KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

Malleshwaram, Bengaluru – 560003

S.S.L.C. MODEL QUESTION PAPER – 03 – 2026-27

MODEL ANSWERS

Subject: MATHEMATICS

(English Medium)

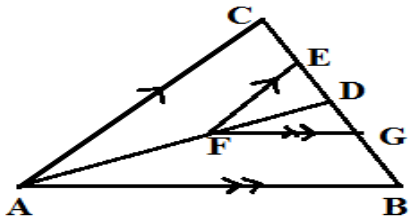
Subject Code: 81 – E

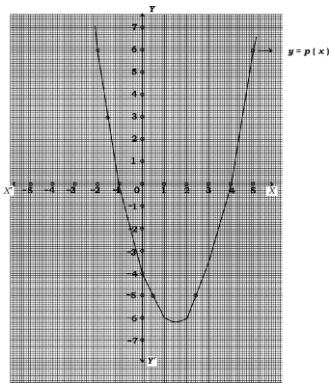
[Time: 3 Hours 15 Minutes]

[Max. Marks: 80]

Q.No	Ans Key	Value Points	Marks allotted
1	(A)	**I. Multiple Choice Questions (1-marks for each correct answer)** $8 \times 1 = 8$ If the lines represented by the pair of linear equations $a_1x + b_1y + c_1=0$ and $a_2x + b_2y + c_2 =0$ intersect each other, then the correct relation among the following is (A) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (C) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ Ans: $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	1

Q.No	Ans Key	Value Points	Marks allotted
2	(B)	If α and β are the zeroes of the polynomial $p(x) = ax^2 + bx + c$, then the value of α + β is (A) $\frac{b}{a}$ (B) $\frac{-b}{a}$ (C) $\frac{c}{a}$ (D) $\frac{-c}{a}$ Ans: $\frac{-b}{a}$	1
3	(A)	The formula to find the sum of all terms of the arithmetic progression with first term 'a' and last term 'l' is (A) $S_n=\frac{n}{2}(a+l)$ (B) $S_n=\frac{n}{2}(a-l)$ (C) $S_n=\frac{n}{2}(a\times l)$ (D) $S_n=\frac{n}{2}(a\div l)$ Ans: $S_n=\frac{n}{2}(a+l)$	1
4	(C)	The value of $\text{cosec}\ 60^0 + \sec 30^0$ is (A) $\frac{\sqrt{3}}{2}$ (B) $\frac{\sqrt{3}}{4}$ (C) $\frac{4}{\sqrt{3}}$ (D) $\frac{2}{\sqrt{3}}$ Ans: $\frac{4}{\sqrt{3}}$	1
5	(B)	The formula to find the total surface area of cube of edge 'a' unit is (A) $4a^2$ Sq. units (B) $6a^2$ Sq. units (C) $4a^3$ Sq. units (D) $6a^3$ Sq. units Ans: $6a^2$ Sq. units	1

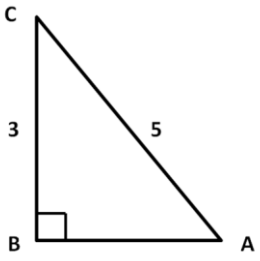
Q.No	Ans Key	Value Points	Marks allotted
6	(B)	Which measure of central tendency is calculated by finding Cumulative frequency? (A) Mean (B) Median (C) Mode (D) Deviation Ans: Median	1
7	(B)	If p and q are co-primes, then the H.C.F of p^2 and q^2 is (A) pq (B) 1 (C) p + q (D) p^2q^2 Ans: 1	1
8	(A)	In the figure, if EF∥CA and FG ∥AB, then $\frac{DE}{EC}$ is equal to  (A) $\frac{DG}{GB}$ (B) $\frac{GB}{DG}$ (C) $\frac{AF}{DF}$ (D) $\frac{AB}{AD}$ Ans: $\frac{DG}{GB}$	1

