X – STD – APRIL -2023 ANSWER KEY
MATHEMATICS

Section - I $14 \times 1 = 14$

1	c) 12	8	(b) point of contact
2	d) 2^{pq}	9	(c) ∞
3	d) 11	10	$(a)\frac{3}{2}$
4	b) an Arithmetic Progression	11	(a) 12 cm
5	a) $\frac{9y}{7}$	12	(d) 3:1:2
6	(c) parabola	13	(a) 37
7	(c) ∠B = ∠D	14	$(c)\ \frac{23}{26}$

Section - I $10 \times 2 = 20$

15	A= {3, 4} $B = \{-2,0,3\}$	1 1	2 mark
16	$fof(k) = f[f(k)] \Rightarrow 4k - 3$ $fof(k) = 5 \qquad k = 2$	1 1	2 mark
17	G.P is $x+6, x+12, x+15$ $r = \frac{t_2}{t_1} = \frac{t_3}{t_2} \Rightarrow \frac{x+12}{x+6} = \frac{x+15}{x+12}$ $(x+12)^2 = x+6\,(x+15) \ \Rightarrow x = -\frac{54}{3} \qquad x = -18$	1 1	2 mark
18	$\frac{x+2}{4y} \times \frac{12y^2}{x^2-x-6}$ $\frac{x+2}{4y} \times \frac{12y^2}{(x-3)(x+2)} \Rightarrow \frac{3y}{x-3}$	1 1	2 mark
19	$2x^2 - x - 1 = 0 \quad a = 2, \quad b = -1, \quad c = -1$ $\Delta = b^2 - 4ac \ \Rightarrow (-1) - 4(2)(-1)$ $= 9$ $\Delta > 0$ *real and unequal roots*	1 1	2 mark
20	$AB = 10\ cm, \quad AC = 14cm, \ BC = 6cm \quad BD = ? \ DC = ?$ BY using ABT $\frac{AB}{AC} = \frac{BD}{DC} \ \Rightarrow \frac{10}{4} = \frac{X}{6-X}$ $x = 2.5\ cm \ \ BD = 2.5\ cm \ \ DC = \ 3.5cm$	1 1	2 mark
21	$A(x_1, y_1)\ B = (5,11)$ $\frac{y-y_1}{y_2-y_1} = \frac{x-x_1}{x_2-x_1}$ $\frac{y-(-4)}{11-(-4)} = \frac{x-(-6)}{5-(-6)}$ $15x - 11y + 46 = 0$	1 1	2 mark

22	$12y = -(p+3)x + 12 \quad \& \quad 12x - 7y = 16$ $m_1 = -\frac{x}{y} = -\frac{(p+3)}{12} \Rightarrow m_2 = -\frac{x}{y} = \frac{12}{7}$ $m_1 \times m_2 = -1 \Rightarrow p = 4$	1 1	2 mark
23	$\frac{\sec\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} = \cot\theta$ $\frac{1/\cos\theta}{\sin\theta} - \frac{\sin\theta}{\cos\theta} \Rightarrow \frac{1-\sin^2\theta}{\sin\theta\cos\theta}$ $\frac{1-\cos^2\theta}{\sin\theta\cos\theta} = \cot\theta$	1 1	2 mark

24	$r = 7m, \quad h = 24m, \quad l = \sqrt{r^2+h^2} \Rightarrow l = 25m$ $CSA\ of\ the\ conical\ tent = \pi rl\ sq.unit$ $= \frac{22}{7} \times 7 \times 25 = 550m^2$ Length of the canvas $\frac{550}{4} = 137.5m.$	1 1	2 mark
25	Let r_1 *and* r_2 be the radii of the two given sphere $\frac{r_1}{r_2} = \frac{4}{7}$ Radio of their volume $= \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{r_1^3}{r_2^3}$ $\frac{v_1}{v_2} = \frac{4\times4\times4}{7\times7\times7} = \frac{64}{343}$ Ratio of their volume $64:343$	1 1	2 mark
26	Range = $L - S \Leftrightarrow 125 - 63 = 62$ Coefficient of range = $\frac{L-S}{L+S} = \frac{125-63}{125+63} = \frac{62}{188} \Leftrightarrow 0.33$	1 1	2 mark
27	$P(A) = 0.5 \quad P(A\cap B) = 0.3$ $P(AUB) \leq 1$ $P(A) + P(B) - P(A\cap B) \leq 1$ $P(B) \leq 1 - 0.2$ $P(B) = 0.8$	1 1	2 mark
28	$p^2 \times q^1 \times r^4 \times s^3$ 2 | 315000 2 | 157500 2 | 78750 3 | 39375 5 | 13125 3 | 2625 5 | 875 5 | 175 7 | 35 | 5 $p^2 \times q^1 \times r^4 \times s^3 = 3^2 \times 7^1 \times 5^4 \times 2^3$ $p = 3, \quad q = 7, \quad r = 5, \quad s = 2$	1 1	2 mark

