MATHEMATICS BASIC – Code No. 241
MARKING SCHEME
CLASS - X (2025 - 26)

SECTION - A		
Q. No.	**Answer**	**Marks**
1.	**Answer – D** As, 2025 = $3^4 \times 5^4$ So, the exponent of 3 in the prime factorization of 2025 is **4**	**1**
2.	**Answer – B** On subtracting first equation from second equation, we get $2025\boldsymbol{x} + 2024\boldsymbol{y} - 2024\boldsymbol{x} - 2025\boldsymbol{y} = -1 - 1 \Rightarrow (\boldsymbol{x} - \boldsymbol{y}) = \mathbf{-2}$	**1**
3.	**Answer – D** As, $f(x) = \mathrm{k}(\mathrm{x}+2)(\mathrm{x}-5) \Rightarrow f(x) = \mathrm{k}(x^2 - 3\mathrm{x} - 10), \mathrm{k} \neq 0$ Since k can be any real number. So, there are Infinitely many such polynomials.	**1**
4.	**Answer – C** On simplification, given equations reduce to $(A)\ x^2 + 2x - 2 = 0$ (**Quadratic Equation**) $(B)\ 2\boldsymbol{x}^2 - 3x - 1 = 0$ (**Quadratic Equation**) (C) $3x + 1 = 0$ (***NOT a*** **Quadratic Equation**) (D) $4\boldsymbol{x}^2 + \boldsymbol{x} = 0$ (**Quadratic Equation**)	**1**
5.	**Answer – A** As, $2(\boldsymbol{x} + 10) = (3\boldsymbol{x} + 2) + 2x \Rightarrow x = 6$	**1**
6.	**Answer – B** As, $\frac{50(51)}{2} = 25k \Rightarrow k = 51$	**1**
7.	**Answer – D** Distance between the given points = $\sqrt{(\frac{1}{2} - \frac{\sqrt{3}}{2})^2 + (\frac{1}{2} + \frac{\sqrt{3}}{2})^2} = \sqrt{2}$	**1**
8.	**Answer – C** We know that, for the coordinates of a mirror image of a point in *x*-axis, abscissa remains the same and ordinate will be of opposite sign of the ordinate of given point. So, the Mirror image of the point (−3, 5) about x-axis is (−3, −5).	**1**
9.	**Answer – B** As, $\Delta\mathrm{ABC} \sim \Delta\mathrm{EFD} \Rightarrow \angle\mathrm{A} = \angle\mathrm{E}$	**1**

10.	**Answer – B** As, $\Delta ABC \sim \Delta PQR \Longrightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{1}{2} \Longrightarrow PQ = 6\text{ cm}, QR = 8\text{ cm}$ Perimeter of the triangle PQR (in cm) = 6 + 8 +10 = 24	**1**
	Question given for Visually impaired candidates **Answer – B** The solution is same as above.	**1**
11.	**Answer – A** From the figure, AE = 24 – r = AF. So, BF = 1 + r = 7 – r ⟹ r = 3 cm	**1**
	Question given for Visually Impaired candidates **Answer – B** As, PQ = PR = 24 cm So, Area of Quadrilateral PQOR (in cm^2) = $2 \times \frac{1}{2} \times 24 \times 10 = 240$	**1**
12.	**Answer – B** As, $\cot^2 \mathbf{x} - \text{cosec}^2 \mathbf{x} = -\mathbf{1}$, so it is **NOT** equal to Unity	**1**
13.	**Answer – C** As, Median class is 10-15. So, its upper limit is 15.	**1**
14.	**Answer – C** Since, 3 Median = Mode + 2 Mean. So, **a = 3 & b = 2.** Thus, (2***b*** + 3***a***) = 4 + 9 = 13	**1**
15.	**Answer – B** Radius (in cm) = $\sqrt{13^2 - 12^2} = 5$	**1**
16.	**Answer – A** As, ∠PAO= 90°. So, ∠APO = 115° – 90° = 25°	**1**
	Question given for Visually Impaired candidates **Answer – A** As, the chord is at a distance of 18 cm (more than the radius). So, the chord will be at a distance of 5 cm on the opposite side of the centre. Thus, length of the chord CD will be $2\sqrt{13^2 - 5^2} = 24\ cm$	**1**
17.	**Answer – C** As, $r_1 : r_2$ = 3 : 4. So, the ratio of their areas = $r_1^2 : r_2^2$ = 9 :16	**1**
18.	**Answer – A** Since, the event is most unlikely to happen. Therefore, its probability is 0.0001	**1**
19.	**Answer – A** As**,** Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	**1**

