SSLC PUBLIC EXAMINATION - 2025
MATHEMATICS
DETAILED ANSWERS

PART - I

1. (c) $\{4, 9, 25, 49, 121\}$
2. (a) m^n
3. (c) $0 \le r < b$
4. (a) 0
5. (b) 5
6. (d) row matrix
7. (b) point of contact
8. (d) $7x - 3y = 0$
9. (b) 1
10. (d) 60°
11. (d) $136\pi\ cm^2$
12. (a) $\frac{4}{3}\pi$
13. (a) $P(A) > 1$
14. (d) $\frac{4}{5}$

PART - II

15. $A = \{1, 2, 3\}$

$B = \{2, 3, 5, 7\}$

$A \times B = \{(1,2)(1,3)(1,5)(1,7)$
$(2,2)(2,3)(2,5)(2,7)$
$(3,2)(3,3)(3,5)(3,7)\}$

16. $f(x) = 2x + 1$

$g(x) = x^2 - 2$

$f o g = 2x^2 - 3$

$g o f = 4x^2 + 4x - 1$

17. $a = bq + r$

$532 = 21(25) + 7$

Completed rows = 25

Remaining flower pots = 7

18. $\frac{x^3}{x-y} + \frac{y^3}{y-x} = \frac{x^3 - y^3}{x - y}$

$= \frac{(x-y)(x^2+xy+y^2)}{(x-y)}$

$= x^2 + xy + y^2$

19. $AB = \begin{bmatrix} 4+1 & 0+3 \\ 2+3 & 0+9 \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ 5 & 9 \end{bmatrix}$

$BA = \begin{bmatrix} 4+0 & 2+0 \\ 2+3 & 1+9 \end{bmatrix} = \begin{bmatrix} 4 & 2 \\ 5 & 9 \end{bmatrix}$

$AB \neq BA$

20. $\frac{BD}{DC} = \frac{AB}{AC}$

$\frac{4}{3} = \frac{6}{AC}$

$AC = 6 \times \frac{3}{4}$

$AC = \frac{9}{2}$

$AC = 4.5\ cm$

21. Slope $= \frac{-1}{2}$

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{3-a}{9+2} = \frac{3-a}{11}$

$\frac{3-a}{11} = \frac{-1}{2}$

$\boxed{a = \frac{17}{2}}$

22. $m_1 = \frac{-1}{-2} = \frac{1}{2}$

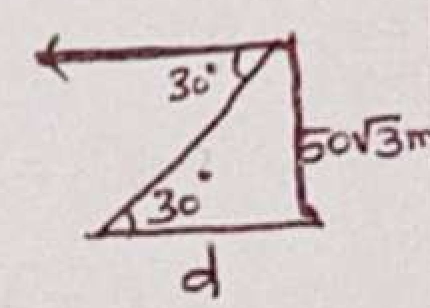
$m_2 = \frac{-6}{3} = -2$

$m_1 \times m_2 = \frac{1}{2} \times (-2)$

$m_1 \times m_2 = -1$

$\therefore$ Two straight lines are perpendicular.

23. $\tan 30^\circ = \frac{50\sqrt{3}}{d}$



$\frac{1}{\sqrt{3}} = \frac{50\sqrt{3}}{d}$

$d = 50\sqrt{3} \times \sqrt{3}$

$\boxed{d = 150m}$

24. $r_1 : r_2 = 4 : 7$

$V_1 : V_2 = \frac{4}{3}\pi r_1^3 : \frac{4}{3}\pi r_2^3$

$= r_1^3 : r_2^3$

$= 4^3 : 7^3$

$= 64 : 343.$

25. $l = 5cm$, $R = 4cm$, $r = 1cm$

Curved Surface Area $= \pi(R + r)l$

$= \frac{22}{7} \times (4+1) \times 5$

$= \frac{22}{7} \times 25$

$C.S.A = \frac{550}{7} = 78.57\ cm^2$

26. $L = 28$, $S = 18$

Range $= L - S = 28 - 18$

Range = 10 years.

27. $n(S) = 80 + 70 + 50 = 200$

$P(Y) = \frac{n(Y)}{n(S)}$

$= \frac{80}{200}$

$\boxed{P(Y) = \frac{2}{5}}$

28. $d = t_2 - t_1 = t_3 - t_2 = t_4 - t_3 \ldots$

$t_2 - t_1 = \sqrt{8} - \sqrt{2} = 2\sqrt{2} - \sqrt{2} = \sqrt{2}$

$t_3 - t_2 = \sqrt{18} - \sqrt{8} = 3\sqrt{2} - 2\sqrt{2} = \sqrt{2}$

$t_4 - t_3 = \sqrt{32} - \sqrt{18} = 4\sqrt{2} - 3\sqrt{2} = \sqrt{2}$

$\therefore$ Given sequence is an A.P.