Section - III

$10 \times 5 = 50$

29

$$f(x) = \frac{x}{2} - 1 \qquad A = \{2,4,6,10,12\}, \qquad B = \{0,1,2,4,5,9\}$$ 1

(i) Set ordered pairs 1

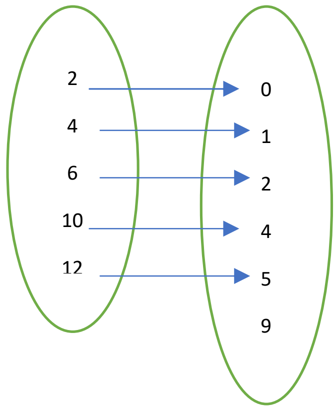
$$\{(2,0), (4,1), (6,2), (10,4), (12,5)\}$$

(ii) Table

x	2	4	6	10	12
$f(x)$	0	1	2	4	5

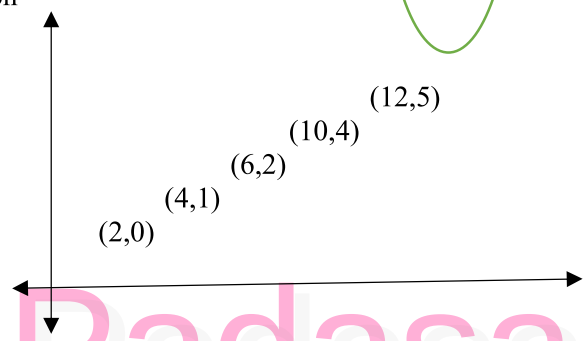
1

(iii) An arrow diagram



1

Graph



1

5 MARK

30 Senthil house number be x

$$1 + 2 + 3 + \cdots \ldots + (x-1) = (x+1) + (x+2) + \cdots \ldots + 49$$ 1

$$1 + 2 + 3 + \cdots \ldots + (x-1) = (1 + 2 + 3 + \cdots \ldots + 49) - (1 + 2 + \cdots + x)$$ 1

$$\frac{x-1}{2}[1 + x - 1] = \frac{49}{2}[1 + 49] - \frac{x}{2}[1 + x]$$ 1

$$\frac{x(x-1)}{2} = \frac{49 \times 50}{2} - \frac{x(x+1)}{2}$$ 1

$x^2 - x = 2450 \qquad = x = 35$ 1

5mark

31

$$= 5 + 55 + 555 + \cdots \ldots . + n\ terms$$

$$= \frac{5}{9}(9 + 99 + 999 + \cdots \ldots + n\ terms)$$ 1

$$= \frac{5}{9}[(10-1) + (100-1) + (1000-1) + \cdots . + n\ terms]$$ 1

$$= \frac{5}{9}[(10 + 100 + 1000 + \cdots . + n\ terms) - (1 + 1 + 1 + \cdots .. + n\ terms)]$$

$$= \frac{5}{9}\left[\frac{10(10^n - 1)}{9} - n\right]$$ 1 1

$$= \frac{50\,(10^n - 1)}{81} - \frac{5n}{9}$$ 1

5mark

32

I II III IV

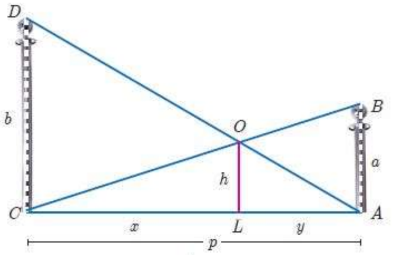
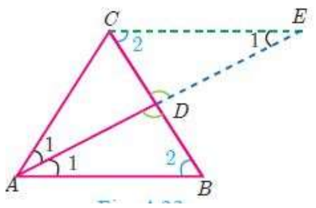
$$x + 20 = \frac{3y}{2} + 10 = 2z + 5 = 110 - (y + z)$$

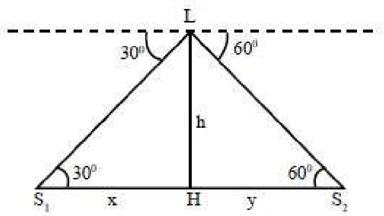
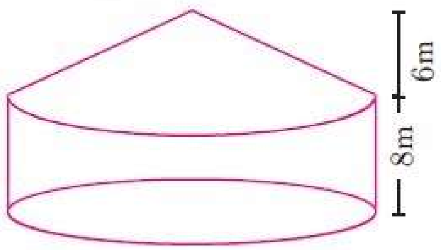
I&II $\quad 2x - 3y = -20$ ----------- (1) 1

