

GOVT. PUBLIC EXAMINATION

SSLC - APRIL 2024

ANSWER KEY

PART - I

- ① c) 3 ② a) 7 ③ d) 2520.
④ c) 31m ⑤ b) $16x^2$ ⑥ a) 637680
(straight line) ⑦ a) 1.4cm
⑧ b) two (85000) ⑨ b) 25 sq. units.
⑩ a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ ⑪ a) 40π sq. units.
⑫ d) 3:1:2 ⑬ c) 1.05 ⑭ b) 1

PART II

⑮ $A = \{3, 5\}$ $B = \{2, 4\}$

⑯ $f \circ g = g \circ f$
 $(3x-2) \circ (2x+k) = (2x+k) \circ (3x-2)$
 $3(2x+k) - 2 = 2(3x-2) + k$
 $6x + 3k - 2 = 6x - 4 + k$
 $2k = -2$
 $k = -1$

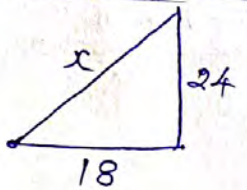
⑰ $a^b \times b^a = 800$
 $5^2 \times 2^5 = 800$
 $a=5, b=2$ (or) $a=2, b=5$

⑱ $\frac{4x^2y}{2x} \times \frac{3y^2z^3}{2y^2z^3}$
 $= \frac{3xz^3}{y^3}$

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⑲ $a=1, b=8, c=-65$
 $SOR = \frac{-b}{a} = \frac{-8}{1} = -8$
 $FOR = \frac{c}{a} = \frac{-65}{1} = -65$

⑳ $x^2 = 18^2 + 24^2$
 $= 324 + 576$
 $x^2 = 900$
 $x = 30$



㉑ slope of AB = slope of AC
(AB's gradient) (AC's gradient)

$$\frac{b-9}{a+3} = \frac{-5-9}{4+3}$$
$$\frac{b-9}{a+3} = \frac{-14}{7}$$
$$b-9 = -2(a+3)$$
$$b-9 = -2a-6$$
$$2a+b = 3 \rightarrow \text{①}$$
$$a+b = 1 \rightarrow \text{②}$$

① - ② $\Rightarrow a = 2$
sub in ② $b = -1$

㉒ $y - y_1 = m(x - x_1)$
 $y - 2 = \frac{-5}{4}(x + 1)$
 $4(y - 2) = -5(x + 1)$
 $4y - 8 = -5x - 5$
 $5x + 4y - 3 = 0$

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23) $\frac{1+\cos\theta}{1-\cos\theta} = \frac{(1+\cos\theta)(1+\cos\theta)}{(1-\cos\theta)(1+\cos\theta)}$
 $= \frac{(1+\cos\theta)^2}{1-\cos^2\theta} = \frac{(1+\cos\theta)^2}{\sin^2\theta}$
 LHS $= \sqrt{\frac{1+\cos\theta}{1-\cos\theta}} = \frac{1+\cos\theta}{\sin\theta} = \frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta}$
 $= \operatorname{cosec}\theta + \cot\theta = \text{RHS}$

24) $\pi r^2 = 1386 \text{ sq.m.}$
 $\text{PSA} = 3\pi r^2 = 3 \times 1386 = 4158 \text{ sq.m.}$

25) $V = \pi r^2 h = 250 \times 2 = 500 \text{ sq.m.}$

26) $\text{Range}(25\text{ to }74) = L - S$
 $= 67 - 18 = 49$
 $\left. \begin{array}{l} \text{Co. of Range} \\ \text{(25 to 74)} \end{array} \right\} = \frac{L - S}{L + S} = \frac{67 - 18}{67 + 18} = \frac{49}{85}$
 $= 0.576$

27) 366 Days = 52 weeks + 2 days.
 $S = \{SM, MT, TW, WT, TH, FS, SS\}$
 $n(S) = 7$
 $A = 53 \text{ Saturdays.}$
 $A = \{FS, SS\}, n(A) = 2,$
 $P(A) = \frac{n(A)}{n(S)} = \frac{2}{7}$

28) $23 = (1 \times 12) + 11$
 $12 = (1 \times 11) + 1$
 $11 = (11 \times 1) + 0$
 $\therefore \text{HCF} = 1$

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PART III

29) $A = \{2, 3\}, B = \{0, 1\}, C = \{1, 2\}$
 LHS
 $B \cup C = \{0, 1, 2\}$
 $A \times (B \cup C) = \{2, 3\} \times \{0, 1, 2\}$
 $= \{(2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2)\} \rightarrow \textcircled{1}$

RHS
 $A \times B = \{(2, 0), (2, 1), (3, 0), (3, 1)\}$
 $A \times C = \{(2, 1), (2, 2), (3, 1), (3, 2)\}$
 $(A \times B) \cup (A \times C) = \{(2, 0), (2, 1), (2, 2), (3, 0), (3, 1), (3, 2)\} \rightarrow \textcircled{2}$
 From ① & ② LHS = RHS.

