MARKING SCHEME
CLASS XI
MATHEMATICS(2026-27)

S.NO.	ANSWERS	MARKS
1	B) [1,15)	1
2	D) IV	1
3	B) 25	1
4	B) 4	1
5	C) U	1
6	C) $2\sqrt{7}$	1
7	C) -1/10	1
8	D) 1	1
9	D) - 1	1
10	A) $\frac{x}{(sec\theta)/2} + \frac{y}{tan\theta} = 1$	1
11	C) 35	1
12	D) 8	1
13	D) No such value exists	1
14	B) 2310	1
15	A) 60°	1
16	C) $-\frac{\alpha}{3}$	1
17	B) $-\frac{1}{n!}$	1
18	D) (-7,5,-6)	1
19	A)Both A and R are true and R is the correct explanation of A.	1
20	D)A is false but R is true	1

21	$\lim_{x \to \frac{\pi}{4}} \frac{\sin x - \cos x}{x - \frac{\pi}{4}}$ $= \lim_{x \to \frac{\pi}{4}} \frac{\sqrt{2}\left[\frac{1}{\sqrt{2}}\sin x - \frac{1}{\sqrt{2}}\cos x\right]}{x - \frac{\pi}{4}}$ $= \lim_{x \to \frac{\pi}{4}} \frac{\sqrt{2}\left[\cos\frac{\pi}{4}\sin x - \sin\frac{\pi}{4}\cos x\right]}{x - \pi/4}$ $= \lim_{x \to \frac{\pi}{4}} \frac{\sqrt{2}\ \sin\left(x - \frac{\pi}{4}\right)}{x - \pi/4}$ $= \sqrt{2} \cdot 1 = \sqrt{2}$	½ ½ ½ ½
22	Let P(0,y,z) be a point in the yz -plane. PA = PB = PC $\Rightarrow (PA)^2 = (PB)^2 = (PC)^2$ $\Rightarrow (-3)^2 + (y)^2 + (z)^2 = (y+1)^2 + z^2 = (y)^2 + (z-2)^2$ $\Rightarrow 9 = 2y+1 = 4 - 4z$ $\Rightarrow y = 4,\ z = -\frac{5}{4}$ Therefore, the point is P(0, 4, $\frac{-5}{4}$)	½ ½ ½ ½
23	$f(x + \frac{1}{x}) = (x^2 + \frac{1}{x^2})$ $\Rightarrow f(x + \frac{1}{x}) = x^2 + \frac{1}{x^2} + 2 - 2 = (x + \frac{1}{x})^2 - 2$ $f(x) = x^2 - 2$ $x^2 \geq 0 \Rightarrow x^2 - 2 \geq -2$ Range = $[-2, \infty)$	1 ½ ½
24	A) Vowels - EAIE Consonants - RMNDR EAIE RMNDR 1 unit Total units = 6 (R repeated 2 times) 6 units can be arranged in $\frac{6!}{2!}$ = 360 Vowels can be arranged among themselves in $\frac{4!}{2!}$ = 12 Number of words formed = 360 x 12 = 4320 **OR** B) The possible arrangement is BGBGBGBGBGB Boys can arrange among themselves in 6! Ways Girls can arrange among themselves in 5! Ways	1 ½ ½ ½ ½

	Total arrangements = 6! × 5! = 86400	½ ½
25	A) Required Probability $= 1 - P(\text{ all are blue })$ $= 1 - \frac{5C_3}{15C_3} = 1 - \frac{2}{91} = \frac{89}{91}$ **OR** B) According to the question P(AUB) =1 We know that P(AUB) = P(A) + P(B) – P (A∩ B) 1= 0.83 +0.29 – P (A∩ B) P (A∩ B)= 0.12	1 1 ½ ½ ½ ½
26	$(2 + x)^5 = 32 + 80x + 80x^2 + 40x^3 + 10x^4 + x^5$ $(2x - 1)^4 = 16x^4 - 32x^3 + 24x^2 - 8x + 1$ Coefficient of x^3 is 32(-32) + 80(24) - 80(8) + 40 = -1024 + 1920 -640 + 40 = 296	1 1 ½ ½
27	A) For station P,distance to the line x + y = 4 for (4,6) is $d_1 = \left\|\frac{4+6-4}{\sqrt{2}}\right\| = \frac{6}{\sqrt{2}} = 3\sqrt{2}$ Total distance travelled to station P is $(1 + 3\sqrt{2})$km = 5.2km(approx) And for station Q, distance to the line x+ y = 4 for (-2,2) is $d_2 = \left\|\frac{-2+2-4}{\sqrt{2}}\right\| = \frac{4}{\sqrt{2}} = 2\sqrt{2}$ Total distance travelled to station Q is $(2 + 2\sqrt{2})$km = 4.8km(approx) Therefore, the driver must choose Station Q which is closer. **OR** B) Let P(h,k) be the image of the ear tag. Therefore, $(\frac{h+3}{2}, \frac{k+8}{2})$ $satisfies\ x + 3y = 7$ $\frac{h+3}{2} + 3(\frac{k+8}{2}) = 7$ $\Rightarrow h + 3k = -13$ Also, slope of the line joining the ear tag and image of ear tag with the given line is -1. $\Rightarrow 3h - k = 1$ Solving gives h = -1, k = -4 Thus, image of ear tag is (-1,-4)	½ 1 1 ½ 1 ½ 1 ½

