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)**

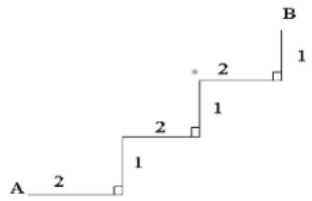
1. If $a = 2^3 \times 3$, $b = 2 \times 3 \times 5$, $c = 3^n \times 5$ and LCM (a, b, c) $= 2^3 \times 3^2 \times 5$, then n is equal to

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

Answer ⇦

b) 2 (1)

2. The straight line distance between A and B is



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

Answer ⇦

c) $3\sqrt{5}$ (1)

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) $\frac{-3}{2}$

Answer ⇦

a) -6 (1)

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

Answer ⇦

b) 34 cm (1)

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

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

Answer ⇦

b) 1 (1)

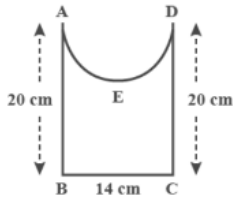
6. The quadratic equation $x^2 - 4x - 3\sqrt{2} = 0$ has be

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

Answer ⇦

a) Two distinct real roots. (1)

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

Answer ⇦

d) (7π + 54)cm (1)

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

Answer ⇦

a) $\frac{1}{5}$ (1)

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

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

Answer ⇦

b) $\frac{3}{2\sqrt{2}}$ (1)

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

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

Answer ⇦

a) 60 (1)

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%

Answer ⇦

d) 125% (1)

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

Answer ⇦

a) 32 (1)

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) $\frac{1}{2}\pi d^2$

Answer ⇦

c) $\frac{1}{8}\pi d^2$ (1)

14. ΔABC is such that AB = 3cm, BC = 2cm, CA = 2.5 cm. If ΔABC ~ ΔDEF and EF = 4cm, then the perimeter of ΔDEF is

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

Answer ⇦

b) 15 cm (1)

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) $\frac{1}{5}$

Answer ⇦

c) $\frac{4}{5}$ (1)

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

Answer ⇦

b) Rectangle (1)

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

Answer ⇦

b) 17 (1)

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

Answer ⇦

b) Supplementary (1)

19. Assertion (A): For $0 < \theta \leq 90^{o}$, cosec θ – cot θ and cosec θ + cot θ 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

Answer ⇦

c) (A) is correct but (R) is wrong (1)

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

Answer ⇦

a) Both (A) and (R) are true and (R) is the correct explanation of (A) (1)

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?

Answer ⇦

1) $a_n = a + (n-1)d$ (0.5)

2) $= 3 + 20 \times 12 = 3 + 240 = 243$ (0.5)

3) an = 363 (0.5)

4) Solving for n , n = 31 (0.5)

(OR)

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

Answer

1) $a_n = 5 - 6n,\ a = -1,\ a_2 = 7,\ a_3 = -13,\ d = -6$ (0.5)

2) $S_n = \frac{n}{2}[2a + (n-1)d]$ (0.5)

3) $\frac{n}{2}[-2 - 6n + 6]$ (0.5)

4) $S_n = n[-3n + 2]$ =-3n2+2n (0.5)

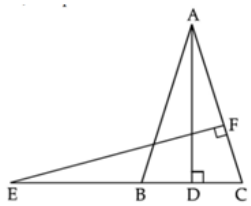
22. If tan A = $\frac{3}{4}$, find the value of $\frac{(1 + sinA)(1-sinA)}{(1 + \cos A)(1-\cos A)}$.

Answer

1) 1-cos2A = $sin^2 A = \frac{\cos^2 A}{\sin^2 A} \Rightarrow \cot^2 A$ (1)

2) cot2A = $\frac{16}{9}$ (1)

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.



