KendriyaVidyalayaSangathan, Bhopal Region

Pre Board Exam – 1 (2025 - 26)

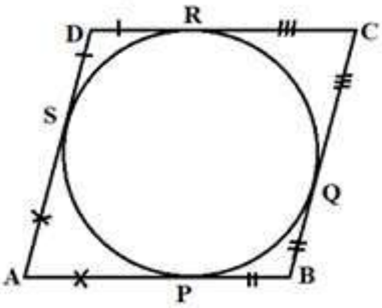
Mathematics - Class X (SET 2)

Maximum Marks: 80 **Time: 3 hours**

MARKING SCHEME

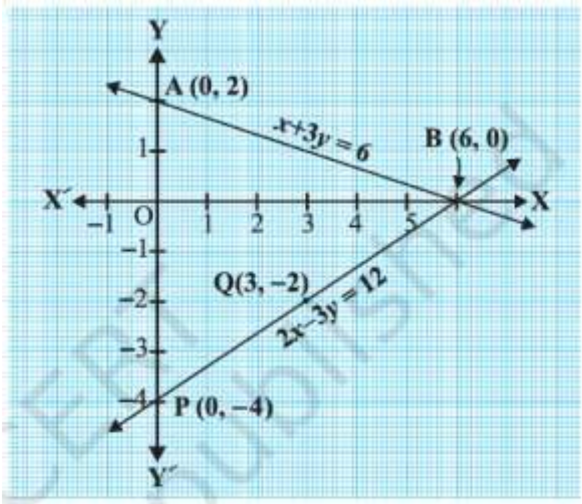
Q.No.	Section A	Marks
1	(d) 7	**1**
2	(a) 4	**1**
3	(b) 12/11	**1**
4	(d) 2	**1**
5	(a) 84	**1**
6	(a) 10m	**1**
7	(a) 4/11	**1**
8	c) $x^2 + 2x + 5$	**1**
9	c) – 2	**1**
10	(b) 3, –3	**1**
11	(b) (2,5)	**1**
12	(c) $\sqrt{119}$ cm	**1**
13	(d) 3	**1**
14	(c) 12·5 cm	**1**
15	(b) 12°	**1**
16	b) 24	**1**
17	(b) 4 cm	**1**
18	(d) Y	**1**
19	(d) Assertion (A) is false but reason (R) is true.	**1**
20	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	**1**
	Section B	
21(A)	$\Delta ABC \sim \Delta PQR \Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{8}{6} = \frac{4}{3}$ **PQ =** ¾ × AB = ¾ × 6 = 9/2 = 4.5 QR = ¾ × BC = ¾ × 4 = 3 PQ + QR = 7.5 (or 15/2)	½ ½ ½ ½
21(B)	OA . OB = OC . OD => $\frac{OA}{OC} = \frac{OD}{OB}$ **And** ∠AOD = ∠COB (vertically opposite angles) By SAS similarity criterion, ΔAOD ~ΔCOB Corresponding angles of similar triangles are equal, ∠A = ∠C and ∠B = ∠D	½ ½ ½ ½
22	Let the two numbers be 4x and 5x. HCF = 11 => x = 11 Numbers are 4x = 44 , 5x = 55 LCM = 44 × 55 / 11 = 220	½ ½ **1**
23	$4k = (\sqrt{3})^2 - 2(2)^2 - 2\left(\frac{1}{\sqrt{3}}\right)^2$ = 3 – (2 × 4) – 2/3 = 3 – 8 – 2/3 = – 5 – 2/3 $= \frac{-15-2}{3} = \frac{-17}{3}$ $k = \frac{-17}{3\times4} = \frac{-17}{12}$	½ ½ ½ 1/2

