SSLC Annual Exam Key answer

MATHEMATICS

I. 1. B) equations have unique solution.

2. C) 2

3. B) 1

4. D) $\frac{13}{12}$

5. A) 1:2

6. A) a tangent

7. D) $\frac{\theta}{360} \times 2\pi r$

8. C) $220\,cm^3$

II. 9. $\frac{23}{20} = \frac{23}{2^2 \times 5^1}$

$\therefore$ It has a terminating decimal expansion.

10. 3 zeroes

11. $\tan 45^\circ + \cot 45^\circ = 1 + 1$
$= \underline{\underline{2}}$

12. $P(x, y) = P\left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$

13. If a straight line is drawn parallel to one side of a triangle then it divides other two sides are proportionally. 2

14. $\angle BAC = 50^\circ$

15. $\frac{x+1}{2} = \frac{1}{x}$

$x^2 + x = 2$

$x^2 + x - 2 = 0$

16. TSA of a cone $= \pi r(r+l)$ sq.units

III. 17. $2x + y = 11 \rightarrow (1)$

$x + y = 8 \rightarrow (2)$

$(-)\ (-)\ \ \ (-)$

Eqn (1) − (2) $\therefore \boxed{x = 3}$

sub $x = 3$ in eqn (2)

$x + y = 8$

$3 + y = 8$

$y = 8 - 3$

$\therefore \boxed{y = 5}$

(18) Find the sum of $5+8+11+\cdots\cdots$ to 10 terms (3)

soln:-

$a=5$

$d=3$

$n=10$

$$S_n = \frac{n}{2}[2a+(n-1)d]$$

$$S_{10} = \frac{10}{2}[2\times5+(10-1)3]$$

$$= 5[10+27]$$

$$= 5\times37$$

$$\therefore \boxed{S_{10} = 185}$$

(19).

soln:- If the equations are inconsistent

then,

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$

$$\frac{2}{2(k-4)} = \frac{-3}{-k}$$

$$\frac{2}{2k-8} = \frac{3}{k}$$

$$2k = 3(2k-8)$$

$$2k = 6k-24$$

$$2k-6k = -24$$

$$-4k = -24$$

$$k = \frac{24}{4}$$

$$\therefore \boxed{k=6}$$

20. $2x^2 - 5x + 3 = 0$

$a = 2,\ b = -5,\ c = 3$

$\Delta = b^2 - 4ac$

$= (-5)^2 - 4 \times 2 \times 3$

$= 25 - 24$

$\therefore \boxed{\Delta = 1}$ $\therefore$ Roots are real and distinct

21. $p(x) = x^2 - 6x + k$

$a = 1,\ b = -6,\ c = k$

If α and β are the two zeroes of the polynomial then Acc. to the qesn,

$\alpha = \alpha$ and $\beta = 2\alpha$

(i) $\alpha + \beta = \frac{-b}{a}$

$\alpha + 2\alpha = \frac{-(-6)}{1}$

$3\alpha = 6$

$\alpha = \frac{6}{3}$

$\therefore \alpha = 2$

(ii) $\alpha\beta = \frac{c}{a}$

$\alpha(2\alpha) = \frac{k}{1}$

$2\alpha^2 = k$

$2(2)^2 = k$

$2(4) = k$

$\therefore \boxed{k = 8}$

(OR)

$p(x) = x^3 - 2x^2 + 3x + 4$ $\qquad g(x) = x^2 - 3x + 1$

$$
\begin{array}{r|l}
 & x+1 \\ \hline
x^2-3x+1 & x^3 - 2x^2 + 3x + 4 \\
 & x^3 - 3x^2 + 1x \\
 & (-)\ \ (+)\ \ \ (-) \\ \hline
 & \quad x^2 + 2x + 4 \\
 & \quad x^2 - 3x + 1 \\
 & (-)\ \ (+)\ \ (-) \\ \hline
 & \qquad 5x + 3
\end{array}
$$

$\therefore$ we should subtract $5x+3$ from $p(x)$.