Common difference $= \sqrt{2}$

NCERT — 10^{th} Exercise 5.1(4)(xii)

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PART – III

29) $A = \{1,2,3,4,5,6,7\}$

$B = \{2,3,5,7\}$

$C = \{2\}$

$A \cap B = \{2,3,5,7\}$

$(A \cap B) \times C = \{(2,2)(3,2)(5,2),(7,2)\}$

$A \times C = \{(1,2)(2,2)(3,2)(4,2)(5,2)(6,2)(7,2)\}$

$B \times C = \{(2,2)(3,2)(5,2)(7,2)\}$

$(A \times C) \cap (B \times C) = \{(2,2)(3,2)(5,2)(7,2)\}$

$\therefore (A \cap B) \times C = (A \times C) \cap (B \times C)$

30) $f(x) = \frac{x}{2} - 1$

$f(2) = 0, f(4) = 1, f(6) = 2, f(10) = 4$

$f(12) = 5$

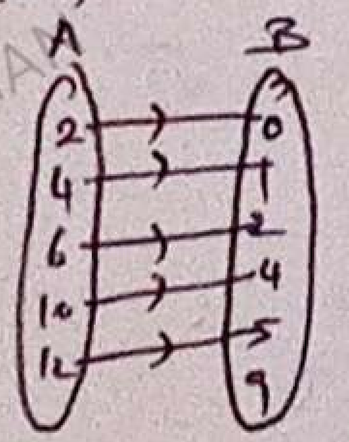
(i) Set of ordered pairs

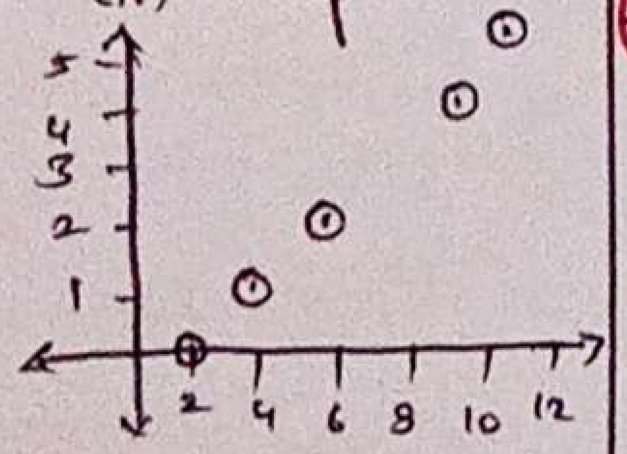
$f(x) = \{(2,0),(4,1),(6,2)(10,4)(12,5)\}$

(ii) Table

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

(iii) Arrow diagram (iv) Graph





31)

$$\begin{array}{r|l} 2 & 113400 \\ 2 & 56700 \\ 2 & 28350 \\ 3 & 14175 \\ 3 & 4725 \\ 3 & 1575 \\ 3 & 525 \\ 5 & 175 \\ 5 & 35 \\ & 7 \end{array}$$

$P_1 = 2, P_2 = 3, P_3 = 5, P_4 = 7$

$x_1 = 3, x_2 = 4, x_3 = 2, x_4 = 1$

32) $(1^2 + 2^2 + \cdots + 21^2) - (1^2 + 2^2 + \cdots + 5^2)$

$= \frac{n(n+1)(2n+1)}{6}\Big|_{n=21} - \frac{n(n+1)(2n+1)}{6}\Big|_{n=5}$

$= \frac{21 \times 22 \times 43}{6} - \frac{5 \times 6 \times 11}{6}$

$= 77 \times 43 - 55$

$= 3311 - 55$

$= 3256$

33) $AB = \begin{bmatrix} 2-2+0 & -1+8+2 \\ 4+1+0 & -2-4+2 \end{bmatrix} = \begin{bmatrix} 0 & 9 \\ 5 & -4 \end{bmatrix}$

$AB^T = \begin{bmatrix} 0 & 5 \\ 9 & -4 \end{bmatrix}$

$A^T = \begin{bmatrix} 1 & 2 \\ 1 & -1 \\ & 1 \end{bmatrix}, \quad B^T = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 4 & 2 \end{bmatrix}$

$B^T A^T = \begin{bmatrix} 2-2+0 & 4+1+0 \\ -1+8+2 & -2-4+2 \end{bmatrix} = \begin{bmatrix} 0 & 5 \\ 9 & -4 \end{bmatrix}$

$\therefore (AB)^T = B^T A^T$

34) Angle bisector theorem.

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 is the bisector of $\angle BAC$ which meets BC at D.

To prove: $\frac{BD}{DC} = \frac{AB}{AC}$

Construction:

Draw a line through C parallel to AB. Extend AD to meet line through C at E.