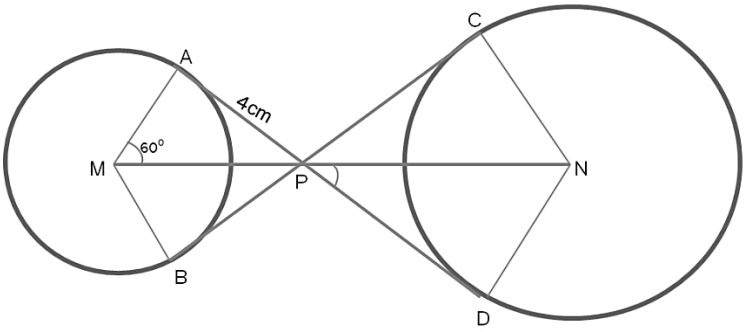
Q. No	Value points	Marks allotted
	II. Answer the following questions: $8 \times 1 = 8$	
9	Write the zeroes of the polynomial y=p(x) in the given graph. 	
	Ans: -1 and 4	1
10	Find the roots of the quadratic equation $(x-1)(x+3) = 0$ Ans: $x-1=0 \quad or \quad x+3 = 0$ $x = 1 \quad or \quad x = -3$	1
11	Write the coordinates of the point P which divides the line segment joining the points $A(x_1, y_1)$ and B (x_2, y_2) internally in the ratio 1:1. Ans: $P(x,y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$	1
12	When a die is rolled once, find the probability of getting the number 6 on the top. Ans: S={1,2,3,4,5,6} n(S) = 6 Getting number 6 on top , A={6} n(A) = 1 P(A) $= \frac{n(A)}{n(S)}$ ½ $= \frac{1}{6}$ ½	1

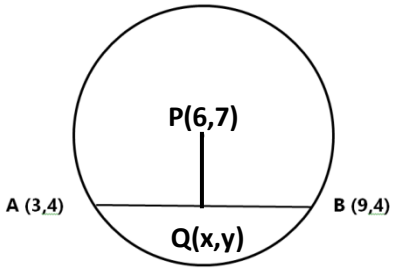
Q. No	Value points	Marks allotted
13	How many solutions does the pair of linear equations $2x + 3y - 9 = 0$ and $4x + 6y - 18 = 0$ have? Ans: $\frac{2}{4} = \frac{3}{6} = \frac{-9}{-18}$ $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ ½ ∴ They have infinitely many solutions ½	1
14	If the nth term of an arithmetic progression is $a_n = 2n - 1$ then find its 4th term. Ans: $a_n = 2n - 1$ $a_4 = 2(4) - 1$ ½ $a_4 = 8 - 1$ $a_4 = 7$ ½	1
15	If the area of base of a cylinder is $22cm^2$ and height is 10cm, then find the volume the cylinder. Ans: $V = \pi r^2 h$ ½ $V = 22 \times 10$ $V = 220\ cm^3$ ½	1
16	In ΔLMN, ∠L = 50° and ∠N = 60°. If ΔLMN ~ ΔPQR, then find the measure of ∠Q . Ans: Since ΔLMN ~ ΔPQR, ∠L = ∠P = 50° and ∠N = ∠R = 60° $\therefore \angle Q = 180^0 - (50^0 + 60^0)$ $\angle Q = 70^0$	1

Q. No	Value points	Marks allotted
	III. Answer the following questions: **8 x 2 = 16**	
17	Prove that $4 + \sqrt{3}$ is an irrational number Ans: Let us assume that $4 + \sqrt{3}$ is rational number. Then we can find coprime a and b (b≠0) such that $4 + \sqrt{3} = \frac{a}{b}$ ½ Rearranging the equation, we get $\sqrt{3} = \frac{a}{b} - 4$ ½ $\sqrt{3} = \frac{a}{b} - \frac{4}{1}$ $\sqrt{3} = \frac{a-4b}{b}$ Since a and b are integers, we get $\frac{a-4b}{b}$ is rational, and so $\sqrt{3}$ is rational. But this contradicts the fact that $\sqrt{3}$ is irrational. This contradiction has arisen because of our incorrect assumption that $4 + \sqrt{3}$ is rational. ½ So, we conclude that $4 + \sqrt{3}$ is an irrational. ½	**2**
18	Solve the given pair of linear equations by elimination method. $2x - y = 8$ $x + y = 7$ Ans: $2x - y = 8$ …….(i) $x + y = 7$ …….(ii) ---------- ½ $3x=15$ $x=5$ ½ Substitute value of x in equation (ii) $x+y=7$ $5+y = 7$ ½ $y=7-5$ $y=2$ ½	**2**