20.	**Answer – D** Since events given in Assertion are not equally likely, so probability of getting two heads is not $\frac{1}{3}$. Thus, Assertion (A) is false but reason (R) is true.	**1**
	Section –B **[This section comprises of solution of very short answer type questions (VSA) of 2 marks each]**	
21 (A).	It can be observed that, $2 \times 5 \times 7 \times 11 + 11 \times 13 = 11 \times (70 + 13)$ = 11 x 83 which is the product of two factors other than 1. Therefore, it is a composite number. **OR**	 **1** **1**
21 (B).	The smallest number which is divisible by any two numbers is their LCM. So, Number which is divisible by both 306 and 657 = LCM (306, 657) Since, 306 = $2^1 \times 3^2 \times 17^1$ and 657 = $3^2 \times 73$ LCM (306, 657) = $2^1 \times 3^2 \times 17^1 \times 73$ = 22338	**½** **1** **½**
22.	As, P(3, a) lies on the line L, so 3 + a = 5 $\Longrightarrow a = 2$ Now, the radius of the circle = CP = $\sqrt{3^2 + 2^2} = \sqrt{13}\ units$ **<u>Question given for Visually Impaired candidates</u>** Diameter of the circle = Distance between (0,0) and (6,8) = $\sqrt{6^2 + 8^2} = 10$ Radius of the circle = ½ (Diameter of the circle) = 5 units	**1** **1** **1½** **½**
23.	Sum of the zeroes = 2 – 3 = $-(\boldsymbol{a} + 1) \Longrightarrow a = 0$ Product of the zeroes = – 6 = $b \Longrightarrow b = -6$ Hence, $a = 0$ & $b = -6$	**1** **1**
24.	Discriminant, D = 16 + $12\sqrt{2}$ > 0 As, Discriminant is positive. So, Roots are real and distinct.	**1** **1**
25 (A).	$2\sin 30° \tan 60° - 3\cos^2 60° \sec^2 30° = 2\left(\frac{1}{2}\right)\left(\sqrt{3}\right) - 3\left(\frac{1}{2}\right)^2\left(\frac{2}{\sqrt{3}}\right)^2$ $= \sqrt{3} - 1$ **OR**	**1½** **½**
25 (B).	$\text{As, sinx. cosx(tanx + cotx)} = \text{sinx. cosx}\left(\frac{\text{sinx}}{\text{cosx}} + \frac{\text{cosx}}{\text{sinx}}\right).$ $= \text{sinx. cosx}\left(\frac{1}{\text{cosx .sinx}}\right)$ = 1 (Constant) Since, the value of sinx. cosx (tanx + cotx) is constant, so its equal 1 for all angles.	**½** **1½**

Section –C

[This section comprises of solution short answer type questions (SA) of 3 marks each]

26.

To prove that $(\sqrt{2} - \sqrt{5})$ is an irrational number, we will use the contradiction Method.

Let, if possible, $\sqrt{2} - \sqrt{5} = x$, where x is any rational number (Clearly $x \neq 0$)

so, $\sqrt{2} = x + \sqrt{5} \Rightarrow 2 = (x + \sqrt{5})^2$ **1**

$\Rightarrow 2 = x^2 + 5 + 2\sqrt{5}x$

$\Rightarrow -x^2 - 3 = 2\sqrt{5}x$

$\Rightarrow \frac{-x^2-3}{2x} = \sqrt{5}$ ……(1) **1**

(Note: $\sqrt{5}$ is an irrational number, as the square root of any prime number is Always an irrational number)

In equation (1), LHS is a rational number while RHS is an irrational number but an irrational number cannot be equal to a rational number.
So, our assumption is wrong.

