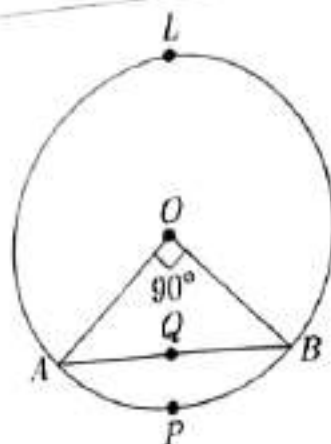
- Three consecutive natural number are such that the square of the middle number exceeds the difference of the squares of the other two by 60. Find the number.
- Q28. Find the mode of the following frequency distribution: (3)

Class	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	3	8	9	10	3	2

- Q29. If $1 + \sin^2 \theta = 3 \sin \theta \cos \theta$, prove that $\tan \theta = 1$ or $\frac{1}{2}$. (3)
- Q30. Two dice are tossed simultaneously. What is the probability of getting
 (i) a sum less than 7?
 (ii) a doublet of odd numbers?
 (iii) a product less than 10? (3)
- Q31. A horse is tethered to one corner of a rectangular field of dimensions $70 \text{ m} \times 52 \text{ m}$, by a rope of length 21 m. How much area of the field can it graze? (3)

OR

In the given figure, a chord AB of the circle with centre O and radius 10 cm, that subtends a right angle at the centre of the circle. Find the area of the minor segment $AQBP$. Hence, find the area of major segment $ALBQA$. (Use $\pi = 3.14$)



SECTION D

- Q32. A vertical tower stands on horizontal plane and is surmounted by a vertical flagstaff of height 6m. At a point on the ground, angle of elevation of the bottom and top of the flagstaff are 30° and 45° respectively. Find the height of the tower. (5)

OR

From the top of tower, 100 m high, a man observes two cars on the opposite sides of the tower with the angles of depression 30° and 45° respectively. Find the distance between the cars. (Use $\sqrt{3} = 1.73$).

- Q33. Find c if the system of equations $cx + 3y + (3 - c) = 0$; $12x + cy - c = 0$ has infinitely many solutions. (5)

- Q34. From a solid cylinder whose height is 15 cm and the diameter is 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid. (5)

OR

The internal and external radii of a spherical shell are 3 cm and 5 cm respectively. It is melted and recast into a solid cylinder of diameter 14 cm, find the height of the cylinder. Also, find the total surface area of the cylinder.

- Q35. The mean of the following frequency distribution is 53. But the frequencies f_1 and f_2 in the classes 20-40 and 60-80 are missing. Find the missing frequencies. (5)

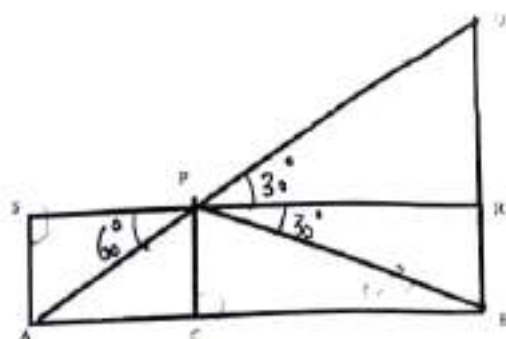
Classes	Frequencies
0-20	15
20-40	f_1
40-60	21
60-80	f_2
80-100	17
Total	100

SECTION E

Case study-based questions are compulsory.

- Q36. Lakshman Jhula is located 5 kilometers northeast of the city of Rishikesh in the Indian state of Uttarakhand. The bridge connects the villages of Tapovan to Jonk. Tapovan is in Tehri Garhwal district, on the west bank of the river, while Jonk is in Pauri Garhwal district, on the east bank. Lakshman Jhula is a pedestrian bridge also used by motorbikes. It is a landmark of this Rishikesh. (4)

A group of Class X students visited Rishikesh in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 meters from the river.



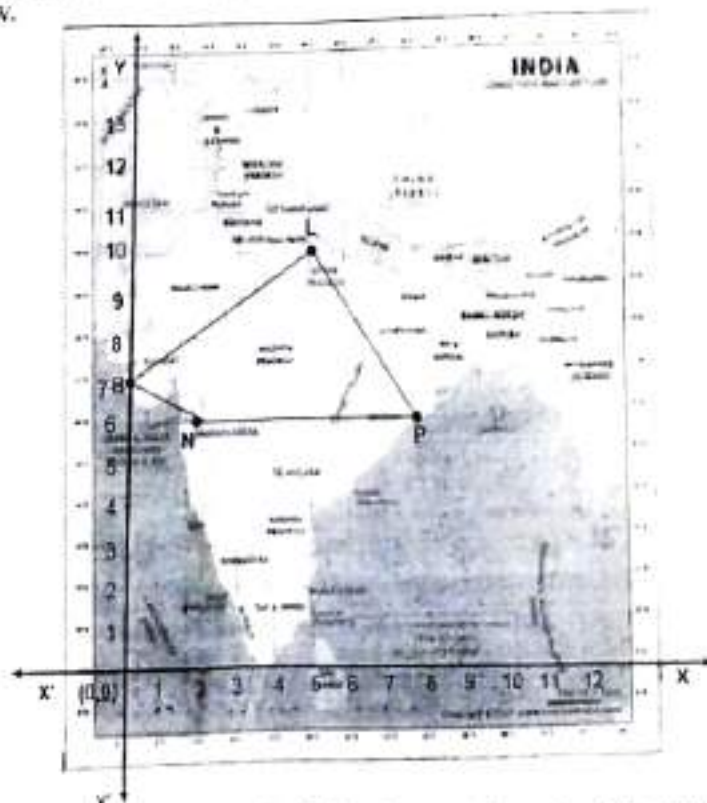
Based on the above information answer the following questions.

- Find the distance PA.
- Find the distance PB.
- A. Find the width AB of the river.

OR

B. Find the height BQ if the angle of the elevation from P to Q be 30° .

- Q37. In a GPS, the lines that run East-West are known as lines of latitude, and the lines running North-South are known as lines of longitude. The latitude and the longitude of a place are its coordinates, and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (B) and Nashik (N) as shown in the given figure below.



Based on the above information answer the following questions using the coordinate geometry.

- Find the distance between Lucknow (L) to Bhuj (B).
- If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3:2 then find the coordinate of Kota (K).
- A. Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P)

[OR]

Q38.

B. Find a place (point) on the longitude (y -axis) which is equidistant from the points Lucknow (L) and Puri (P).

Aditya is celebrating his birthday. He invited his friends. He bought a packet of candies which contains 120 candies. He arranges the candies such that in the first row there are 3 candies, in second there are 5 candies, in third there are 7 candies and so on.



Based on the above information, answer the following questions:

- (i) Find the total number of rows of candies.
- (ii) How many candies are placed in last row?
- (iii) A. Find the difference in number of candies placed in 7th and the 3rd rows.

OR

B. If Aditya decides to make 15 rows, then how many total candies will be placed by him with the same arrangements?