Q. No	Value points	Marks allotted
19	Express (2x+3) x = x^2+1 in the standard form of quadratic equation. **OR** For what value of 'k' the roots of the equation $kx^2 + 6x + 1 = 0$ are equal? Ans: (2x + 3) x = x^2 + 1 $2x^2 + 3x = x^2 + 1$ 1 $2x^2 + 3x - x^2 - 1 = 0$ $x^2 + 3x - 1 = 0$ 1 **OR** $kx^2 + 6x + 1 = 0$ a= k , b = 6 , c = 1 $b^2 - 4ac = 0$ ½ $(6)^2 - 4 \times k \times 1 = 0$ ½ $36 - 4k = 0$ $4k = 36$ ½ $k = \frac{36}{4}$ $k = 9$ ½	2 2
20	Find how many numbers between 201 and 401 are divisible by 6 using formula. **OR** Find the sum of first 20 terms of the arithmetic progression 2, 5, 8, 11,..... using formula. Ans: The numbers divisible by 6 between 201 and 400 are 204, 210,216,.....396 a= 204; a_n=396; d=6: n=? $a_n = a+(n-1)d$ ½ $396 = 204+(n-1)6$ ½ $396 = 204+6n-6$ $396 = 6n+198$ $6n = 198$ ½ n= 33 ½	2

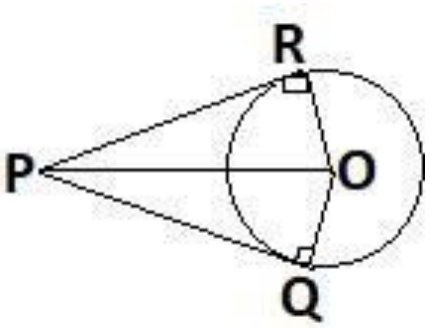
Q. No	Value points	Marks allotted
	OR a=2; d=3; n=20; s_{20}=? $S_n = \frac{n}{2}[2a+(n-1)d]$ ½ $S_{20} = \frac{20}{2}[2x2+(20-1)3]$ ½ $= 10\,[4+19x3]$ $= 10\,[4+57]$ ½ $= 10 \times 61$ $S_{20} = 610$ ½	2
21	If $sin\ A = \frac{3}{5}$ then find the value of tan A Ans: In Δ ABC , ∠B = 90^0  $AC^2 = AB^2 + BC^2$ $5^2 = AB^2 + 3^2$ $25 = AB^2 + 9$ $AB^2 = 25 - 9$ $AB^2 = 16$ AB = 4 1 $\tan A = \frac{BC}{AB}$ ½ $\tan A = \frac{3}{4}$ ½	**2**

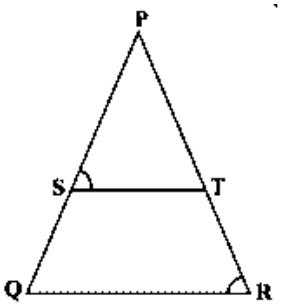
Q. No	Value points	Marks allotted
22	Find the H.C.F and L.C.M of 68 and 72 by the method of prime factorization and verify that L.C.M X H.C. F = The product of numbers. Ans: $2 \mid 68$ $2 \mid 34$ 17 $2 \mid 72$ $2 \mid 36$ $2 \mid 18$ $3 \mid 9$ 3 $68 = 2^2 \times 17^1$ $72 = 2^3 \times 3^2$ ½ L.C.M $= 2^3 \times 3^2 \times 17^1 = 1224$ ½ H.C.F $= 2^2 = 4$ ½ $A \times B = L \times H$ $68 \times 72 = 1224 \times 4$ $4896 = 4896$ ½	**2**
23	AD and BC are tangents to the circles with centre M and N and they intersect at point P as shown in the figure. If $\angle AMP = 60°$, AP = 4 cm and $AP : PD = 1 : 2$, then find the measure of $\angle NPD$ and length of BC.  	