Thus, $(\sqrt{2} - \sqrt{5})$ is an irrational number. **1**

27 (A).

	Area of land (in hectares)	No. of families	
	1 – 3	20	
	3 – 5	45	f_0
Modal class →	**5 – 7**	80	f_1
	7 – 9	55	f_2
	9 – 11	40	
	11 – 13	12	

1

∴ Modal class = 5 – 7 , l = 5, h = 2 **2**

Mode = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right)h = 5 + \left(\frac{80-45}{2(80)-45-55}\right) 2 = 6.166\ldots..$

Hence, modal agriculture holdings of the village is 6.17 hectare (approx.)

OR

27 (B).

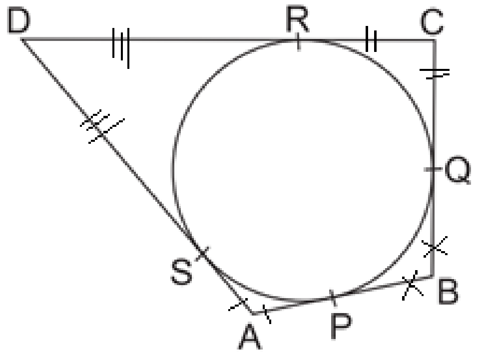
Class interval	f_i	x_i (Mid-value)	$d_i = \frac{x_i - 30}{h}$	$f_i d_i$
0-20	7	10	− 1	− 7
20-40	p	30	0	0
40-60	10	50	1	10
60-80	9	70	2	18
80-100	13	90	3	39
Total	**39 + p**			**60**

2

Assumed mean(A) = 30, Width of the interval (h) = 20

$\text{Mean} = 30 + \frac{60}{39+\text{p}} \times 20 = 54 \Rightarrow 50 = 39 + \text{p} \Rightarrow \text{p} = 11$ **1**

28.



Tangents drawn to a circle from an external point are equal.

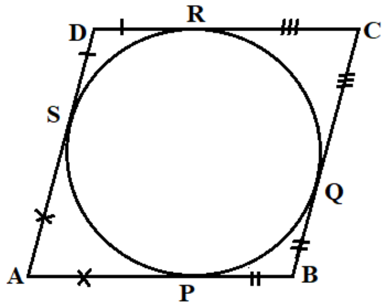
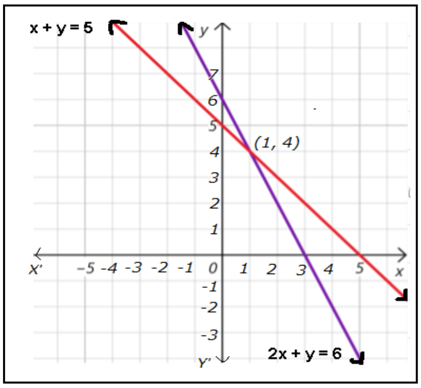
So, AP = AS, PB = BQ,
CR = CQ, DR = DS **1½**

On adding the above equations,

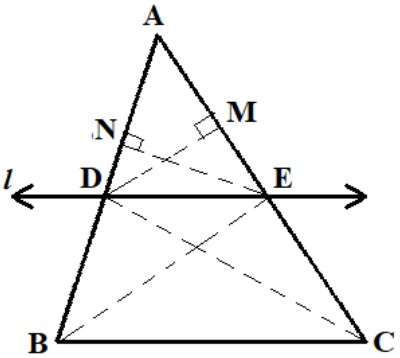
$(\text{AP} + \text{PB}) + (\text{CR} + \text{RD}) = (\text{AS} + \text{BQ}) + (\text{CQ} + \text{DS})$ **1**