28	$cosx = \frac{-3}{5}$, x lies in II Quadrant $sin^2x + cos^2x = 1$ $\Rightarrow sin^2x = 1 - (\frac{-3}{5})^2$ $\Rightarrow sin^2x = \frac{16}{25}$ $\Rightarrow sinx = \pm\frac{4}{5}$ As x lies in II Quadrant So , $sinx = \frac{4}{5}$ $sin2x = 2sinx\,cosx = 2(\frac{-3}{5})(\frac{4}{5}) = \frac{-24}{25}$ $(\pi < 2x < 2\pi)$ $\Rightarrow \frac{\Pi}{4} < \frac{x}{2} < \frac{\pi}{2}$ $sin\frac{x}{2} = \sqrt{\frac{1-cosx}{2}}$ $sin\frac{x}{2} = \sqrt{\frac{1+\frac{3}{5}}{2}}$ $sin\frac{x}{2} = \sqrt{\frac{8}{10}} = \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}}$ or $\frac{2\sqrt{5}}{5}$	½ ½ ½ ½ ½ ½
29	$z_1 = 1 - 3i$, $z_2 = 3i + 1$ *and* $z_3 = 2 + i$. (i) Associative Law for Multiplication $z_1(z_2 z_3) = (z_1 z_2) z_3$ LHS = $(1 - 3i)[(3i + 1)(2 + i)]$ $= (1 - 3i)(-1 + 7i)$ $= 20 + 10i$ RHS =. $[(1 - 3i)(3i + 1)](2 + i)$ $= 10(2 + i)$ $= 20 + 10i$ Hence Verified (ii) $z_1 + 2z_2 - z_3 = (1 - 3i) + 2(3i + 1) - (2 + i)]$ $= 1 + 2i$ Additive inverse = $-1 - 2i$	½ ½ ½ ½ ½ ½

30	A) $U = \{1, 2, 3, 4, 5, 6, \ldots\ldots\ldots, 40\}$, $A = \{6, 12, 18, 24, 30, 36\}$ $B = \{1, 4, 9, 16, 25, 36\}$ $(A \cap B) = \{36\}$ $(A - B) = \{6, 12, 18, 24, 30\}$ $(A \cap B) \cup (A - B) = \{6, 12, 18, 24, 30, 36\} = A$ LHS=RHS,hence verified. **OR** B) Let x ϵ A $\Rightarrow x \in A \cup B$ $\Rightarrow x \in A \cap B$ (as AUB $= A \cap B$) $\Rightarrow x \in B$ $\therefore A \subset B$ Similarly, B ⊂ A Now, A ⊂ B and B ⊂ A ⇒ A = B Hence verified.	½ ½ ½ ½ ½ 1 ½ ½ ½ ½
31	Since the fixed distance is 26m . Therefore, a = 13 As the distance between both handpumps = 10 m . $\Rightarrow c = 5$ We know, $c^2 = a^2 - b^2$ $\Rightarrow b = 12$ The equation of the path traced by the farmer is $\frac{x^2}{169} + \frac{y^2}{144} = 1$.	½ ½ 1 1
32	A) $sin5A = sin(3A + 2A)$ $sin5A = sin3Acos2A + cos3Asin2A$ $sin5A = (3sinA - 4sin^3A)(1 - 2sin^2A) + (4cos^3A - 3cosA)(2sinAcosA)$ $sin5A = (3sinA - 6sin^3A - 4sin^3A + 8sin^5A) + (8cos^4A - 6cos^2A)sinA$ $= (3sinA - 10sin^3A + 8sin^5A) + (8(1 - sin^2A)^2 - 6(1 - sin^2A))sinA$ $= (3sinA - 10sin^3A + 8sin^5A) + (8(1 + sin^4A - 2sin^2A) - 6(1 - sin^2A))sinA$ $= (3sinA - 10sin^3A + 8sin^5A) + (8sinA + 8sin^5A - 16sin^3A - 6sinA + 6sin^3A)$ $= 5sinA - 20sin^3A + 16sin^5A$	½ ½ ½ ½ ½ ½ ½