Q. No	Value points	Marks allotted
	AP = 4cm (Given) AP = BP = 4cm [Tangents drawn from an external point P to the same circle] AP : PD = 1 : 2 [Given] PD = 2 AP = 2 X 4 = 8cm ½ PD = PC = 8cm [Tangents drawn from an external point P to the same circle] BC = BP + PC = 4 + 8 BC = 12cm ½ ∠AMP = 60° [Given], ∠MPA = 90°[Angle at the point of contact] ½ ∴ ∠NPD = 180°− (60°+90°) $= 180^0 - 150^0$ ∴ ∠NPD = 30° ½	2
24	The centre of a circle is 'P' whose coordinates are P(6, 7). In this circle AB is a chord and the coordinates of its end points are A (3, 4) and B (9, 4). Find the perpendicular distance to the chord from the centre of the circle using formula.  	

Q. No	Value points	Marks allotted
	Ans: AB is a chord and PQ ⊥ AB Therefore, AQ = BQ ⇒ Q is the Midpoint of AB $Q(x,y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ ½ $Q(x,y) = \left(\frac{3+9}{2}, \frac{4+4}{2}\right)$ $Q(x,y) = \left(\frac{12}{2}, \frac{8}{2}\right)$ $Q(x,y) = (6,4)$ ½ $PQ = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ ½ $PQ = \sqrt{(6-6)^2+(7-4)^2}$ $PQ = \sqrt{(0)^2+(3)^2}$ $PQ = \sqrt{9}$ PQ = 3 units ½	2
	IV .Answer the following questions: **9 x 3 = 27** Find the zeroes of the quadratic polynomial p(x) = x^2 + 6x + 8 and verify the relationship between the zeroes and the coefficients. **OR** Write the quadratic polynomial whose sum of the zeroes is 3 and product of the zeroes is -10. And also find the zeroes of this polynomial.	

Q. No	Value points	Marks allotted
25	Ans: $p(x) = x^2 + 6x + 8$ $p(x) = x^2+6x+8$ $p(x) = x^2 + 4x + 2x + 8$ ½ $p(x) = x(x + 4)+2(x + 4)$ $(x + 4)(x + 2) = 0$ $x + 4 = 0$ or $x + 2 = 0$ $x = -4$ or $x = -2$ ½ ∴zeros of polynomials $\alpha = -4$ and $\beta = -2$ sum of the zeros of polynomials $= \alpha + \beta = (-4) + (-2) = -6$ ½ $= \frac{-(-6)}{1} = \frac{-coefficient\ of\ x}{coefficient\ of\ x^2}$ ½ product of the zeros of polynomials $= \alpha \times \beta = (-4)(-2) = 8$ ½ $= \frac{8}{1} = \frac{constant}{coefficient\ of\ x^2}$ ½ **OR** Given $\alpha + \beta = 3$, $\alpha \times \beta = -10$ Required quadratic polynomial $P(x) = x^2 - (\alpha + \beta)x + \alpha\beta$ ½ $P(x) = x^2 - 3x - 10$ ½ $P(x) = x^2 - 3x - 10$ $P(x) = x^2 - 5x + 2x - 10$ ½ $P(x) = x(x - 5) + 2(x - 5)$ ½ $(x - 5)(x + 2) = 0$ $x - 5 = 0$ or $x + 2 = 0$ ½ $x = 5$ or $x = -2$ ½ ∴zeroes of the polynomial are 5 and -2	3 3

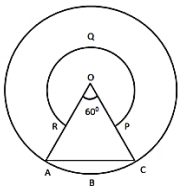
Q. No	Value points	Marks allotted
26	Prove that "the length of tangents drawn to a circle from an external point are equal".  Given : PQ and PR are the two tangents drawn from the external point P to a circle of center O. To Prove : PQ = PR Construction : Join OP, OQ, OR Proof : In △ OQP and △ORP OQ = OR (∵ Radii of same circle) OP = OP (∵Common side) ∠OQP =∠ORP =90^0 (Theorem 10.1) ∴ Δ OQP ≅ △ORP (RHS congruence rule) ∴ PQ = PR (CPCT) Data , Figure: 1 mark To prove, construction : ½ marks Proof : 1 ½ marks	3