(22). $(-5, 7)$ $\quad (-1, 3)$

$x_1 \ y_1 \qquad x_2 \ y_2$

$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

$= \sqrt{(-1+5)^2 + (3-7)^2}$

$= \sqrt{16 + 16}$

$= \sqrt{32}$

$= \sqrt{16 \times 2}$

$\therefore \boxed{d = 4\sqrt{2} \text{ units}}$

(OR)

$m_1 = 1 \quad m_2 = 2$

$A \quad P \quad B$

$A(1, 6)$ (x_1, y_1) $\quad P(x, y) \quad B(4, 3)$ (x_2, y_2)

$$x = \frac{m_1x_2 + m_2x_1}{m_1 + m_2}$$

$$= \frac{1(4) + 2(1)}{1+2}$$

$$= \frac{4+2}{3}$$

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

$$\therefore \boxed{x = 2}$$

$$y = \frac{m_1y_2 + m_2y_1}{m_1 + m_2}$$

$$= \frac{1(3) + 2(6)}{1+2}$$

$$= \frac{3+12}{3}$$

$$= \frac{15}{3}$$

$$\therefore \boxed{y = 5}$$

$$\therefore P(x, y) = (2, 5)$$

(23). $A(1, 1)$ (x_1 y_1) $\quad B(3, 2)$ (x_2 y_2) $\quad C(5, 3)$ (x_3 y_3)

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

$$= \frac{1}{2}[1(2-3) + 3(3-1) + 5(1-2)]$$

$$= \frac{1}{2}[-1 + 6 - 5]$$

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

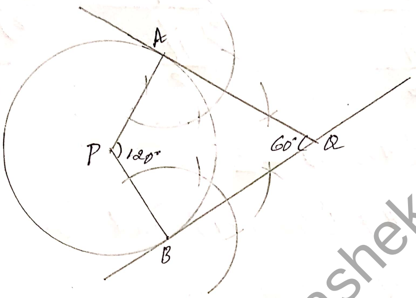
$$= \frac{1}{2} \times 0$$

$$\boxed{A = 0 \text{ sq. units}}$$

$\therefore$ The given points are collinear

Hence the points cannot be the vertices of the Δle ABC.

(24). $r = 3cm$ $\quad \angle P = 180 - 60^\circ$
$= 120^\circ$



IV. (25). Assume that $\sqrt{5}$ is a rational no

$\sqrt{5} = \frac{p}{q}$ (p and q are co-prime nos)

$5 = \frac{p^2}{q^2}$

$5q^2 = p^2 \longrightarrow (1)$

Here p is a multiple of 5

let, $p = 5k$,

sub $p = 5k$ in eqn (1)

$5q^2 = p^2$

$5q^2 = (5k)^2$

$\cancel{5}q^2 = \cancel{25}^{5}k^2$

$q^2 = 5k^2 \longrightarrow (2)$

∴ From eqn (1) & (2) Both p and q has a common factor 5. ∴ our assumption is wrong

∴ $\sqrt{5}$ is an irrational no

Soln:

(OR)

$a = 40, \quad b = 24$

$$\begin{array}{r|l} 24 & 40 \quad (1) \\ & \underline{24} \\ & 16 \end{array}$$

$a = 24, \quad b = 16$

$$\begin{array}{r|l} 16 & 24 \quad (1) \\ & \underline{16} \\ & 8 \end{array}$$

$a = 16 \quad b = 8$

$$\begin{array}{r|l} 8 & 16 \quad (2) \\ & \underline{16} \\ & 0 \end{array}$$

$\therefore$ HCF $(40, 24) = \underline{\underline{8}}$

$\rightarrow$ Lcm of HCF $(40, 24)$ and 20.

Lcm of 8 and 20.

$8 = 2 \times 2 \times 2$
$= 2^3$

$20 = 2 \times 2 \times 5$
$= 2^2 \times 5$

$\therefore$ Lcm $(8$ and $20) = 2^3 \times 5$
$= 8 \times 5$
$= \underline{\underline{40}}$

$\therefore$ Lcm of HCF $(24, 40)$ and $20 = \underline{\underline{40}}$.