	Since $\sin 5A = p\sin A + q\sin^3 A + \mathrm{r}\sin^5 A$ Hence $p = 5, q = -20, r = 16$ Therefore $p - q + r = 5 + 20 + 16 = 41$ **OR** B) $\cos 10^\circ \cos 50^\circ \cos 60^\circ \cos 70^\circ$ $= \frac{1}{2}(cos\ 10^\circ\ cos\ 50^\circ\ cos\ 70^\circ)$ $= \frac{1}{4}[(2cos\ 10^\circ\ cos\ 50^\circ)\ cos\ 70^\circ]$ $= \frac{1}{4}[(cos(10^\circ + 50^\circ) + cos(10^\circ - 50^\circ))\ cos\ 70^\circ]$ $= \frac{1}{4}[(\frac{1}{2} + cos\ 40^\circ)\ cos\ 70^\circ]$ $= \frac{1}{8}(cos\ 70^\circ + 2\ cos\ 40^\circ cos\ 70^\circ)$ $= \frac{1}{8}[cos\ 70^\circ + cos(40^\circ + 70^\circ) + cos(40^\circ - 70^\circ)]$ $= \frac{1}{8}(cos\ 70^\circ + cos\ 110^\circ + \frac{\sqrt{3}}{2})$ $= \frac{1}{8}[2cos(\frac{70^\circ+110^\circ}{2})cos(\frac{70^\circ-110^\circ}{2}) + \frac{\sqrt{3}}{2}]$ $= \frac{1}{8}(0 + \frac{\sqrt{3}}{2})$ $= \frac{\sqrt{3}}{16}$	½ ½ ½ ½ ½ ½ ½ ½ ½ ½
33	The spending and re- spending create a G.P. as follows: 10000, 8000, 6400, 5120,... Amount saved after 10th round = 20% of sum of 10 terms $= \frac{20}{100}\{10000[\frac{1-(\frac{4}{5})^{10}}{1-\frac{4}{5}}]\}$ $= ₹\ 10000[1 - (\frac{4}{5})^{10}]$ crores The total increase in economic activity by continuous spending rounds is given by $S_\infty = \frac{a}{1-r}$ $= \frac{10000}{1-\frac{4}{5}} = ₹\ 50000$ crores	1 1 1 1 1
34	A)	

C.I	f	x	$d = \frac{x-65}{10}$	fd	fd^2
$30-40$	3	35	-3	-9	27
$40-50$	7	45	-2	-14	28
$50-60$	12	55	-1	-12	12
$60-70$	15	65	0	0	0
$70-80$	8	75	1	8	8
$80-90$	3	85	2	6	12
$90-100$	2	95	3	6	18
	$\Sigma f = 50$			$\Sigma fd = -15$	$\Sigma fd^2 = 105$

2 marks for Correct table

$$\text{Mean} = A + h\frac{\Sigma fd}{\Sigma f} = 65 + 10 \times \frac{-15}{50}$$
$$= 65 - 3 = 62$$

1

$$\text{Variance} = h^2\left[\frac{\Sigma fd^2}{\Sigma f} - \left(\frac{\Sigma fd}{\Sigma f}\right)^2\right]$$
$$= 100\left[\frac{105}{50} - \left(\frac{-15}{50}\right)^2\right]$$
$$= 100\left[\frac{5250-225}{2500}\right] = \frac{5025}{25} = 201$$

1

$$\text{Standard deviation} = \sqrt{\text{variance}} = \sqrt{201} = 14.18 \text{ (approx)}$$

1

OR

B)

C. I	f	cf	x	$D = \lvert x-28 \rvert$	fD
$0-10$	6	6	5	23	138
$10-20$	7	13	15	13	91
$20-30$	15	28	25	3	45
$30-40$	16	44	35	7	112