30) $f: A \rightarrow B, f(x) = 2x + 1$
 $f(0) = 0 + 1 = 1$
 $f(1) = 2 + 1 = 3$
 $f(2) = 4 + 1 = 5$
 $f(3) = 6 + 1 = 7$

Arrow Diagram (அம்புகளால் மூலம்)

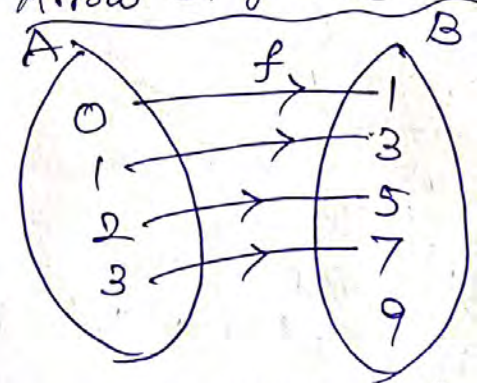


Table (அட்டவணை)

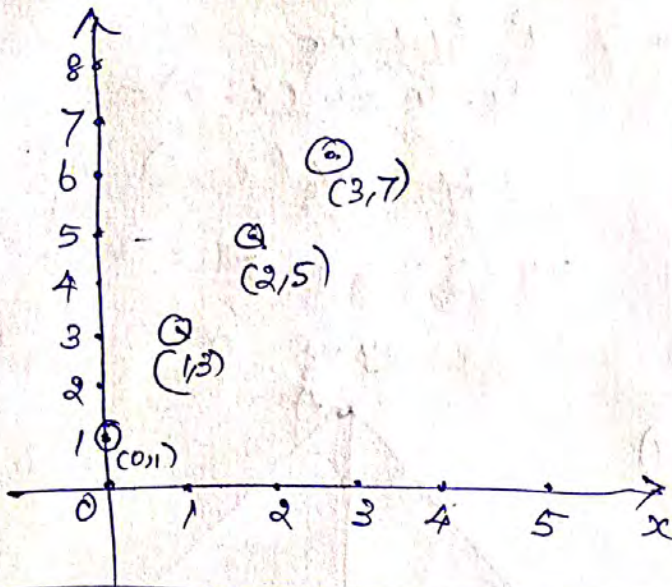
x	0	1	2	3
y	1	3	5	7

as a set of ordered pairs (அணுகல்)

$f = \{(0, 1), (1, 3), (2, 5), (3, 7)\}$

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Graph (2007HL6)



$$\begin{aligned}
 (31) \quad & 9^3 + 10^3 + \dots + 21^3 \\
 &= (1^3 + 2^3 + \dots + 8^3 + 9^3 + \dots + 21^3) \\
 &\quad - (1^3 + 2^3 + \dots + 8^3) \\
 &= \left(\frac{21 \times 22}{2}\right)^2 - \left(\frac{8 \times 9}{2}\right)^2 \\
 &= (21 \times 11)^2 - (4 \times 9)^2 \\
 &= (231)^2 - (36)^2 = 53361 - 1296 \\
 &= 52065
 \end{aligned}$$

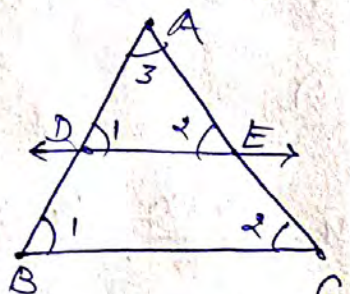
$$\begin{array}{r|l}
 8 & 8 \quad -1 \quad 1 \\
 8 & 64 \quad -16 \quad +17 \quad -2 \quad +1 \\
 & 64 \\
 & (-) \\
 \hline
 16 & -1 \quad \quad \quad -16 \quad +17 \\
 & \quad \quad \quad -16 \quad +1 \\
 & \quad \quad \quad + \quad \quad - \\
 \hline
 16 & -2 \quad 1 \quad \quad \quad 16 \quad -2 \quad +1 \\
 & \quad \quad \quad \quad \quad \quad 16 \quad -2 \quad +1 \\
 & \quad \quad \quad \quad \quad \quad + \quad \quad - \\
 \hline
 & \quad \quad \quad \quad \quad \quad \quad \quad \quad 0
 \end{array}$$