24(A)	the area of grass field that can be grazed by them = $\frac{A}{360} \times \pi r^2 + \frac{B}{360} \times \pi r^2 + \frac{C}{360} \times \pi r^2$ $= \frac{(A+B+C)}{360} \times \pi r^2$ $= \frac{180}{360} \times \pi r^2$ $= \frac{1}{2} \times \pi r^2$ $= \frac{1}{2} \times \frac{22}{7} \times 14 \times 14$ **= 22 X 14** **= 308 sq. m**	½ ½ ½ **1/2**
24 (B)	angle at the centre, θ = 60°, Area of minor sector = $\frac{\theta}{360} \times \pi r^2 = \frac{60}{360} \times \pi r^2$ $= \frac{1}{6} \times \pi r^2 = \frac{1}{6} \times 3.14 \times 10^2$ = 314/6 = 52.33 cm^2 triangle formed is an equilateral triangle Area of corresponding triangle = $\frac{\sqrt{3}}{4} r^2 = \frac{1.73}{4}$ x 100 = 173/4 = 43.25cm^2 Area of minor segment = 52.33 – 43.25 = 9.08 cm^2	½ ½ **1/2** **1/2**
25	TP and TQ are two tangents => in ΔTPQ, TP = TQ =>∠TPQ = ∠TQP (Angles opposite to equal sides of triangle) = 65° by angle sum of triangle ∠TPO = 90°, ∠OPQ = 90 – 65 = 25°	½ ½ ½ ½
	Section C	
26	Let assume that $\sqrt{3}$ is not an irrational number $\Longrightarrow$ $\sqrt{3}$ is rational number $\Longrightarrow \sqrt{3} = \frac{a}{b}$ where a and b are non - zero integers such that a and b are co-primes, i.e HCF(a, b) = 1 $\Longrightarrow a = \sqrt{3}b$ On squaring both sides, we get $a^2 = 3b^2 - - - (1)$ $\Longrightarrow$ a^2 is divisible by 3 $\Longrightarrow$ a is divisible by 3 $- - - (2)$ Let assume that a = 3m {where m is natural number} On squaring both sides, we get $a^2 = 9m^2$ $3b^2 = 9m^2$ $[\because$ using (1)] $b^2 = 3m^2$ $\Longrightarrow$ b^2 is divisible by 3 $\Longrightarrow$ b is divisible by 3 $- - - (3)$ Thus, from equation (2) and (3), we concluded that both a and b are divisible by 3, which is contradiction to the fact that HCF(a, b) is 1. Hence, our assumption is wrong. $\Longrightarrow$ **$\sqrt{3}$ is an irrational number**	½ ½ ½ ½ ½ ½
27(A)	Parallelogram ABCD circumscribes a circle as shown in figure. Tangents drawn to a circle from an external point are equal .	½

	So, AP = AS, PB = BQ, CR = CQ, DR = DS On adding the above equations, (AP+PB)+ (CR+RD) = (AS+BQ)+ (CQ+DS) ⟹AB+CD = AD+BC ⇒ 2AB=2BC (Opposite sides of parallelogram are equal) Thus, AB = BC Since, in Parallelogram ABCD a pair of adjacent sides are equal. Hence, ABCD is a rhombus.  	½ 1 ½ ½
27(B)	Proof: OA = OC [radius] In ΔOAC, angles opposite to equal sides are equal. ∠OAC = ∠OCA …. (i) ∠OCD = 90° [tangent is radius are perpendicular at point of contact] ∠ACD + ∠OCA = 90° ∠ACD + ∠OAC = 90° [∵ ∠OAC = ∠BAC] ∠ACD + ∠BAC = 90° ⟶ Hence proved	½ ½ 1 1
28(A)	$\frac{tanA}{1+secA} - \frac{tanA}{1-secA} = 2cosecA$ **LHS** = $\frac{tanA}{1+secA} - \frac{tanA}{1-secA}$ $= \frac{\frac{SinA}{cosA}}{1+\frac{1}{cosA}} - \frac{\frac{SinA}{cosA}}{1-\frac{1}{cosA}}$ $= \frac{SinA}{cosA+1} - \frac{SinA}{cosA-1}$ $= \frac{SinA}{1+cosA} + \frac{SinA}{1-cosA} = \frac{SinA-SinAcosA+SinA+SinAcosA}{1-cos^2A}$ $= \frac{2SinA}{Sin^2A} = \frac{2}{SinA} = \boldsymbol{RHS}$	½ ½ 1 1
28 (B)	$sin\theta + cos\theta = \sqrt{3}$ gives $(sin\theta + cos\theta)^2 = 3$. Hence $1+2sin\theta cos\theta = 3$ So $2sin\theta cos\theta = 2$ $\Rightarrow sin\theta cos\theta = 1$ □ $tan\theta + cot\theta = \frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$ $= \frac{sin^2\theta + cos^2\theta}{\sin\theta . \cos\theta} = 1/1 = 1$	½ ½ 1 1
29	see tables below	1

x	0	6
$y = \frac{6-x}{3}$	2	0

x	0	3
$y = \frac{2x-12}{3}$	−4	−2



Area of triangle = ½ x 6 x 6 = 36/2 = 18 sq. units

Marks: 1, 1

30

P(Vidhi drives the car) = $\frac{3}{8}$ as favourable outcomes are HHT,THH,HHH — **1**

P(Unnati drives the car) = $\frac{4}{8}$ as favourable outcomes are THT,THH,HTH,TTH — **1**