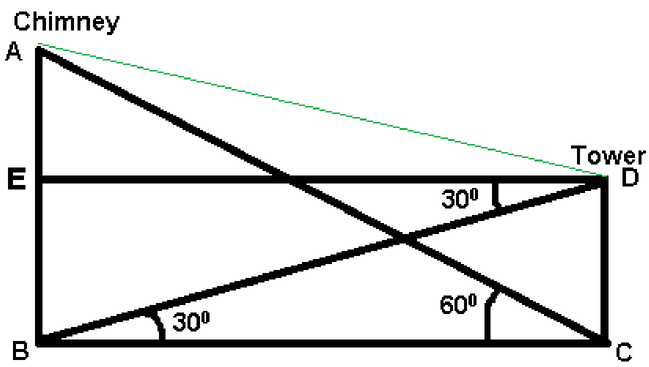
$\Rightarrow \text{AB} + \text{CD} = \text{AD} + \text{BC}$

$\Rightarrow \frac{\text{AB} + \text{CD}}{\text{AD} + \text{BC}} = 1$ **½**

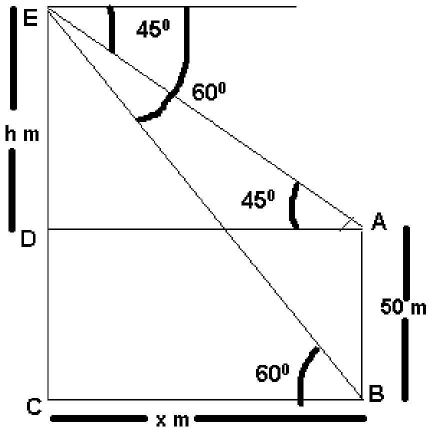
	<u>Question given for Visually Impaired candidates</u> Parallelogram ABCD circumscribes a circle as shown in figure.  Tangents drawn to a circle from an external point are equal So, AP = AS, PB = BQ, CR = CQ, DR = DS On adding the above equations, $(AP + PB) + (CR + RD) = (AS + BQ) + (CQ + DS)$ $\Longrightarrow AB + CD = AD + BC$ $\Rightarrow 2AB = 2BC$ (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.	**1½** **1** **½**
29 (A).	According to the question, 1000x + 200y = 42000000 ⇒ 5x + y = 210000 ……… (1) x + y = 50000 ……….(2) (1) – (2) ⇒ 4x = 160000 ⇒ x = 40000 Substituting value of x in (2), y = 10000 ∴ Number of adults attended the match is 40000 and number of children attended is 10000 **OR**	**1** **½** **1** **½**
29 (B).	$2x + y = 6$ x: 2, 3, 0 y: 2, 0, 6 $x + y = 5$ x: 2, 5, 0 y: 3, 0, 5  Hence solution is x = 1, y = 4	**2** For graph **1**

	Question given for Visually Impaired candidates **29(A)** Solution and marks distribution is same as above **OR**	
	29(B) Let unit place digit be x & tens place digit be y ∴ original number = 10y+x Reversed number = 10x+y Given, 10y + x = 6(x + y) ⟹ 5x – 4y = 0 ……(1) And (10y + x) – (10x + y) = 9 ⟹ –9x +9y = 9 ⟹ x – y = –1 ……(2) On solving (1) and (2) , we get x = 4, y= 5 ∴ The number is 54	**1** **1** **1**
30.	LHS = $(\sin\boldsymbol{x} - \cos\boldsymbol{x} + 1).(\sec\boldsymbol{x} - \tan\boldsymbol{x})$ $= (\sin\boldsymbol{x} - \cos\boldsymbol{x} + 1).\left(\frac{1-\sin x}{\cos x}\right)$ $= (1 + \sin\boldsymbol{x})\left(\frac{1-\sin x}{\cos x}\right) - \cos\boldsymbol{x}\left(\frac{1-\sin x}{\cos x}\right)$ $= \left(\frac{1-\sin^2 x}{\cos x}\right) - (1 - \sin\boldsymbol{x})$ $= \frac{\cos^2 x}{\cos x} - 1 + \sin\boldsymbol{x} = \sin\boldsymbol{x} + \cos\boldsymbol{x} - 1$ = RHS	**1** **1** **1**
31.	As, $S_n = 5n^2 - n$ Now, nth Term is given by $a_n = S_n - S_{n-1}$ $a_n = [5n^2 - n] - [5(n-1)^2 - (n-1)]$ $a_n = 5[n^2 - (n-1)^2] - [n - (n - 1)]$ $a_n = 5[2n-1] - [1]$ $a_n = 10n - 6$	**½** **1** **1½**
	Section –D **[This section comprises of solution of long answer type questions (LA) of 5 marks each]**	
32.	Given: In ΔABC, a line *l* drawn parallel to side BC intersects AB and AC at D and E respectively. To prove: $\frac{AD}{DB} = \frac{AE}{EC}$ Construction: Draw perpendicular from D and E to AC and AB i.e., DM⊥AC and EN⊥AB. Join DC and BE.	**½** **½** **½**