Answer

1) AD ⊥ BC ∴ ∠ADB = 90° (0.5)

2) EF ⊥ AC ∴ ∠EFC = 90° (0.5)

3) ∠ADB = ∠EFC = 90° (From (ii) & (iii)) (0.5)

4) ∴ ΔABD ~ ΔECF (By AA Criterion) (0.5)

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)

Answer

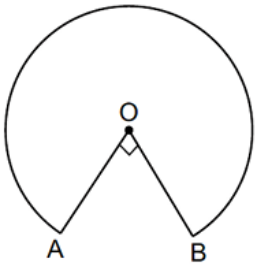
1) $Quantity\ of\ water\ used\ after\ 8\ \min tues : 5.54 - \left(8 \times \frac{1}{2}\right) = 1.54\ litres\ or\ 1540$ (1)

2) $the\ equation\ for\ the\ height\ of\ the\ can, h\ as\ \frac{22}{7} \times (7)^2 \times h$ = 1540 (0.5)

3) $\frac{1540 \times 7}{22 \times 7^2} = \frac{10780}{1078} = 10\ cm$ (0.5)

(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 $\pi = \frac{22}{7}$]



Answer

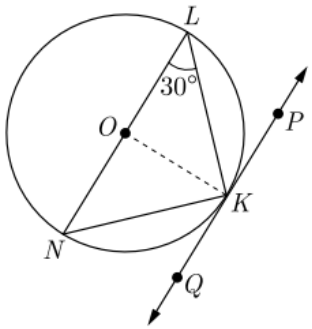
1) Perimeter = length of major arc $+2r$ (0.5)

2) $\frac{270^\circ}{360^\circ} \times 2 \times \pi r + 2r$ (0.5)

3) $\frac{3}{2} \times \frac{22}{7} \times 42 + 2 \times 42$ (0.5)

4) $198 + 84 = 282$cm (0.5)

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.



Answer

1) O K = OL(radius) (0.5)

2) $\angle OKL = \angle OLK = 30^\circ$ (0.5)

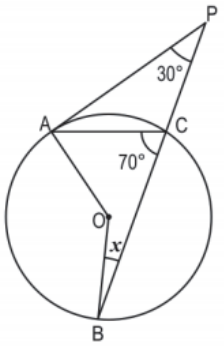
3) $\angle OKP = 90^\circ$ (0.5)

4) $\angle PKL = \angle OKP - \angle OKL \Rightarrow 90^\circ - 30^\circ = 60^\circ$ (0.5)

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.)

Answer

Sum of angles on a straight line is 180° and finds the measure of ∠ACP as 110°. (0.5)

Sum of angles in a triangle is 180° and finds the measure of ∠CAP as 40°. (0.5)

∠OAP = 90° since PA is tangent to the circle and finds the measure of ∠OAC as 50°. (0.5)

Joins OC. Writes that △OAC is isosceles and finds the measure of ∠OCA as 50°. (0.5)

The measure of ∠OCB as 20°. (0.5)

△OCB is isosceles and finds the measure of ∠OBC as 20°. (0.5)

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?

Answer

1) $LCM\ (40,42,45)$ (0.5)

2) $40 = \ 2 \times 2 \times 2 \times 5 = 2^3 \times 5$ (0.5)

3) $42 = \ 2 \times 3 \times 7$ (0.5)

4) $45 = \ 3 \times 3 \times 5 \ = 3^2 \times 5$ (0.5)

5) $LCM\ (40,42,45) \ = \ \ 2^3 \times 3^2 \times 5 \times 7 \ = 2520$ (0.5)

6) Each person should walk a minimum distance of 2520 cm in complete steps (0.5)

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)

Answer

1) $= Zeroes\ are - \frac{1}{2}\ and\ \frac{3}{4}$ (1)

2) $= New\ zeroes\ are - \frac{5}{2}\ and - \frac{5}{4}$ (0.5)

3) $Sum\ of\ new\ zeroes \ = \ \frac{-5}{2} + \frac{-5}{4} = \frac{-15}{4}$ (0.5)