Q. No	Value points	Marks allotted
27	Find the coordinates of the point which divides the line segment joining the points $(4,-3)$ and $(8,5)$ internally in the ratio $3:1$. Ans:) $A(4,-3)=(x_1, y_1)$, $B(8,5)=(x_2, y_2)$, $m_1:m_2=3:1$, $P(x, y)=?$ $P(x, y)=\left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$ ½ $P(x, y)=\left[\frac{3(8)+1(4)}{3+1}, \frac{3(5)+1(-3)}{3+1}\right]$ 1 $=\left[\frac{24+4}{4}, \frac{15-3}{5}\right]$ ½ $=\left[\frac{28}{4}, \frac{12}{4}\right]$ ½ $\therefore P(x, y)=[7, 3]$ ½	3
28	In the figure, $\frac{PS}{SQ}=\frac{PT}{TR}$ and $\angle PST = \angle PRQ$. Prove that PQR is an isosceles triangle.  Ans: ST || QR ($\therefore$ Converse of Thales theorem) ½ $\angle PST = \angle PQR$ ($\therefore$ Corresponding angles) ½ $\angle PST = \angle PRQ$ ($\therefore$ data) ½ $\Rightarrow \angle PRQ = \angle PQR$ ½ $\therefore PQ = PR$ ½ Δ PQR is an isosceles triangle ½	3

Q. No	Value points		Marks allotted
29	Prove that cosec A (1 – cos A) (cosec A + cot A) = 1		
	OR		
	Prove that $\frac{sin\theta}{1-cos\theta}+\frac{tan\theta}{1+cos\theta}=cot\theta+sec\theta\cdot cosec\theta$		
	LHS = cosec A (1 – cos A)(cosec A + cot A)		
	$=(cosecA-cosecA.cosA)$(cosec A +cot A)	½	
	$=\left(cosec\ A-\frac{1}{sinA}.cos\ A\right)$(cosec A +cot A)	½	
	= (cosec A – cot A) (cosec A +cot A)	½	
	= $cosec^2$ A– cot^2 A	½	
	= 1 + cot^2 A –cot^2 A	½	
	=1 = RHS	½	3
	OR		
	LHS = $\frac{sin\theta}{1-cos\theta}+\frac{tan\theta}{1+cos\theta}$		
	$=\frac{sin\theta(1+cos\theta)+tan\theta(1-cos\theta)}{1^2-cos^2\theta}$	1	
	$=\frac{sin\theta+sin\theta cos\theta+tan\theta-tan\theta cos\theta}{sin^2\theta}$		
	$=\frac{sin\theta+sin\theta cos\theta+tan\theta-sin\theta}{sin^2\theta}$	1	
	$=\frac{sin\theta cos\theta+tan\theta}{sin^2\theta}$		
	$=\frac{sin\theta cos\theta}{sin^2\theta}+\frac{tan\theta}{sin^2\theta}=cot\theta+sec\theta.cosec\theta$ = RHS	1	3

Q. No	Value points	Marks allotted
30	A bag contains 26 cards numbered from 5 to 30. A card is drawn at random from the bag. Find the probability that the card drawn is (i) a multiple of both 2 and 3 (ii) a square number (iii) a multiple of 3 **OR** There are 3 red balls, 5 white balls and 8 blue balls in a bag. A ball is drawn at random from the bag. Find the probability that the ball drawn is (i) a red ball (ii) not a white ball (iii) a green ball Ans: S={5,6,7,8,…….,30} n(S)=26 i) A={6,12,18,24,30} n(A)=5 $P(A)=\frac{n(A)}{n(S)}=\frac{5}{26}$ 1 ii) B= {9,16,25 } n(B) = 3 P(B)=$\frac{n(B)}{n(S)}=\frac{3}{26}$ 1 iii) C={6,9,12,15,18,21,24,27,30} n(C) =9 $P(C)=\frac{n(C)}{n(S)}=\frac{9}{26}$ 1 **OR**	3