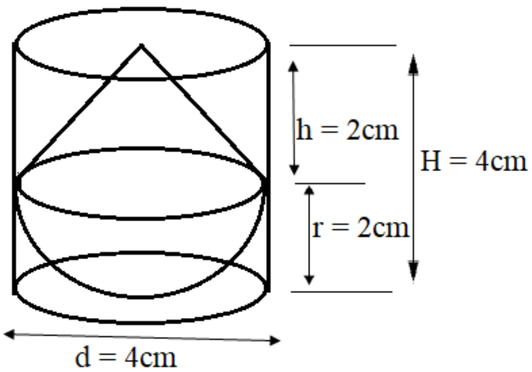
	 Proof: $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2}(AD)(EN)}{\frac{1}{2}(BD)(EN)} = \frac{AD}{DB}$ ....(1) $\frac{ar(\Delta ADE)}{ar(\Delta CED)} = \frac{\frac{1}{2}(AE)(DM)}{\frac{1}{2}(EC)(DM)} = \frac{AE}{EC}$ .... (2) Also, $ar(\Delta BDE) = ar(\Delta CED)$ ....(3) (Triangles on same base and between same parallel are equal in area) From (1), (2) & (3), we get $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{ar(\Delta ADE)}{ar(\Delta CED)}$ $\Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$ (Hence proved)	½ **(for correct figure)** **1** ½ ½ **1**
33 (A)	Let the denominator of the required fraction be x Then, its numerator = $x - 3$ So, the original fraction is $\frac{x-3}{x}$ Given, $\frac{(x-3)+2}{x+2} + \frac{(x-3)}{x} = \frac{29}{20}$ $\frac{(x-1)}{x+2} + \frac{(x-3)}{x} = \frac{29}{20}$ $\frac{(x-1)x + (x-3)(x+2)}{(x+2)x} = \frac{29}{20}$ $\frac{x^2 - x + x^2 - x - 6}{x^2 + 2x} = \frac{29}{20}$ $20(2x^2 - 2x - 6) = 29(x^2 + 2x)$ $11x^2 - 98x - 120 = 0$ $11x^2 - 110x + 12x - 120 = 0$ $11x(x - 10) + 12(x - 10) = 0$ $(11x + 12)(x - 10) = 0$ $x = 10 \text{ or } x = -\frac{12}{11}$ (not possible as it is not an integer) $\therefore x = 10$ Hence, the required fraction is $\frac{7}{10}$ **OR**	**1** **1** **1½** **1** ½

33 (B)	Let the original speed of the train be x km/hr Distance travelled be 300km ∴ Original time (t_o) = $\frac{300}{x}$ hr New speed of the train = (x+5) km/hr ∴ New time (t_n) = $\frac{300}{x+5}$ hr Given, $t_o - t_n = 2$ $\frac{300}{x} - \frac{300}{x+5} = 2$ $\frac{300(x+5) - 300(x)}{x(x+5)} = 2$ $\frac{1500}{x^2 + 5x} = 2$ $x^2 + 5x - 750 = 0$ $x^2 + 30x - 25x - 750 = 0$ $x(x+30) - 25(x+30) = 0$ $(x-25)(x+30) = 0$ $x = 25 \text{ or } x = -30 (\text{not possible as speed cannot be negative})$ $\therefore x = 25$ Hence, the original speed of the train is 25km/hr	½ ½ 1 1½ 1 ½
34 (A)	Let BA be the Chimney and CD be the tower.  40m In $\Delta CBD, tan30° = \frac{40}{BC} \Longrightarrow BC = 40\sqrt{3}\, m$ In $\Delta ABC, tan60° = \frac{AB}{40\sqrt{3}} \Longrightarrow AB = 120\, m$ AE = (120 – 40) m = 80m, ED = BC = $40\sqrt{3}$m Now, $AD = \sqrt{AE^2 + ED^2} = \sqrt{6400 + 4800} = 40\sqrt{7}\, m$ Thus, length of wire tied from the top of the chimney to the top of tower is $40\sqrt{7}\, m$. **OR**	**1 (for correct figure)** 1½ 1½ 1