I & III $\quad x - 2z = -15$ ---------- (2)

I & IV $\quad x + y + z = 90$ --------- (3)

	$2\times 3 \Rightarrow 2x-2y+2z=180$ $2 \quad x-2z=-15$ $3x+2y=165 ------(4)$ $1\times 3 \Rightarrow 6x-9y=-60$ $4\times 2 \Rightarrow 6x+4y=330$ $-13y=-330$ $x=35, \quad y=30, \quad z=25$	1 1 1 1	5mark
33	$A=\begin{pmatrix}5 & 2 & 9\\ 1 & 2 & 8\end{pmatrix} \quad B=\begin{pmatrix}1 & 7\\ 1 & 2\\ 5 & -1\end{pmatrix}$ L.H.S $AB=\begin{pmatrix}52 & 30\\ 43 & 3\end{pmatrix}$ $AB^T=\begin{pmatrix}52 & 43\\ 30 & 3\end{pmatrix} ----------(1)$ R.H.S $B^T=\begin{pmatrix}1 & 1 & 5\\ 7 & 2 & -1\end{pmatrix}$ $A^T=\begin{pmatrix}5 & 1\\ 2 & 2\\ 9 & 8\end{pmatrix}$ $B^TA^T=\begin{pmatrix}52 & 43\\ 30 & 3\end{pmatrix} ----(2)$ L.H.S = R.H.S $\quad AB^T=B^TA^T$ hence proved	1 1 1 1 1	5 mark

34	CL= x, LA = y $x + y = P$ $\Delta ABC, \Delta LOC$ $\frac{CA}{CL} = \frac{AB}{LO} \Rightarrow \frac{p}{x} = \frac{a}{h}$ $x = \frac{ph}{a} - - - (1)$  $\Delta ALO, \Delta ACD$ $\frac{AL}{AC} = \frac{OL}{DC} \Rightarrow \frac{y}{b} = \frac{h}{b}$ $y = \frac{ph}{b} - - - - - - - - - (2)$ Add 1 and 2 $x + y = \frac{ph}{a} + \frac{ph}{b} \Rightarrow p = ph\left(\frac{1}{a} + \frac{1}{b}\right)$ $1 = h\left(\frac{a+b}{ab}\right)$ $h = \frac{ab}{a+b}$	1 1 1 1 1	5mark
35	Statement Diagram Given, To prove and construction Proof Note: without diagram give 1 marks only for statement **Statement** The internal bisector of an angle of a triangle divides the opposite side internally in the ratio of the corresponding sides containing the angle.  Given : In ΔABC, AD internal bisector. To prove : $\frac{AB}{AC} = \frac{BD}{CD}$ Construction : Draw a line through C parallel to AB. Extend AD to meet line through C at E ΔACE is isosceles triangle $AC = CE$ $\Delta ABD \sim \Delta ECD$ $\frac{AB}{CE} = \frac{BD}{CD}$ $\frac{AB}{AC} = \frac{BD}{CD}$	1 1 1 2	5 mark

	Hence proved		
36	$A(8,6), B(5,11), C(-5,12), D(-4,3)$ $= \frac{1}{2}\begin{bmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{bmatrix} sq.units$ $= \frac{1}{2}\begin{bmatrix} 8 & 5 & -5 & -4 & 8 \\ 6 & 11 & 12 & 3 & 6 \end{bmatrix}$ $= \frac{1}{2}\{(88+60-15-24)-(30-55-48+24)\}$ $= \frac{1}{2}(109+49)$ $= 79\ sq.units.$	1 1 1 1 1	5mark
37			
38	In $\Delta\ ABC,\ CB = x,\ BD = y$  $\Delta\ ABC, \tan 30° = \frac{AB}{BC}$ $\frac{1}{\sqrt{3}} = \frac{h}{x}$ $x = \sqrt{3}\,h ------(1)$ $\Delta\ ABD, \tan 60° = \frac{AB}{BD}$ $\sqrt{3} = \frac{h}{y}$ $y = \frac{h}{\sqrt{3}} ----(2)$ From 1 and 2 $x + y = \sqrt{3}\,h + \frac{h}{\sqrt{3}}$ $x + y = \frac{4h}{\sqrt{3}}\ m$	1 1 1 1 1	5mark
39	$r:h = 5:7 \Rightarrow r = 5x, \quad h = 7x$ Volume of the cylinder = $2\pi rh\ sq.units$ $5500 = 2 \times \frac{22}{7} \times 5x \times 7x$ $x = 5$ Radius = $r = 5x = 5(5) = 25$ Height = h = $7x = 7 \times 5 = 35$	1 1 1 1 1	5 mark
40	Area for one person = 4 sq.m Total of person = 150  Total base area = 150×4 $= \pi r^2 = 600 ----(1)$ One person = 40 m^3	1 1 1	5 mark