As $\frac{4}{8} > \frac{3}{8}$

=>Unnati has greater probability to drive the car — **1**

31

p(x) = $3x^2 - 2x - 1$

= $3x^2 - 3x + x - 1$

= (3x + 1) (x – 1)

Zeroes are -1/3 and 1 — **1**

Sum = -1/3 + 1 = -1 + 3 / 3 = 2/3

-b/ a = 2/3 — **1**

Product = -1/3 x 1 = -1/3

c/a = -1/3 — **1**

Section D

32

Given, to prove, figure , construction — **1**

Correct proof — **2**

$\frac{AO}{BO} = \frac{CO}{DO}$ and ∠AOB = ∠COD (vertically opposite angles) — ½

By SAS similarity criterion, ΔAOB ~ΔCOD — ½

Corresponding angles of similar triangles are equal,

∠OAB = ∠OCD — ½

they are alternate interior angles and equal.

Hence AB is parallel to DC — ½

And ABCD is a trapezium. Proved.

33(A)

For Median,

CLASS	FREQUENCY	CF
0 -10	8	8
10 – 20	7	15
20 – 30	15	30 = cf
30 – 40	20 = f	50
40 – 50	12	62
50 – 60	8	70
60 - 70	10	80

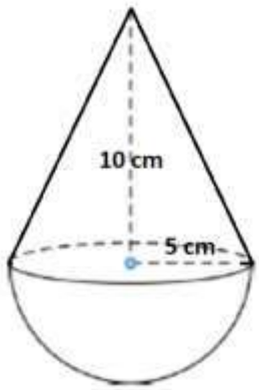
1

N = 80

N/2 = 40, Median class = (30 – 40) , l = 30 , cf = 30, f = 20, h = 10 — ½

Median = $l + \frac{(\frac{N}{2} - cf)}{f} \times h$ — ½

	$= 30 + \frac{(40-30)}{20} \times 10$ $= 30 + 10/20$ $= 30 + 0.5 = 30.5$ Highest frequency $f_1 = 20$ ⇨ Modal class = (30 – 40) , l = 30, $f_0 = 15$, $f_2 = 12$, h = 10 Mode = $l + \frac{(f_1 - f_0)}{2f_1 - f_0 - f_2} \times h$ $\mathbf{= 30 +} \frac{\mathbf{(20-15)}}{\mathbf{2 \times 20 - 15 - 12}} \times 10$ = 30 + 50/13 = 30 + 3.846 = 33.846 ≈ 33.85	**1** ½ ½ ½ ½
33(B)	$\sum f = 20 + x + y = 30$ X + y = 10 ___________ (1) Finding class marks Finding x f $\sum xf = 2 + 48 + 10x + 84 + 90 + 22y = 224 + 10x + 22y$ Mean = $\frac{\sum xf}{\sum f}$ 12 = (224 + 10x + 22y)/ 30 12 × 30 = 224 + 10x + 22y 360 – 224 = 10x + 22y 136 = 10x + 22y 68 = 5x + 11y ______________ (2) Solving equation (1) and (2), we get, x = 7 and y = 3	**1** **1** ½ **1** **1** ½
34(A)	Let the sides of the two given squares be x and y, According to the question, $x^2 + y^2 = 2650$______________ (1) And 4x + 4y = 280 Gives x + y = 70 Or y = 70 – x Put it in eq. 1, we get $x^2 + (70 - x)^2 = 2650$ Simplifying we get, $2x^2 - 140x + 2250 = 0$ $x^2 - 70x + 1125 = 0$ $(x - 45)(x - 25) = 0$ X = 45 or 25 Then y = 25 or 45. Hence, sides of the two given squares are 45 cm and 25 cm.	½ ½ **1** **1** **1** **1**
34(B)	$2x^2 + kx + 3 = 0$ has real and equal roots $b^2 - 4ac = 0$ for real and equal roots $k^2 - 4 \times 2 \times 3 = 0$ $k^2 = 24$ $k = \sqrt{24} = \pm 2\sqrt{6}$ for $k = 2\sqrt{6}$ the equation is $2x^2 + 2\sqrt{6}x + 3 = 0$ $x = \frac{-b}{2a} = \frac{-2\sqrt{6}}{2 \times 2} = \frac{-\sqrt{6}}{2}$ for $k = -2\sqrt{6}$ the equation is $2x^2 - 2\sqrt{6}x + 3 = 0$ $x = \frac{-b}{2a} = \frac{2\sqrt{6}}{2 \times 2} = \frac{\sqrt{6}}{2}$	½ **1/2** **1** **1/2** **1** ½ **1**
35	Cone and hemisphere have the same radii =>$r_c = r_h = r$ Radius of the conical part is 5 cm =>$r_c = 5$ cm $= r_h$	 **1**