$$\sqrt{64x^4 - 16x^3 + 17x^2 - 2x + 1} = |8x^2 - x + 1|$$

$$\begin{aligned}
 (33) \quad A^2 &= \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} \\
 &= \begin{pmatrix} 8 & 5 \\ -5 & 3 \end{pmatrix} \\
 -5A &= -5 \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} -15 & -5 \\ 5 & -10 \end{pmatrix} \\
 7I_2 &= 7 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 7 & 0 \\ 0 & 7 \end{pmatrix} \\
 A^2 - 5A + 7I_2 &= \begin{pmatrix} 8 & 5 \\ -5 & 3 \end{pmatrix} + \begin{pmatrix} -15 & -5 \\ 5 & -10 \end{pmatrix} \\
 &\quad + \begin{pmatrix} 7 & 0 \\ 0 & 7 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix} \\
 &= 0
 \end{aligned}$$

(34) Statement:-
A straight line drawn parallel to a side of triangle intersecting the other two sides, divides the sides in the same ratio.

Proof:- Given!
In $\triangle ABC$, D, E are the points on AB and AC respectively.



To prove:-
$$\frac{AD}{DB} = \frac{AE}{EC}$$

Construction:- Draw a line $DE \parallel BC$.
 $\angle ABC = \angle ADE = \angle 1$ (corresponding angles)
 $\angle ACB = \angle AED = \angle 2$ (")
 $\angle BAC = \angle DAE = \angle 3$ (common)

$$\Delta ABC \sim \Delta ADE$$

$$\frac{AB}{AD} = \frac{AC}{AE}$$

$$\frac{AD+DB}{AD} = \frac{AE+EC}{AE}$$

$$1 + \frac{DB}{AD} = 1 + \frac{EC}{AE}$$

$$\frac{DB}{AD} = \frac{EC}{AE}$$

$$\frac{AD}{DB} = \frac{AE}{EC}$$

(35) $A(-9, -2), B(-8, -4), C(1, -3), D(2, 2)$

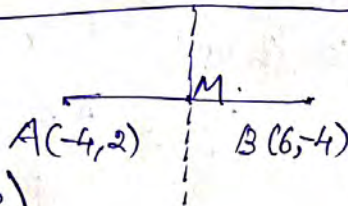
$$A = \frac{1}{2} [(x_1 - x_3)(y_2 - y_4) - (x_2 - x_4)(y_1 - y_3)]$$

$$= \frac{1}{2} [(-9-1)(-4-2) - (-8-2)(-2+3)]$$

$$= \frac{1}{2} [(-10)(-6) - (-10)(1)]$$

$$= \frac{1}{2} [60 + 10] = \frac{1}{2} \times 70 = 35 \text{ sq. Units.}$$

(36)



$$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$= \left(\frac{-4+6}{2}, \frac{2+4}{2} \right) \Rightarrow M = (1, 1)$$

$$\text{slope of } AB = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-2}{6-(-4)} = \frac{2}{10} = \frac{1}{5}$$

$$m_1 = -\frac{3}{5}$$

$$\text{slope of } \perp^r \text{ bisector } m = \frac{5}{3}$$

Eqn of \perp^r bisector

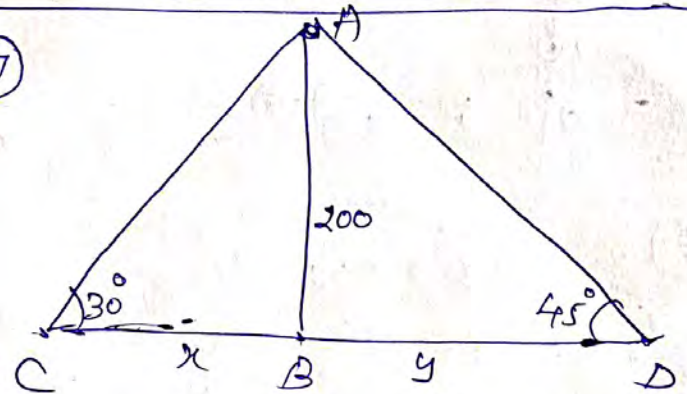
$$y - y_1 = m(x - x_1)$$

$$y + 1 = \frac{5}{3}(x - 1)$$

$$3y + 3 = 5x - 5$$

$$5x - 3y - 8 = 0$$

(37)