4) $Product\ of\ new\ zeroes \ = \ \left(-\frac{5}{2}\right) \times \left(-\frac{5}{4}\right) = \frac{25}{8}$ (0.5)

5) $= Required\ polynomial\ is\ x^2 + \frac{15}{4}\ x + \frac{25}{8}\ or 8x^2 + 30x + 25$ (0.5)

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

Answer

1) $\frac{cos^2\theta}{1-tan\theta}+\frac{sin^2\theta}{1-cot\theta} = \frac{\cos^3\theta}{\cos\theta-\sin\theta}-\frac{\sin^3\theta}{\cos\theta-\sin\theta}$ (1)

2) $\frac{\cos^3\theta-\sin^3\theta}{\cos\theta-\sin\theta} = \frac{(\cos\theta-\sin\theta)(\cos^2\theta+\sin^2\theta+\cos\theta\sin\theta)}{\cos\theta-\sin\theta}$ (1)

3) $1+\sin\theta\cos\theta$=RHS (1)

(OR)

29.b. If sin θ + cos θ = p and sec θ + cosec θ = q, show that $q(p^2-1)=2p$.

Answer

1) $(sec\theta+\cos es\theta)\left((sin\theta+cos\theta)^2-1\right) = (sec\,\theta+co\sec\theta)\left(\sin^2\theta+cos^2\theta+2\sin\theta\cos\theta-1\right)$ (1)

2) $\frac{\sin\theta+\cos\theta}{\sin\theta\cos\theta}\times 2\sin\theta\cos\theta$ (1)

3) $2(\sin\theta+\cos\theta)$ (0.5)

4) $2p$=RHS (0.5)

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.

Answer

1) $Total\ number\ of\ outcomes = 8$ (0.5)

2) $Favorable\ outcomes = 3$ (0.5)

3) $Two\ heads\ in\ row = \frac{3}{8}$ (0.5)

4) $Favorable\ outcomes\ for\ unnati = 4$ (0.5)

5) $Head\ immediately\ by\ a\ tail = \frac{4}{8}=\frac{1}{2}$ (0.5)

6) $If\ they\ flipped\ their\ coin\ exactly\ three\ times\ unnati\ is\ more\ likely\ to\ drive\ the\ car\ that\ day.$ (0.5)

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?

Answer

1) fixed charge of taxi=x,charge for the distance covered = ₹y (0.5)

2) x+10y = 105...(1) (0.5)

3) x+15y = 155...(2) (0.5)

4) sub (1) and (2) we get, y = 10 (1)

5) x = 5 (1)

(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.

Answer

Finding the table from the equation:

x - y + 1

X	0	1	2
Y	-1	0	1

Finding the table from the equation:

y = 8 - 2x

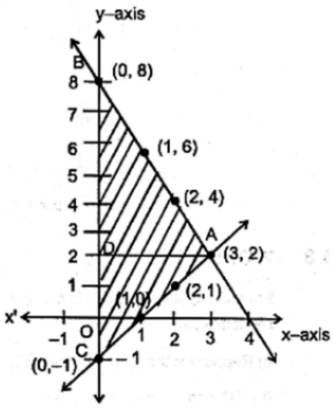
X	0	1	2
Y	8	6	4

Equation x-y+1 (0.5)

Equation y=8-2x (0.5)

Drawing the graph of equations by taking values from the respective tables

The graphical representation of the equations is:



Solution is x = 3 and y = 2

Shading the region

Graph (1.5)

x=3 and y=2 (0.5)

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.