	Height of the conical part of the toy is equal to the diameter of its base =>$h_c = 2 \times r_c = 2 \times 5$ cm = 10 cm Volume of the toy = volume of cone + volume of hemisphere $= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$ $= \frac{1}{3}\pi r^2\ (h + 2r)$ $= \frac{1}{3}\pi(5)^2\ (10 + 2x5)$ $= \frac{1}{3} \times 3.14 \times 25 \times 20$ $= \frac{1}{3} \times 1570 = 523.33\ cm^3$ 	**1** **1** **1** **1**
	Section E	
36	i) $\tan 45° = \frac{CD}{BD}$ $1 = \frac{h}{BD}$ -> BD = h metres ii) $\sin 45° = \frac{CD}{BC}$ $\frac{1}{\sqrt{2}} = \frac{h}{BC}$ -> BC = $h\sqrt{2}$ metres **iii)** **(A)** $\tan 60° = \frac{CE}{AE}$ $\sqrt{3} = \frac{40+h}{h}$ (AE = BD = h) $h\sqrt{3} = 40 + h$ $h = \frac{40}{\sqrt{3}-1} = \frac{40\ (\sqrt{3}+1)}{2} = 20\ (\sqrt{3}+1)$ **m** OR **(B)** $\cos 60° = \frac{AE}{AC}$ $\frac{1}{2} = \frac{AE}{100}$ $AE = 50\ m$	½ ½ ½ ½ ½ **1** ½ ½ **1** ½
37	**i)** Forradius of the 13^{th} spiral, a = 50, d = 100 – 50 = 50, n = 13 $a_{13} = a + 12d$ $= 50 + 12 \times 50 = 50 + 600 = 650$cm **ii)** $a_n = a + (n – 1)\ d$ $500 = 50 + (n – 1) \times 50$ $10 = 1 + n – 1$ n = 10 iii) **(A)** No. of saplings in spiral 1 = a_1 = 10 No. of saplings in spiral 2 = a_2 =20, and so on . d = 10, for total no. of saplings till 11^{th} spiral, n = 11, $S_n = \frac{n}{2}(2a + (n – 1)\ d)$ $S_{11} = \frac{11}{2}(2\times 10 + (11 – 1)\ 10)$ $= \frac{11}{2} \times (20 + 100) = \frac{11}{2} \times 120 = 11 \times 60 = 660$ Total no. of saplings till 11^{th} spiral is 660 **OR** **(B)** $S_n = 450$, a = 10, d = 10 $S_n = \frac{n}{2}(2a + (n – 1)\ d)$ $450 = \frac{n}{2}(2\times 10 + (n – 1)\ 10)$	½ ½ ½ ½ ½ ½ **1** ½ ½

	$45 = \frac{n}{2}(2 + (n-1))$ on dividing the equation by 10 $90 = n(n + 1)$ Gives $n^2 + n - 90 = 0$ $n^2 + 10n - 9n - 90 = 0$ $(n + 10)(n - 9) = 0$ Gives n = -10 (rejected) or 9 Till 9th spiral, there be a total of 450 saplings	½ ½
38	i) P(2,5) and R(8,3) PR = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2)} = \sqrt{6^2 + (-2)^2}$ $= \sqrt{36 + 4} = \sqrt{40} = 2\sqrt{10}$ units ii) Coordinates of Q are (4, 4) Mid point of PR = $\left(\frac{2+8}{2}, \frac{5+3}{2}\right)$ = (5,4) No, Q is not the mid point of PR. iii) **(A)** Let the point on x – axis be A(a,0) PA = QA or $PA^2 = QA^2$ $(a-2)^2 + 5^2 = (a-4)^2 + 4^2$ $a^2 + 4 - 4a = a^2 + 16 - 8a + 16$ $8a - 4a = 32 - 4$ $4a = 28$ $a = 7$, the required point on x – axis is (7,0) **OR (B)** correct section formula with m:n = 2:3 X coordinate $= \frac{2\times4+3\times2}{2+3} = \frac{8+6}{5} = \mathbf{\frac{14}{5}}$ y coordinate $= \frac{2\times4+3\times5}{2+3} = \frac{8+15}{5} = \mathbf{\frac{23}{5}}$ coordinates of S are $\left(\mathbf{\frac{14}{5}}, \mathbf{\frac{23}{5}}\right)$	½ ½ ½ ½ ½ ½ ½ ½ **1** **1**