B.K. Birla Centre For Education

Date: 12-11-2025 | PRE BOARD EXAMINATION | **Duration**: 3 Hrs

Class: X | Maths | **Total Marks** : 80

Instructions to the Students

- Write only question numbers clearly outside the margin (1, 2, 3.i, 5.b, 4.c.ii, etc.).
- Do not write questions or any titles. (For ex. - Do not write **II. Answer the following**).
- After every answer, give a one-line space.
- For Multiple choice Questions - Both Option and Answer should be written.
- Bullet points & Sub-points should be written inside the margin.
- Do not fold / staple the paper.

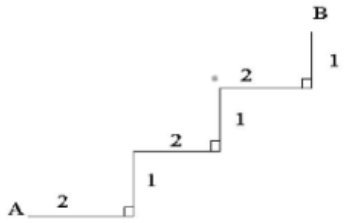
Section A

Multiple Choice Questions: **(20 x 1 = 20)**

1. If $a = 2^3 \times 3$, $b = 2 \times 3 \times 5$, $c = 3^n \times 5$ and LCM (a, b, c) $= 2^3 \times 3^2 \times 5$, then n is equal to

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

2. The straight line distance between A and B is



   a) $5\sqrt{3}$ b) 5 c) $3\sqrt{5}$ d) $5\sqrt{2}$

3. The value of k for which the system of equations 3x-7y = 1 and kx + 14y =6 is inconsistent is

   a) -6 b) $\frac{2}{3}$ c) 6 d) $\frac{-3}{2}$

4. PQ and PT are the tangents drawn from an external point 'P' to a circle with centre 'O' and radius 5 cm. If PQ = 12 cm then the perimeter of the quadrilateral PQOT is :

   a) 24 cm b) 34 cm c) 17 cm d) 20 cm

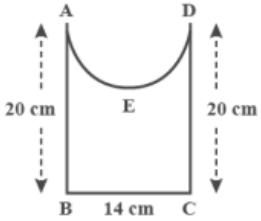
5. The value of $\cos^2\theta + \frac{1}{co\sec^2\theta}$ = ……

   a) 0 b) 1
   c) 2 d) -1

6. The quadratic equation $x^2 - 4x - 3\sqrt{2} = 0$ has be

   a) Two distinct real roots. b) Two equal real roots.
   c) No real roots. d) None

7. The perimeter of the given fig,where AED is semicircle and ABCD is a rectangle is



   a) (π + 54)cm b) (3π + 54)cm c) (5 π + 54)cm d) (7π + 54)cm

8. A ticket is drawn at random from a bag containing tickets numbered from 1 to 40. The probability that the selected ticket has a number which is a multiple of 5 is

   a) $\frac{1}{5}$ b) $\frac{3}{5}$ c) $\frac{4}{5}$ d) 1

9. If $\sin\theta = \frac{1}{6}$, then $\sec\theta$ is equal to:

a) $\frac{2\sqrt{2}}{2}$ b) $\frac{3}{2\sqrt{2}}$ c) 3 d) $\frac{1}{\sqrt{3}}$

10. The least number that is divisible by all the numbers from 1 to 5 is:

a) 60 b) 70 c) 80 d) 90

11. If each edge of a cube is increased by 50%, the percentage increase in the surface area is

a) 50% b) 75% c) 100% d) 125%

12. If x = 2 is a root of both the equations $3x^2 + 2x + a = 0$ and $bx^2 + bx + 12 = 0$, then ab is

a) 32 b) 40 c) 22 d) 15

13. What is the area of a semi-circle of diameter 'd'?

a) $\frac{1}{16}\pi d^2$ b) $\frac{1}{4}\pi d^2$ c) $\frac{1}{8}\pi d^2$ d) $\frac{1}{2}\pi d^2$

14. ΔABC is such that AB = 3cm, BC = 2cm, CA = 2.5 cm. If $\Delta ABC \sim \Delta DEF$ and EF = 4cm, then the perimeter of ΔDEF is _____

a) 7.5cm b) 15 cm c) 22.5 cm d) 30c

15. Two customers Rahul and Neha are visiting a particular shop in the same week (Tuesday to Saturday). Each is equally likely to visit the shop on any one day as on another. What is the probability that both will visit the shop on different days?

a) $\frac{12}{25}$ b) $\frac{3}{5}$ c) $\frac{4}{5}$ d) $\frac{1}{5}$

16. The points A(2, – 1), B(5, – 1), C(5,6) and D(2,6), are the vertices of a

a) Parallelogram b) Rectangle c) Rhombus d) Square

17. The mean and median of a distribution are 14 and 15, respectively. The value of the mode is:

a) 16 b) 17 c) 18 d) 13

18. The angle subtended by the opposite sides of a quadrilateral circumscribing a circle at the centre of the circle are

a) Complementary b) Supplementary c) Equal d) Unequal

19. Assertion (A): For $0 < \theta \leq 90^o$, $\text{cosec}\,\theta - \cot\theta$ and $\text{cosec}\,\theta + \cot\theta$ are reciprocal of each other.