	Volume of air required for 150 persons = $150 \times 40 = 6000\ m^3$ $\pi r^2 h_1 + \frac{1}{3}\pi r^2 h_2 = 6000$ $\pi r^2 \left(h_1 + \frac{1}{3}h_2\right) = 6000$ $600\left(8 + \frac{1}{3}h_2\right) = 6000$ $\frac{1}{3}h_2 = 10 - 8 = 2$ $h_2 = 6\ m$ Therefore, the height of the conical tent $h_2\ is\ 6\ m.$	1 1	
41	Sample space = S= $\left\{\begin{matrix}(1,1),(1,2),(1,3),(1,4),(1,5),(1,6),\\(2,1),(2,2),(2,3),(2,4),(2,5),(2,6),\\(3,1),(3,2),(3,3),(3,4),(3,5),(3,6),\\(4,1),(4,2),(4,3),(4,4),(4,5),(4,6),\\(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),\\(6,1),(6,2),(6,3),(6,4),(6,5),(6,6)\end{matrix}\right\}$ $n(s) = 36$ 1. A= {(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)} $n(A) = 6$ $P(A) = \frac{n(A)}{n(s)} = \frac{6}{36}$ 2. B= {(1,2), (2,1), (1,3), (3,1), (1,5), (5,1)} $n(B) = 6$ $P(B) = \frac{n(B)}{n(s)} = \frac{6}{36}$ 3. C= $\left\{\begin{matrix}(1,1),(1,2),(1,4),(1,6),\\(2,1),(2,3),(2,5),\\(3,2),(3,4),\\(4,1),(4,3),\\(5,2),(5,6),\\(6,1),(6,5)\end{matrix}\right\}$ $n(C) = 15$ $P(C) = \frac{n(C)}{n(s)} = \frac{15}{36}$ 4. $n(D) = 0$ $P(D) = \frac{n(D)}{n(s)} = \frac{10}{36} = 0$	1 1 1 1 1	5 mark
42	$A = \{0,1,2\},\quad B = \{2,3,4,5\},\quad C = \{3,5,7\}$ $B \cup C = \{2,3,4,5,7\}$ $A \times (B \cup C) = \left\{\begin{matrix}(0,2),(0,3),(0,4),(0,5),(0,7)\\(1,2),(1,3),(1,4),(1,5),(1,7)\\(2,2),(2,3),(2,4),(2,5),(2,7)\end{matrix}\right\} --- (1)$ $A \times B$ $= \{(0,2),(0,3),(0,4),(0,5),(1,2),(1,3),(1,4),(1,5),(2,2),(2,3),(2,4),(2,5)\}$ $A \times C = \{(0,3),(0,5),(0,7),\}(1,3),(1,5),(1,7),(2,3),(2,5),(2,7)\}$	1 1 1 1	5 mark

	$(A\times B)\cup(A\times C)=\begin{Bmatrix}(0,2),(0,3),(0,4),(0,5),(0,7)\\(1,2),(1,3),(1,4),(1,5),(1,7)\\(2,2),(2,3),(2,4),(2,5),(2,7)\end{Bmatrix}---(2)$ From 1 and 2 is verified. $A\times(B\cup C)=(A\times B)\cup(A\times C)$	1	
	Section - IV $2\times 8=16$		
43 a)	Rough diagram First circle Second circle Two tangents Length of the tangents = 10.1 cm (or) 10.2 (or) 10.3 cm	2 2 2 1 1	8 mark
b	Rough diagram Line segment Circle Perpendicular bisector Draw ΔABC	2 2 2 1 1	8 mark
44 a	X – axis , Y – axis Scale Variation : direct variation Equation: $y=kx$ $y=(3.1)x$ $x=6\ and\ y=18.6$	2 1 1 2 2	8 mark
b	X – axis , Y – axis Scale $y=x^2-5x-6$ (table 1 below) $y=x^2-5x-6$ $0=x^2-5x-14$ $y=8$ (table 2 below) Straight line Solution : $x=\{-2,7\}$	2 1 2 1 1 1	8 mark

$y=x^2-5x-6$

x	-2	-1	0	1	2	3	4	5	6	7
y	8	0	-6	-10	-12	-12	-10	-6	0	8

$y=8$

x	-2	-1	0	1	2
y	8	8	8	8	8

Prepared by

Mr. K. MURUGANANDHAM. M.Sc., M.Ed., M.Phil

+91- 98431 – 51302

MURUGANANDHAM MATHS - YouTube