Answer

1) Portion of the cistern filled by the faster pipe in one hour $= \frac{1}{x}$ (0.5)

2) Portion of the cistern filled by the slower pipe in one hour $= \frac{1}{x+3}$ (0.5)

3) Portion of the cistern filled by the two pipes together in one hour $= \frac{13}{40}$ (0.5)

4) $\frac{1}{x} + \frac{1}{x+3} = \frac{13}{40}$ (0.5)

5) $\frac{x+3+x}{x(x+3)} = \frac{13}{40}$ (0.5)

6) $40(2x + 3) = 13x(x + 3)$ (0.5)

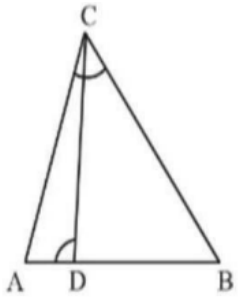
7) $13x^2 - 41x - 120 = 0$ (0.5)

8) $(x - 5)(13x + 24) = 0$ (0.5)

9) $x = 5$ $(Possible\ value)$ (0.5)

10) Time taken for two pipes 5 hours and 8 hours respectively. (0.5)

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



Answer

1) $\Delta ADC = \Delta BCA$ (0.5)

2) $\angle A = \angle A \ldots$ (Common) (0.5)

3) $\angle ADC = \angle BCA \ldots$ (Given) (0.5)

4) $\triangle ADC \sim \triangle BCA$ (AA) (0.5)

5) $\frac{AC}{AD} = \frac{AB}{AC} \Rightarrow \frac{8}{3} = \frac{AB}{8}$ (0.5)

6) $AB = \frac{8 \times 8}{3} = \frac{64}{3}\,cm$ (0.5)

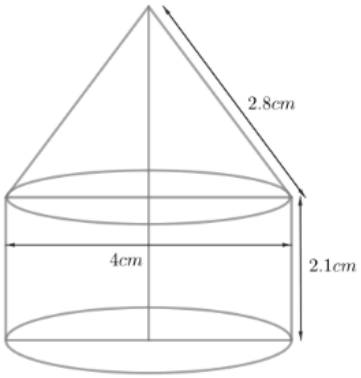
7) $BD = AB - AD$ (0.5)

8) $= \frac{64}{3} - 3$ (0.5)

9) $= \frac{64 - 9}{3} = \frac{55}{3}$ (0.5)

10) $BD = 18\frac{1}{3}$ cm. (0.5)

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.)

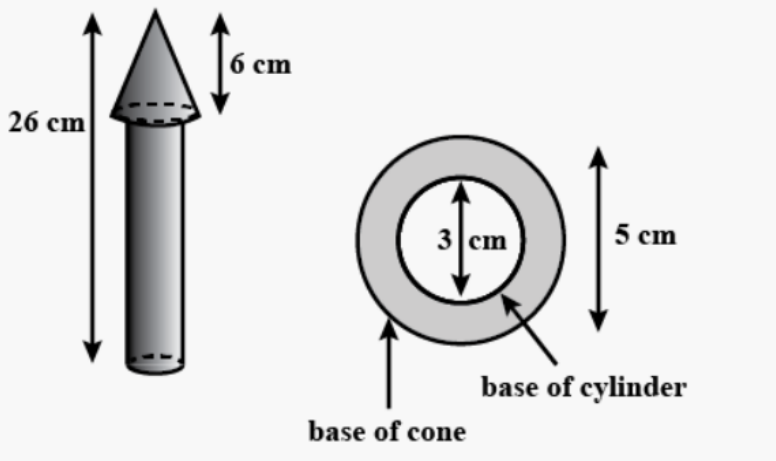


Answer

1) $Curved\ surface\ area\ of\ cylindrical\ portion\ =\ 2\pi rh$ (0.5)
2) $2\pi \times 2 \times 2.1$ (0.5)
3) $8.4\pi m^2$ (0.5)
4) $Curved\ surface\ area\ of\ conical\ portion\ =\ \pi rl$ (0.5)
5) $\pi \times 2 \times 2.8$ (0.5)
6) $5.6\pi m^2$ (0.5)
7) $Total\ curved\ surface\ area\ =\ 8.4\pi + 5.6\pi$ (0.5)
8) $44m^2$ (0.5)
9) $Cost\ of\ canvas = Rate \times Surface\ area\ =\ 500 \times 44$ (0.5)
10) Rs. 22000 (0.5)