In ΔABC ,

$$\frac{200}{x} = \tan 30^\circ$$

$$\frac{200}{x} = \frac{1}{\sqrt{3}}$$

$$x = 200\sqrt{3} \text{ m}$$

In ΔABD ,

$$\frac{200}{y} = \tan 45^\circ$$

$$\frac{200}{y} = 1$$

$$y = 200 \text{ m}$$

$$\begin{aligned} \text{Reqd distance} &= x + y = 200\sqrt{3} + 200 \\ &= 200(1 + \sqrt{3}) = 200 \times 2.732 \\ &= 546.4 \text{ m} \end{aligned}$$

(38) $V = \frac{\pi h}{3} (R^2 + r^2 + Rr)$

$$= \frac{22 \times 15}{7 \times 3} \times (28^2 + 7^2 + 28 \times 7)$$

$$= \frac{22 \times 15}{7} \times 1029 = 22 \times 15 \times 147$$

$$= 48510 \text{ cm}^3$$

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$$V_1 = nV_2$$

$$\pi r_1^2 h_1 = n \left[\frac{1}{3} \pi r_2^2 h_2 + \frac{2}{3} \pi r_2^3 \right]$$

$$\pi \times 6 \times 6 \times 15 = \pi n \left[\frac{3 \times 3 \times 9}{3} + \frac{2 \times 3 \times 3 \times 3}{3} \right]$$

$$6 \times 6 \times 15 = n(27 + 18)$$

$$6 \times 6 \times 15 = 45n$$

$$\frac{2 \cancel{6} \times 6 \times 15}{45 \cancel{3}} = n$$

$$\boxed{n=12}$$

(40) $\bar{x} = \frac{24+26+33+37+29+31}{6}$
 $= \frac{180}{6} = 30$

x_i	$d_i = x_i - 30$	d_i^2
24	-6	36
26	-4	16
29	-1	1
31	1	1
33	3	9
37	7	49
	0	112

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$$\sigma = \sqrt{\frac{\sum d_i^2}{n}} = \sqrt{\frac{112}{6}} = \sqrt{18.67}$$

$$\sigma = 4.32$$

$$CV = \frac{\sigma}{\bar{x}} \times 100\%$$

$$= \frac{4.32}{30} \times 100\%$$

$$= 1.44 \times 10 = 14.4\%$$

(41) $S = \{(1,1) \dots (6,6)\}$

$$n(S) = 36$$

A = even number on the first die

$$A = \{(2,1), \dots (2,6), (4,1), \dots (4,6), (6,1), \dots (6,6)\}$$

$$n(A) = 18, P(A) = \frac{18}{36}$$

B = total of face sum is 8

$$B = \{(2,6), (3,5), (4,4), (5,3), (6,2)\}$$

$$n(B) = 5, P(B) = \frac{5}{36}$$

$$A \cap B = \{(2,6), (4,4), (6,2)\}$$

$$n(A \cap B) = 3, P(A \cap B) = \frac{3}{36}$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{18}{36} + \frac{5}{36} - \frac{3}{36} = \frac{20}{36} = \frac{5}{9}$$

(42) $7 + 77 + 777 + \dots$ upto n terms

$$= 7(1 + 11 + 111 + \dots \text{ upto n terms})$$

$$= \frac{7}{9}(9 + 99 + 999 + \dots \text{ upto n terms})$$

$$= \frac{7}{9}[(10-1) + (100-1) + (1000-1) + \dots]$$

$$= \frac{7}{9} \left[\frac{10(10^n - 1)}{9} - n \right]$$

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PART IV

(43) a) Draw a triangle.

(or)

(b) Draw two tangents.

Tangent length = 7.4 cm.

(44) a) $2x^2 - 3x - 5$

$$\text{Vertex} = \frac{-b}{2a} = \frac{-(-3)}{2 \times 2} = \frac{3}{4} = 0.75$$

$$\begin{aligned} \text{When } x=1, y &= 2(1)^2 - 3(1) - 5 \\ &= 2 - 3 - 5 \\ &= -6 \end{aligned}$$

x	-2	-1	0	1	2	3	4
y	9	0	-5	-6	-3	4	15
	9	5	1		3	7	11

$$y = 2x^2 - 3x - 5$$

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

$$y = x + 1$$

x	-2	-1	0	1	2
y	-1	0	1	2	3
	1	1		1	1

subtract add

Solution! $x = -1, x = 3$.

Scale x-axis 1cm = 1unit.

y-axis 1cm = 1unit.

(b) $xy = 24, x, y > 0$

x	2	3	4	6	8	12
y	12	8	6	4	3	2

Indirect variation.

Scale

x-axis 1cm = 1unit

y-axis 1cm = 1unit.

When $x = 3, y = 8$

When $y = 6, x = 4$.

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