26. soln:-

Distance = 12 Km

speed of A = 'x' km/hr and B = $(x+2)$ km/hr

∴ The time taken by A

$t_1 = \frac{12}{x}$

∴ The time taken by B

$t_2 = \frac{12}{x+2}$

Acc. to the qesn,

$t_2 = t_1 - 30$ min

$$\frac{12}{x+2} = \frac{12}{x} - \frac{1}{2} \text{ hrs.}$$

$$\frac{12}{x+2} - \frac{12}{x} = -\frac{1}{2}$$

$$\frac{\cancel{12x} - \cancel{12x} - 24}{x^2+2x} = -\frac{1}{2}$$

$x^2+2x = 48$

$x^2+2x-48=0$

$x^2+8x-6x-48=0$

$x(x+8)-6(x+8)=0$

$(x-6)(x+8)=0$

∴ $\boxed{x=6}$ & $\boxed{x=-8}$ ✗

∴ Time taken by A

$= \frac{12}{x}$

$= \frac{12}{6}$

$\boxed{t_1 = 2 \text{ hrs}}$

27. $x = p\tan\theta + q\sec\theta \qquad y = p\sec\theta + q\tan\theta$

P.T $x^2 - y^2 = q^2 - p^2$

$$LHS = x^2 - y^2$$

$$= (p\tan\theta + q\sec\theta)^2 - (p\sec\theta + q\tan\theta)^2$$

$$= p^2\tan^2\theta + q^2\sec^2\theta + 2p\tan\theta\, q\sec\theta - [p^2\sec^2\theta + q^2\tan^2\theta + 2p\sec\theta \cdot q\tan\theta]$$

$$= p^2\tan^2\theta + q^2\sec^2\theta + \cancel{2p\tan\theta \cdot q\sec\theta} - p^2\sec^2\theta - q^2\tan^2\theta - \cancel{2p\sec\theta \cdot q\tan\theta}$$

$$= p^2\tan^2\theta + q^2\sec^2\theta - p^2\sec^2\theta - q^2\tan^2\theta$$

$$= p^2[\tan^2\theta - \sec^2\theta] + q^2[\sec^2\theta - \tan^2\theta]$$

$$= p^2(-1) + q^2(1)$$

$$= -p^2 + q^2$$

$\therefore x^2 - y^2 = q^2 - p^2.$

(OR)

$$\frac{\cot^2(90-\theta)}{\tan^2\theta-1} + \frac{\operatorname{cosec}^2\theta}{\sec^2\theta-\operatorname{cosec}^2\theta} = \frac{1}{\sin^2\theta-\cos^2\theta}$$

Soln:- $LHS = \frac{\cot^2(90-\theta)}{\tan^2\theta-1} + \frac{\operatorname{cosec}^2\theta}{\sec^2\theta-\operatorname{cosec}^2\theta}$

$$= \frac{\tan^2\theta}{\tan^2\theta-1} + \frac{\operatorname{cosec}^2\theta}{\sec^2\theta-\operatorname{cosec}^2\theta}$$

$$= \frac{\frac{\sin^2\theta}{\cos^2\theta}}{\frac{\sin^2\theta-\cos^2\theta}{\cos^2\theta}} + \frac{\frac{1}{\sin^2\theta}}{\frac{\sin^2\theta-\cos^2\theta}{\cos^2\theta\cdot\sin^2\theta}}$$

$$= \frac{\sin^2\theta}{\sin^2\theta-\cos^2\theta} + \frac{\cos^2\theta}{\sin^2\theta-\cos^2\theta}$$

$$= \frac{\sin^2\theta+\cos^2\theta}{\sin^2\theta-\cos^2\theta}$$

$$= \frac{1}{\sin^2\theta-\cos^2\theta}.$$

$\therefore$ LHS = RHS

(28) Median :