$\angle AEC = \angle BAE = \angle 1$ transversal

ΔACE isosceles In ΔACE $\angle A = \angle E$

$AC = CE$

$\Delta ABD \sim \Delta ECD$ By AA similarity

$\frac{AB}{CE} = \frac{BD}{CD}$

$\therefore \frac{AB}{AC} = \frac{BD}{CD}$ from $AC = CE$

Hence proved

35) $\frac{1}{2}\begin{Bmatrix} x_1 & x_2 & x_3 & x_4 & x_1 \\ y_1 & y_2 & y_3 & y_4 & y_1 \end{Bmatrix} = 28$

$\frac{1}{2}\begin{Bmatrix} -4 & -3 & 3 & 2 & -4 \\ -2 & k & -2 & 3 & -2 \end{Bmatrix} = 28$

$(-4k + 6 + 9 - 4) - (6 + 3k - 4 - 12) = 56$

$-7k = 35$

$\boxed{k = -5}$

36) $a + b = 7, \quad b = 7 - a$

$\frac{x}{a} + \frac{y}{7-a} = 1$

It passes through $(-3, 8)$

$\frac{-3}{a} + \frac{8}{7-a} = 1$

$-21 + 11a - 7a + a^2 = 0$

$a^2 + 4a - 21 = 0$

$(a+7)(a-3) = 0$

$\boxed{a = 3}, \quad a = -7$

$a = 3 \Rightarrow b = 4$

$\frac{x}{3} + \frac{y}{4} = 1$

$\Rightarrow 4x + 3y - 12 = 0$

37. $\frac{(\sin A + \cos A)(\sin^2 A - \sin A \cos A + \cos^2 A)}{(\sin A + \cos A)} + \frac{(\sin A - \cos A)(\sin^2 A + \sin A \cos A + \cos^2 A)}{(\sin A - \cos A)}$

$= \sin^2 A - \sin A \cos A + \cos^2 A + \sin^2 A + \sin A \cos A + \cos^2 A$

$= 1 + 1 = 2$

38) Radius of cone = Radius of cylinder

$r = \frac{3}{2}$ cm

Height of cone (H) = 2 cm

Height of cylinder (h) = $12 - (2+2) = 8$ cm

Volume = Volume of cylinder + 2. Volume of cone

$= \pi r^2 h + 2 \times \frac{1}{3}\pi r^2 H$

$= \pi r^2 \left[h + \frac{2}{3}H\right]$

$= \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2}\left[8 + \frac{4}{3}\right]$

Volume $= 66 \text{ cm}^3$

39) $R = 16$ cm, $r = 2$ cm

$n \times$ (Volume of small sphere) = Volume of Big metallic sphere

$n \times \frac{4}{3}\pi r^3 = \frac{4}{3}\pi R^3$

$n \times 2^3 = 16^3$

$8n = 4096$

$\boxed{n = 512}$

40) Sathya's score = 460

Vidhya's score = 480

Sathya	Vidhya
$\bar{x}_1 = \frac{460}{5} = 92\%$	$\bar{x}_2 = \frac{480}{5} = 96\%$
$\sigma_1 = 4.6$	$\sigma_2 = 2.4$
$C.V_1 = \frac{\sigma_1}{\bar{x}_1} \times 100\%$	$C.V_2 = \frac{\sigma_2}{\bar{x}_2} \times 100\%$
$= \frac{4.6}{92} \times 100\%$	$= \frac{2.4}{96} \times 100\% = 2.5\%$
$C.V_1 = 5\%$	$CV_1 > CV_2$

$\therefore$ Vidhya is more consistent

41) $n(S) = 5 + 6 + 7 + 8$

$n(S) = 26$

(i) $P(W) = \frac{n(A)}{n(S)} = \frac{6}{26} = \frac{3}{13}$

(ii) $P(B) = \frac{n(B)}{n(S)} = \frac{8}{26}$

$P(R) = \frac{n(R)}{n(S)} = \frac{5}{26}$

$P(B \cup R) = \frac{8}{26} + \frac{5}{26} = \frac{13}{26} = \frac{1}{2}$

(iii) $P(\overline{W}) = 1 - P(W) = 1 - \frac{6}{26} = \frac{20}{26} = \frac{10}{13}$

(iv) $P(\overline{W \cup B}) = 1 - P(W \cup B)$

$= 1 - \frac{6+8}{26}$

$= 1 - \frac{14}{26}$

$= 1 - \frac{12}{13}$

$= \frac{13-12}{13}$

$= \frac{1}{13}$

42) $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$

$x^2 - 2x + 1 + x^2 - 4x + 4 + x^2 - 6x + 9 = 0$

$3x^2 - 12x + 14 = 0$

$a = 3, \; b = -12, \; c = 14$

$\Delta = b^2 - 4ac$

$= (-12)^2 - 4(3)(14)$

$= 144 - 168$

$\Delta = -24$

$\Delta < 0$

Equation has no real roots.