Reason (R): $\text{cosec}^2\theta + \cot^2\theta = 1$.

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 correct but (R) is wrong
d) (A) is wrong but (R) is correct

20. Assertion(A): The number 5^n cannot end with the digit 0, where n is a natural number.

Reason (R): Prime factorization of 5 has only two factors, 1 and 5

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 correct but (R) is wrong
d) (A) is wrong but (R) is correct

Section B

Very Short Answer Type Questions: **(5 x 2 = 10)**

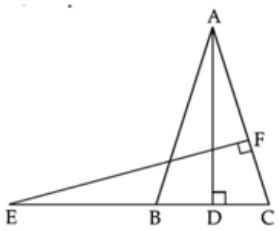
21.a. Which term of the A.P. 3, 15, 27, 39, ... will be 120 more than its 21^{st} term?

(OR)

21.b. Find the sum of n terms of an A.P. whose nth terms is given by $a_n = 5 - 6n$

22. If tan A = $\frac{3}{4}$, find the value of $\frac{(1+sinA)(1-sinA)}{(1+\cos A)(1-\cos A)}$.

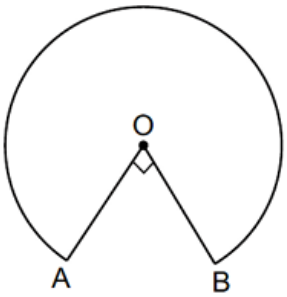
23. In the given figure, E is a point on the side CB produced of an isosceles triangle ABC with AB = AC. If AD ⊥ BC and EF ⊥ AC, then prove that ΔABD ~ ΔECF.



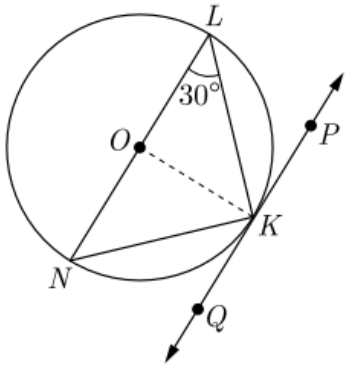
24.a. A 5.54 litre watering can sprinkle water at the rate of 500 mL/min. The can has a diameter of 14 cm and is initially filled to its full capacity. What is the height of water in the can after it is used for 8 minutes? Show your work. (Note: Take π =22/7)

(OR)

24.b. In the given figure, the shape of the top of a table is that of a sector of a circle with centre O and ∠AOB = 90°. If AO = OB = 42 cm, then find the perimeter of the top of the table is [Take π = $\frac{22}{7}$]



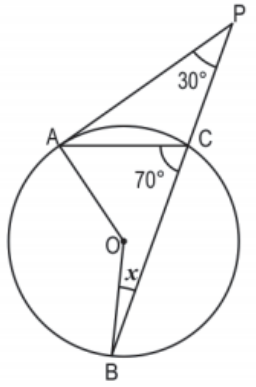
25. In figure, O is the centre of the circle and LN is a diameter. If PQ is a tangent to the circle at K and ∠KLN = 30º, find ∠PKL.



Section C

Short Answer Type Questions: **(6 x 3 = 18)**

26. In the figure given below, PA is a tangent to the circle with centre O and PCB is a straight line. Find the measure of ∠OBC. Show your steps and give valid reasons.



(Note: The figure is not to scale.)

27. On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm, and 45 cm. respectively. What is the minimum distance each should walk, so that each can cover the same distance in complete steps?

28. Find the zeroes of the polynomial $q(x) = 8x^2 - 2x - 3$. Hence, find a polynomial whose zeroes are 2 less than the zeroes of q(x)

29.a. Prove that $\frac{\cos^2\theta}{1-\tan\theta} + \frac{\sin^2\theta}{1-\cot\theta} = 1 + \sin\theta\cos\theta$

(OR)

29.b. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, show that $q(p^2 - 1) = 2p$.

30. On a particular day, Vidhi and Unnati couldn't decide on who would get to drive the car. They had one coin each and flipped their coins exactly three times. The following was agreed upon:
If Vidhi gets two heads in a row, she would drive the car.
If Unnati gets a head immediately followed by a tail, she would drive the car.
Who has more probability to drive the car that day? List all outcomes and show your steps.

31.a. The taxi charges in a city consist of a fixed charge together with the charge for the distance Covered. For a distance of 10 km, the charge paid is ₹105 and for a journey of 15 km, the charge paid is ₹155.What are the fixed charges and the charge per km?