2 marks for Correct table

$40-50$	4	48	45	17	68
$50-60$	2	50	55	27	54
	50				508

$\left(\frac{N}{2}\right)^{th}$ term $= \left(\frac{50}{2}\right)^{th}$ term $= 25^{th}$ term lies in $20-30$ — 1

$$\text{Median} = L + \left(\frac{N}{2} - C \cdot f\right) h/f$$

$$= 20 + \frac{25-13}{15} \times 10 = 20 + 8 = 28$$ — 1

Mean Deviation about Median $= \frac{\Sigma fD}{\Sigma f} = \frac{508}{50} = 10.16$ — 1

35

$$f(x) = \frac{3x-5}{5x-3}$$

$$f(x+h) = \frac{3(x+h)-5}{5(x+h)-3}$$ — ½

we know that

$$f'(x) = \lim_{h \to 0} \frac{f(x+h)-f(x)}{h}$$

$$= \lim_{h \to 0} \frac{\frac{3x+3h-5}{5x+5h-3} - \frac{3x-5}{5x-3}}{h}$$ — 1

$$= \lim_{h \to 0} \frac{(15x^2-9x+15xh-9h-25x+15)-(15x^2-25x+15xh-9x-25h+15)}{h(5x+5h-3)(5x-3)}$$

$$= \lim_{h \to 0} \frac{16h}{h(5x+5h-3)(5x-3)}$$ — 1

$$= \frac{16}{(5x-3)^2}$$ — ½

verification

$$f(x) = \frac{3x-5}{5x-3}$$

$$f'(x) = \frac{(5x-3)(3)-(3x-5)(5)}{(5x-3)^2}$$ — 1

$$= \frac{15x-9-15x+25}{(5x-3)^2}$$

$$= \frac{16}{(5x-3)^2}$$ — 1

36	(i) $P(x) = 8 + 2\sqrt{16 - x^2}$ $(ii) A(x) = x\sqrt{16 - x^2}$ $(iii)a) P(x) = 8 + 2\sqrt{16 - x^2}$ The expression inside the square root must be positive i.e. $16 - x^2 > 0 \Rightarrow x^2 < 16$ $\Rightarrow -4 < x < 4$ .Also the height x must be positive$(x > 0)$ Therefore, Domain of $P(x) = (0, 4)$ $8 < P(x) < n$ so $m = 8$ **OR** $(iii)b) A(x) = x\sqrt{16 - x^2}$ The height x must be positive $(x > 0)$ and the term inside the square root must yield a real, non - zero base i.e. $16 - x^2 > 0 \Rightarrow x^2 < 16 \Rightarrow -4 < x < 4$ Therefore, Domain of $A(x) = (0, 4)$ $A = x\sqrt{16 - x^2}$ $A = 2\sqrt{16 - 4}$ $A = 2\sqrt{12} = 4\sqrt{3}$ sq.cm.	1 1 ½ ½ 1 ½ ½ 1
37	(i)P(A) = $\frac{8}{14}$, P(R) = $\frac{9}{14}$ (ii) Required Probability $= P(A' \cap R)$ $= P(R) - P(A \cap R)$ $= \frac{9}{14} - \frac{5}{14} = \frac{2}{7}$ (iii) a) Required Probability $= P(A' \cap R') = P(A \cup R)'$ $= 1 - P(A \cup R)$ $= 1 - [P(A) + P(R) - P(A \cap R)]$ $= 1 - \left[\frac{8}{14} + \frac{9}{14} - \frac{5}{14}\right]$ $= \frac{1}{7}$ **OR** iii) b)	½ + ½ ½ ½ ½ ½ ½

	Required Probability $= P(A \cap R') \cup P(A' \cap R)$ $= P(A) - P(A \cap R) + P(R) - P(A \cap R)$ $= \frac{8}{14} - \frac{5}{14} + \frac{9}{14} - \frac{5}{14} = \frac{1}{2}$	½ 1 ½
38	(i) For Company A 199 + 15 x ≤ 334 For Company B 164 + 18 x ≤ 334 (ii) For company A 199 + 15 x ≤ 334 15 x ≤ 135 x ≤ 9 For Company B 164 + 17 x ≤ 334 17 x ≤ 170 x ≤ 10 Rohan should select Telecom company B For the same bill Telecom Company B will give more Gigabyte(GB).	1 1 ½ ½ ½ ½