C-I	f	Cf
20-40	7	7
40-60	15	22-Cf
60-80	20-f	42
80-100	8	50
	N=50	

$n = 50$

$\frac{n}{2} = \underline{\underline{25}}$

$$\text{median} = l + \left[\frac{\frac{n}{2} - cf}{f}\right] h$$

$$= 60 + \left[\frac{25 - 22}{\cancel{20}}\right] \cancel{20}$$

$$= 60 + 3$$

$$\therefore \boxed{\text{median} = 63}$$

(OR)

C-I	f	
1-3	6	
3-5	9	$\rightarrow f_0$
5-7	15	$\rightarrow f_1$
7-9	9	$\rightarrow f_2$
9-11	1	

$$\text{mode} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] h$$

$$= 5 + \left[\frac{15 - 9}{2(15) - 9 - 9}\right] 2$$

$$= 5 + \left[\frac{6}{30 - 18}\right] 2$$

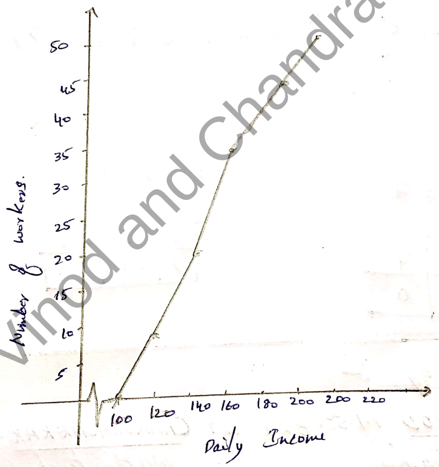
$$= 5 + \frac{12}{12}$$

$$= 5 + 1$$

$$\boxed{\therefore \text{mode} = 6}$$

(29) Less than type of ogive graph.

Daily Income	No. of workers
Less than 100	0
Less than 120	8
Less than 140	20
Less than 160	34
Less than 180	44
Less than 200	50



30. Soln:-

$n(S) = n(R) + n(W) + n(B)$

$= 3+5+8$

$\therefore n(S) = 16$

(a) a Red Ball

$n(A) = 3$

$p(A) = \frac{n(A)}{n(S)}$

$= \frac{3}{16}$

(b) not a white Ball

$n(B) = 11$

$p(B) = \frac{n(B)}{n(S)}$

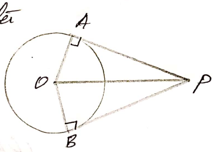
$= \frac{11}{16}$

31. The lengths of tangents are drawn from an external point to a circle are equal

Data:- In a circle 'O' is the center

'P' is the external point

AP and BP are the tangents



To prove:- $AP = BP$

construction:- Join OA, OB and OP

Proof:- In ΔAOP and ΔBOP

$\hat{A} = \hat{B} = 90°$

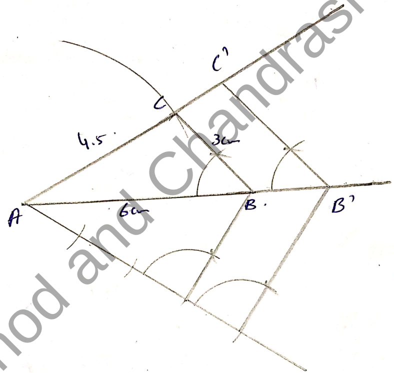
$OP = OP$ (common)

$AO = BO$ (Radii)

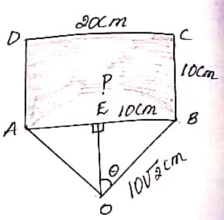
$\therefore \Delta AOP \cong \Delta BOP$ (RHS rule)

$\therefore AP = BP$ (CPCT)

32 Construction of triangle ABC.



(03). Soln:



In ΔOEB,

$$\sin\theta = \frac{EB}{OB}$$

$$= \frac{10}{10\sqrt{2}}$$

$$\sin\theta = \frac{1}{\sqrt{2}}$$

$$\theta = 45^\circ$$

$$\therefore A\hat{O}B = 2 \times E\hat{O}B$$

$$= 2 \times 45^\circ$$

$$= \underline{90^\circ}$$

Area of a segment APB = Area of a sector OAPB − Area of a Δle OAB

$$= \frac{\theta}{360} \times \pi r^2 - \frac{1}{2} \times b \times h$$

$$= \frac{90}{360} \times 3.14 \times 10\sqrt{2} \times 10\sqrt{2} - \frac{1}{2} \times 10\sqrt{2} \times 10\sqrt{2}$$

$$= 50 \times 3.14 - 100$$

$$= \underline{57 cm^2}$$

Area of a shaded Region = Area of $\square$le − Area of a segment APB

$$= l \times b - 57$$

$$= 20 \times 10 - 57$$

$$= \underline{143 cm^2}$$

(OR)

Soln:

Area of the cloth used $= \frac{\theta}{360} \times \pi r^2$

$= \frac{120}{360} \times \frac{22}{7} \times (21)^2$

$= \underline{\underline{462 cm^2}}$

Length of the metallic wire $= \frac{\theta}{360} \times 2\pi r + 2r$

$= \frac{120}{360} \times 2 \times \frac{22}{7} \times 21 + 2 \times 21$

$= 44 + 42$

$= \underline{\underline{86 cm}}$

Length of the metallic wire $= \frac{\theta}{360} \times 2\pi r$

$= \frac{\cancel{120}^{1}}{\cancel{360}_{3}} \times 2 \times \frac{22}{\cancel{7}} \times \cancel{21}^{3}$

$= \underline{\underline{44\,cm}}$

35. Let the 5 terms are, $a-2d,\ a-d,\ a,\ a+d,\ a+2d$
$\qquad\qquad\qquad\qquad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow$
$\qquad\qquad\qquad\qquad a_1 \quad a_2 \quad a_3 \quad a_4 \quad a_5$

$a_1 + a_2 + a_3 + a_4 + a_5 = 55$

$a - \cancel{2d} + a - \cancel{d} + a + a + \cancel{d} + a + \cancel{2d} = 55$

$5a = 55$

$\therefore \boxed{a = 11}$

$a_4 = a_1 + a_2 + 5$

$\cancel{a} + d = \cancel{a} - 2d + a - d + 5$

$d = a - 3d + 5$

$d + 3d = a + 5$

$4d = 11 + 5$

$d = \frac{16}{4}$

$\underline{\underline{d = 4}}$

$\therefore$ The terms are 3, 7, 11, 15 and 19.

(OR)

$a_6 = 2(a_3) + 1$

$a + 5d = 2(a + 2d) + 1$

$a + 5d = 2a + 4d + 1$

$a + 5d - 2a - 4d = 1$

$-a + d = 1$

$a - d = -1 \rightarrow (1)$

$a_4 + a_5 = 5(a_2)$

$a + 3d + a + 4d = 5(a + d)$

$2a + 7d = 5a + 5d$

$3a = 2d$

$3a - 2d = 0 \rightarrow (2)$

eqn (1) - (2)

$3a - 3d = -3$

$\underline{\overset{(-)}{3a} \overset{(+)}{-} 2d = \overset{(-)}{0}}$

$+d = +3$

$\therefore \boxed{d = 3}$

sub $d = 3$ in eqn (1)

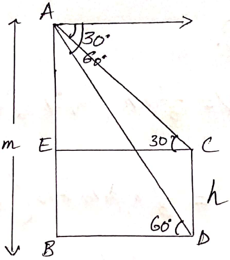
$a - d = -1$

$a - 3 = -1$

$a = -1 + 3$

$\therefore \boxed{a = 2}$

(36).