(OR)

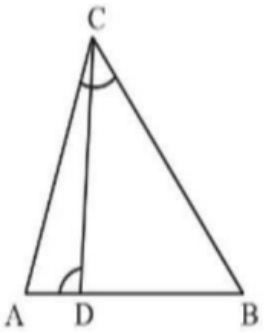
31.b. Solve the following system of linear equations graphically: x - y = 1, 2x + y = 8. Shade the area bounded by these two lines and the y-axis.

Section D

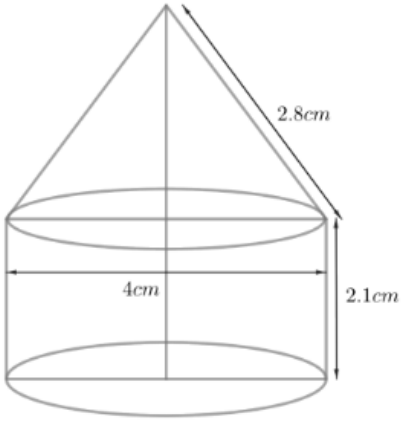
Long Answer Type Questions: **(4 x 5 = 20)**

32. Two pipes running together can fill a cistern in $3\frac{1}{13}$ hours. If one pipe takes 3 hours more than the other to fill it, find the time in which each pipe would fill the cistern.

33. In the given figure, ∠ADC = ∠BCA; prove that △ ACB ~△ ADC. Hence find BD if AC = 8 cm and AD = 3 cm.

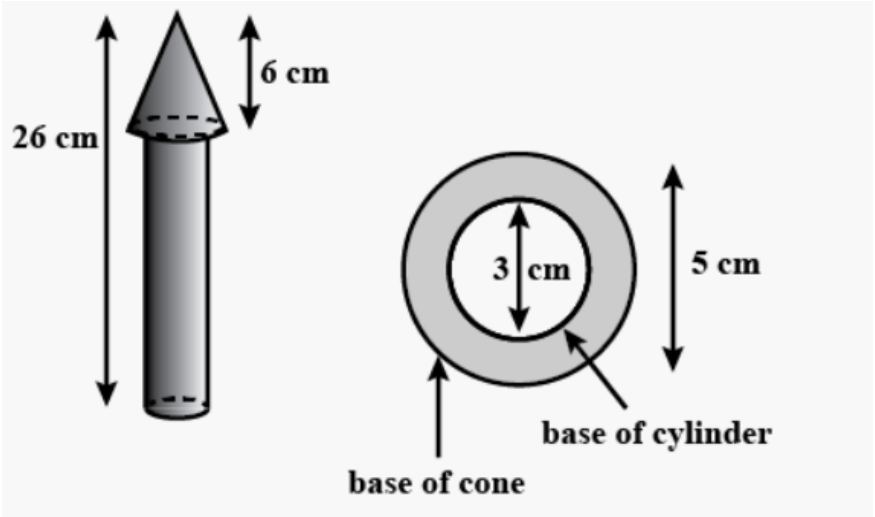


34.a. A tent is in the shape of a cylinder surmounted by a conical top. If the height and diameter of the cylindrical part are 2.1 m and 4 m respectively, and the slant height of the top is 2.8 m, find the area of the canvas used for making the tent. Also, find the cost of the canvas of the tent at the rate of Rs 500 per m^2. (Note that the base of the tent will not be covered with canvas.)



(OR)

34.b. A wooden toy rocket is in the shape of a cone mounted on a cylinder, as shown in Figure. The height of the entire rocket is 26 cm, while the height of the conical part is 6 cm. The base of the conical portion has a diameter of 5 cm, while the base diameter of the cylindrical portion is 3 cm. If the conical portion is to be painted orange and the cylindrical portion yellow, find the area of the rocket painted with each of these colours. (Take π = 3.14)



35.a. The median of the following data is 50 .Find the values of p and q, if the sum of all the frequencies is 90. Also find the mode

Marks:	20 -30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency:	P	15	25	20	q	8	10

(OR)

35.b. 100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows:

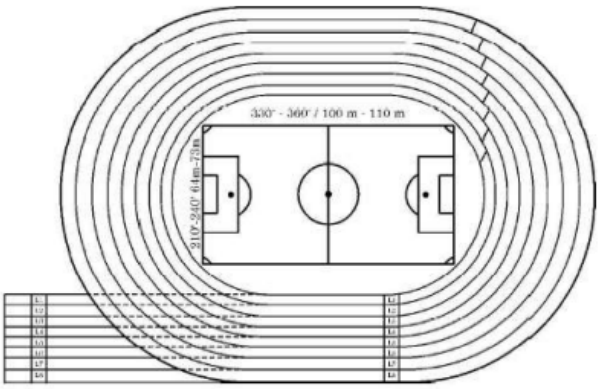
Number of letters	1–4	4–7	7–10	10–13	13–16	16–19
Number of surnames	6	30	40	16	4	4

Determine the median number of letters in the surnames. Find the mean number of letters in the surnames? Also, find the modal size of the surnames.