(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 $\pi = 3.14$)



Answer

1) $l = \sqrt{r^2 + h^2} = \sqrt{2.5^2 + 6^2}\, cm = 6.5\ cm$ (0.5)

2) $Curved\ surface\ area\ of\ cone = 3.14 \times 2.5 \times 6.5 = 51.025\ cm^2$ (0.5)

3) $Base\ area\ of\ cone = \pi r^2 = 19.625\,\text{cm}^2$ (0.5)

4) $Curved\ surface\ area\ of\ cylinder = 2\pi rh = 188.4\,\text{cm}^2$ (0.5)

5) Base area of cylinder = Area of circle $= \pi r^2 = 7.065\ cm^2$ (0.5)

6) $Area\ to\ be\ painted\ orange = 51.025 + 19.625 - 7.0625$ (0.5)

7) $63.59 cm^2$ (1)

8) $Area\ to\ be\ painted\ yellow = 188.4 + 7.065$ (0.5)

9) $195.465 cm^2$ (0.5)

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

Answer

1) Table (1)

2) $l = 50, h = 10, f = 20, cf = p + 40, N = 90$ (0.5)

3) Median $= l + \left\{ \frac{\frac{N}{2} - cf}{f} \right\} \times h$ (0.5)

4) $50 = 50 + \frac{45 - (p + 40)}{20} \times 10$ (0.5)

5) $p = 5$ (0.5)

6) $p + q = 12 \Rightarrow q = 7$ (0.5)

7) mode $= l + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h$ (0.5)

8) $= 46.67$ (1)

(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.

Answer ⊶

Ans: Median: We have, n = 100 ⇒ n/2 = 50 ⇒ Median class is 7 – 10

Here, $\frac{n}{2}=50, l=7, f=40, cf=36, h=3$

Number of letters	Mid-Point (xi)	Frequency (fi)	*cf*	fixi
1–4	2.5	6	6	15
4–7	5.5	30	36	165
7–10	8.5	40	76	340
10–13	11.5	16	92	184
13–16	14.5	4	96	58
16–19	17.5	4	100	70
Total		100		832

$$Median, M = l + \left(\frac{\frac{n}{2}-cf}{f}\right)\times h$$

$$\Rightarrow M = 7+\left(\frac{50-36}{40}\right)\times 3 \Rightarrow M = 7+\frac{14}{40}\times 3 = 7+1.05 = 8.05$$

$$\text{Mean: } \bar{x} = \frac{\sum f_i x_i}{\sum f_i} = \frac{832}{100} = 8.32$$

Table (2)

Finding median (1)

Finding mean (1)

Mode: Modal class is 7 – 10

Here, $l=7, h=3, f_1=40, f_0=30$

$$Mode = l+\left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right)\times h$$

$$= 7+\frac{40-30}{80-30-16}\times 3 = 7+\frac{10}{34}\times 3 = 7+0.88 = 7.88$$

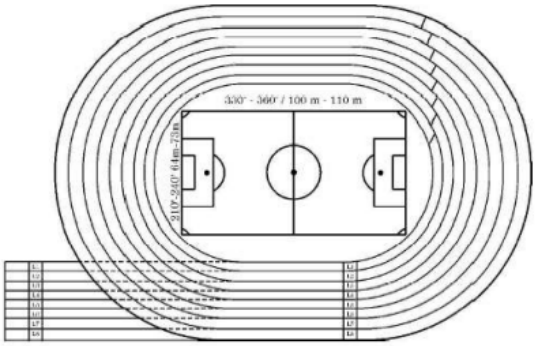
Hence, median =8.05, mean =8.32 and mode =7.88

Finding mode (1)

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]

Answer ⊶

$a_6 = 400 + 5\,(7.6) = 438$ m (1)

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

Answer

$a_8 - a_4 = 30.4$ m (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]