34 (B)	Let EC be the tower and AB be the building.	**1 (for correct figure)**



	In $\Delta EDA, tan 45° = \frac{h}{x} \Rightarrow h = x$	**1½**
	In $\Delta EBC, tan 60° = \frac{EC}{BC} \Rightarrow h + 50 = \sqrt{3}h \Rightarrow h = \frac{50}{\sqrt{3}-1} = 25(\sqrt{3}+1)m$	**1½**
	Thus, $h = 68.25\ m = x$ (Horizontal distance between the tower and building)	**½**
	Now, height of the tower =68.25 + 50 = 118.25 m	**½**
35.	Volume of toy = Vol$_{\text{Hemi-sphere}}$ +Vol$_{\text{Cone}}$	**1 (for correct figure)**



	$= \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi r^2(2r + h) = 25.12\ cm^3$	**2**
	Volume of circumscribing cylinder = $\pi r^2 H$ =50.24 cm^3	**1**
	Now, difference in the volumes of circumscribing cylinder and the toy	
	= Vol. of cylinder – Vol. of toy	
	= (50.24 – 25.12) cm^3	
	= 25.12 cm^3	
	Hence, difference in the volumes of circumscribing cylinder and the toy is 25.12cm^3.	**1**

Section –E [This section comprises solution of 3 case- study based questions of 4 marks each with three sub parts of 1, 1 and 2 marks each respectively]		
36.	(i) Distance between B and C = $4\sqrt{2}\,units$	**1**
	(ii) Mid-point of the line joining the points B and C = (4, 4)	**1**
	(iii) **(A)** As, OA = $\sqrt{41}\,units$, OB = $\sqrt{40}\,units$, OC = $\sqrt{40}\,units$	**1½**
	So, society A is the farthest from the office.	**½**
	OR	
	(iii) **(B)** As, AB = $\sqrt{13}\,units$, AC = $\sqrt{5}\,units$	**1½**
	So, Society C is nearer to society A.	**½**
37.	(i) Area of sector = $\frac{(\text{Arc length} \times \text{radius})}{2}$	**1**
	(ii) Area of sector = $\frac{80}{360}\pi \times 441 = 98\pi\ m^2$	**1**
	(iii) **(A)** $\frac{80}{360}\pi \times 441 = \frac{\theta}{360}\pi \times 28^2$	**1**
	$\theta = 45°$	**1**
	OR	
	(iii) **(B)** Increase in the area of the lawn watered $= \frac{80}{360}\pi \times (784 - 441)$	**1**
	$= 239.56\ \text{m}^2$	**1**
38.	(i) x = 100 – (30 – 32 – 24 – 4) = 10	**1**
	(ii) P(selected person to have Rhesus negative blood type) = $\frac{10+8+6+1}{100}$	
	$=\frac{25}{100}$ or $\frac{1}{4}$	**1**
	(iii) **(A)** P(person is Rhesus positive but neither A nor B type blood)=$\frac{30+3}{100}$	**1+1**
	$=\frac{33}{100}$	
	OR	
	(iii) **(B)** P(person is neither universal recipient nor universal donor)	
	$= 1 - \frac{(3+10)}{100}$	**1½**
	$= 1 - \frac{13}{100}$	**½**
	$= \frac{87}{100}$	