Section E

Case Based Questions: **(3 x 4 = 12)**

36. In order to organise, Annual Sports Day, a school prepared an eight lane running track with an integrated football field inside the track area as shown below:



The length of innermost lane of the track is 400 m and each subsequent lane is 7.6 m longer than the preceding lane.

Based on given information, answer the following questions, using concept of Arithmetic Progression.

36.i. What is the length of the 6^{th} lane? [1]

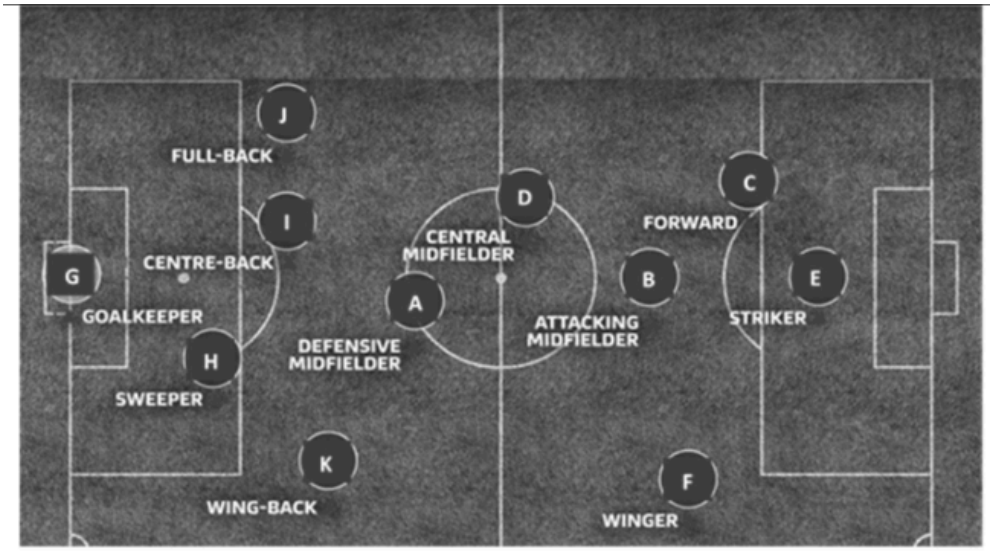
36.ii. How long is the 8th lane than that of 4^{th} lane? [1]

36.iii.a. While practicing for a race, a student took one round each in first six lanes. Find the total distance covered by the student. [2]

(OR)

36.iii.b. A student took one round each in lane 4 to lane 8. Find the total distance covered by the student. [2]

37. Tharunya was thrilled to know that the football tournament is fixed with a monthly timeframe from 20th July to 20th August 2023 and for the first time in the FIFA Women's World Cup's history, two nations host in 10 venues. Her father felt that the game can be better understood if the position of players is represented as points on a coordinate plane.



37.i. At an instance, the midfielders and forward formed a parallelogram. Find the position of the central midfielder (D) if the position of other players who formed the parallelogram are :- A(1,2), B(4,3) and C(6,6) [1]

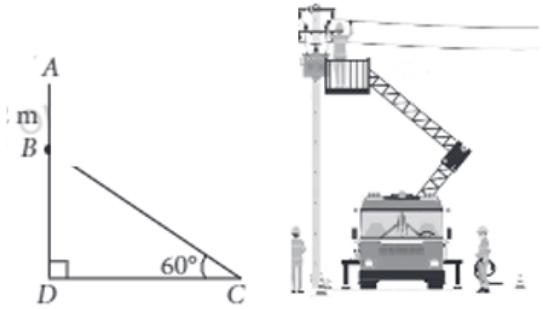
37.ii. If Defensive midfielder A (1,4), Attacking midfielder B (2, -3) and Striker E (a, b) lie on the same straight line and B is equidistant from A and E, find the position of E. [1]

37.iii.a. Check if the Goalkeeper G (-3,5), Sweeper H (3,1) and Wing-back K (0,3) fall on a same straight line. [2]

(OR)

37.iii.b. Check if the Full-back J (5, -3) and Centre-back I (-4,6) are equidistant from forward C (0,1) and if C is the mid-point of IJ [2]

38. An electrician has to repair an electric fault on the pole of 8m . He needs to reach a point 2m below the top of the pole to undertake the repair work. Based on the information given , answer the following questions.



38.i. What is the length of BD ? [1]

38.ii. What will be the measure of ∠BCD when BD and CD are equal ? [1]

38.iii.a. What should be the length of ladder , so that it makes an angle of 60° with the ground ? [2]

(OR)

38.iii.b. Find the distance between the foot of ladder and pole. [2]