Answer

1) $S_6 = \frac{6}{2}\,(2 \times 400 + 5 \times 7.6)$ (1)

2) 2514m (1)

(OR)

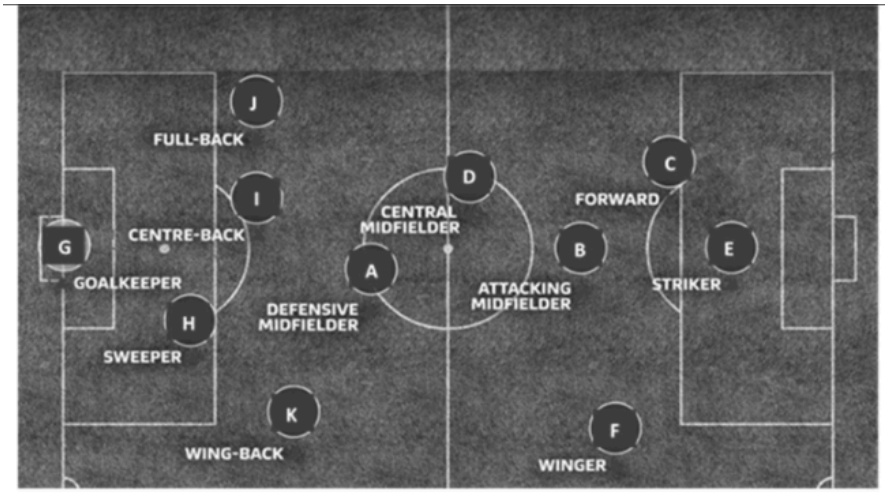
36.iii.b. A student took one round each in lane 4 to lane 8. Find the total distance covered by the student. [2]

Answer

1) $\frac{8}{2}\,(2 \times 400 + 7 \times 7.6) - \frac{3}{2}\,(2 \times 400 + 2 \times 7.6)$ (1)

2) 2190m (1)

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]

Answer

1) $(\frac{1+6}{2}, \frac{2+6}{2}) = (\frac{4+a}{2}, \frac{3+b}{2})$ (0.5)

2) $a=3 \;=\; b=5$ (0.5)

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]

Answer

1) $(\frac{1+a}{2}, \frac{4+b}{2}) = (2,-3)$ (0.5)

2) E(3,-10) (0.5)

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]

Answer

1) $GH = \sqrt{(-3-3)^2+(5-1)^2} = \sqrt{52}$ (0.5)

2) $GK = \sqrt{(0+3)^2+(3-5)^2} = \sqrt{13}$ (0.5)

3) $HK = \sqrt{(3-0)^2+(1-3)^2} = \sqrt{13}$ (0.5)

4) $GH+HK = GK =$ G,H,K lie on the same straight line (0.5)

(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]

Answer ⇦

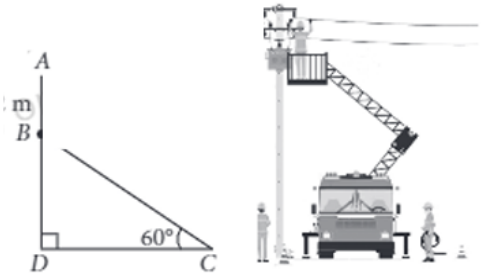
1) $CJ=\sqrt{25+16} = \sqrt{41}$ (0.5)

2) $CI= \sqrt{16+25} = \sqrt{41}$ (0.5)

3) midpoint of IJ $(\frac{5-4}{2}, \frac{-3+6}{2}) = \square (\frac{1}{2}, \frac{3}{2})$ (1)

4) C is not the midpoint of IJ (1)

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]

Answer ⇦

6m (1)

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

Answer ⇦

45° (1)

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

Answer ⇦

$4\sqrt{3}$ m (2)

(OR)

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

Answer ⇦

$2\sqrt{3}$ m (2)