In $\triangle ABD$, $\hat{D} = 60°$ (alternate angle)

$$\tan 60° = \frac{AB}{BD}$$

$$\sqrt{3} = \frac{60}{BD}$$

$$BD = \frac{60}{\sqrt{3}} m = EC$$

In $\triangle AEC$, $\hat{C} = 30°$ (Alternate angle)

$$\tan 30° = \frac{AE}{EC}$$

$$\frac{1}{\sqrt{3}} = \frac{AE}{\frac{60}{\sqrt{3}}}$$

$$\frac{1}{\sqrt{3}} = AE \times \frac{\sqrt{3}}{60}$$

$$AE(\sqrt{3})^2 = 60$$

$$AE = \frac{60}{3}$$

$$AE = 20 m$$

$\therefore$ Height of the pole,

$$CD = AB - AE$$

$$= 60 - 20$$

$$= \underline{\underline{40 m}}$$

37.

$r_1 = 20\,cm$

$r_2 = 8\,cm$

$h = 16\,cm$

$V = \frac{1}{3}\pi h \left(r_1^2 + r_2^2 + r_1 \cdot r_2\right)$

$= \frac{1}{3} \times 3.14 \times 16 \left(20^2 + 8^2 + 20 \times 8\right)$

$= \frac{3.14 \times 16}{3} \left(400 + 64 + 160\right)$

$= \frac{3.14 \times 16}{\cancel{3}} \times \cancel{624}^{208}$

$= 10449.92\,cm^3$

$= 10.4499$ ltr

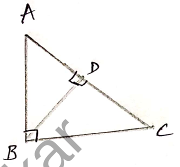
$\therefore \boxed{V = 10.45 \text{ ltr}}$

$\therefore$ cost of the milk $= 10.45 \times 20$ ₹

$=$ ₹209.

VI. 38 Pythagorean Theorem:-

Statement:- In a right angle $\triangle$le, the square on the hypotenuse is equal to sum of the squares on other two sides.



Data:- In $\triangle ABC$, $\hat{B} = 90°$

To prove:- $AC^2 = AB^2 + BC^2$

Construction:- Draw $BD \perp AC$

Proof:- In $\triangle ABC$ and $\triangle ADB$

$\hat{B} = \hat{D} = 90°$ (data & const)

$\hat{A} = \hat{A}$ (common angle)

$\therefore \triangle ABC \sim \triangle ADB$ (AA)

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

$AB^2 = AC \cdot AD \rightarrow (1)$

In $\triangle ABC$ and $\triangle BDC$

$\hat{B} = \hat{D} = 90°$ (data and const)

$\hat{C} = \hat{C}$ (common angle)

$\therefore \triangle ABC \sim \triangle BDC$ (AA)

$$\frac{BC}{DC} = \frac{AC}{BC}$$

$BC^2 = AC \cdot DC \rightarrow (2)$

eqn (1) + (2)

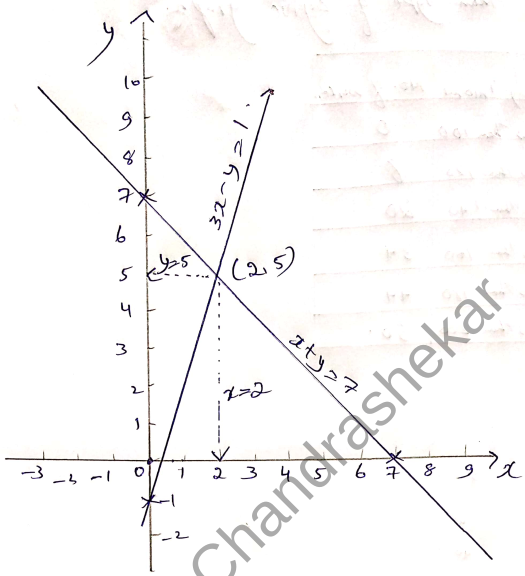
$AB^2 + BC^2 = AC \cdot AD + AC \cdot DC$

$= AC(AD + DC)$

$= AC \cdot AC$

$\therefore AB^2 + BC^2 = AC^2$

34.



$x+y=7$

x	0	7
y	7	0

$3x-y=1$

x	0	0.3
y	−1	0.

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