Q. No	Value points	Marks allotted
	$n(S)= 3+5+8=16$ (i) A= Getting a red ball $n(A) =3$ $P(A)=\frac{n(A)}{n(S)}=\frac{3}{16}$ 1 (ii) B= Not getting a white ball $n(B)=11$ $P(B)=\frac{n(B)}{n(S)}=\frac{11}{16}$ 1 (iii) C= getting a green ball $n(C) = 0$ $P(C)=\frac{n(C)}{n(S)}=\frac{0}{16}=0$ 1	3
31	A farmer wishes to grow a 100 m^2 rectangular vegetable garden. Since he has only 30m barbed wire, he fences the sides of the rectangular garden letting his house compound wall act as the fourth side fence. Find the dimensions of the garden. Ans: Let the length of the rectangular garden be 'l' m and breadth be 'b' m $l + 2b = 30$ (given) ½ $l = 30 - 2b$----------(1) $l \times b = 100$ ½ $(30-2b)b = 100$ (from 1) $30b - 2b^2 - 100 = 0$ $2b^2 - 30b + 100 = 0$ $b^2 - 15b + 50 = 0$ ½ $b^2 - 5b - 10b + 50 = 0$ $b(b-5) - 10(b-5) = 0$	

Q. No	Value points	Marks allotted
	$(b-5)(b-10)=0$ $b=5$ or $b=10$ ½ if $b=5$, $l=30-2\times5$ or if $b=10$, $l=30-2\times10$ $l=30-10$ $l=30-20$ $l=20$ $l=10$ ½ here, if $l=10$ m the garden shape would be a square , but it is of rectangular shape $\therefore\ l=20$ and $b=5$ ∴The length of the garden is 20m and its breadth is 5m ½	3
32	In the given figure, area of the sector OAC is $\frac{77}{3}$ cm^2. If OR = RA and ∠AOC = 60^0 then, find the area of the segment ABC and length of the arc PQR.  Ans: Area of the sector OAC = $\frac{77}{3}$ $\frac{\theta}{360^\circ}\times\pi r^2=\frac{77}{3}$ ½ $\frac{60^\circ}{360^\circ}\times\frac{22}{7}\times r^2=\frac{77}{3}$ $\frac{1}{6}\times\frac{22}{7}\times r^2=\frac{77}{3}$ $r^2=\frac{77\times7\times6}{22\times3}$ $r^2=49$ r=7 cm ½	

Q. No	Value points	Marks allotted
	Area of $\Delta AOC = \frac{\sqrt{3}}{4}a^2$ $= \frac{\sqrt{3}}{4} \times (7)^2$ $= \frac{\sqrt{3}}{4} \times 49$ $= \frac{49\sqrt{3}}{4}$ cm^2 ½ $\therefore$ Area of the segment ABC = Area of the sector OAC − Area of ΔAOC Area of the segment ABC = $(\frac{77}{3} - \frac{49\sqrt{3}}{4})$ cm^2 ½ Length of arc PQR = $\frac{\theta}{360^\circ} \times 2\pi r$ ½ $= \frac{300^0}{360^0} \times 2 \times \frac{22}{7} \times \frac{7}{2}$ $= \frac{110}{6}$ = 18.33cm ½	3
33.	Find the Median for the given data <table><tr><td>Class interval</td><td>frequency</td></tr><tr><td>50 − 60</td><td>6</td></tr><tr><td>60 − 70</td><td>9</td></tr><tr><td>70 − 80</td><td>20</td></tr><tr><td>80 − 90</td><td>10</td></tr><tr><td>90 − 100</td><td>5</td></tr></table> **OR** Find the Mode for the following frequency distribution table <table><tr><td>Class interval</td><td>10 -20</td><td>20 -30</td><td>30 -40</td><td>40 -50</td></tr><tr><td>frequency</td><td>6</td><td>4</td><td>12</td><td>3</td></tr></table>	

Q. No	Value points	Marks allotted

Ans:

C.I	f	cf
50-60	6	6
60-70	9	15
70-80	20	35
80-90	10	45
90-100	5	50
	N=50	

for table 1mark

l=70
cf =15
h =10
f=20

$\frac{N}{2} = \frac{50}{2} = 25$ ½

$\text{Median} = l + \left(\frac{\frac{N}{2} - Cf}{f}\right) \times h$ ½

$= 70 + \left(\frac{25-15}{20}\right) \times 10$ ½

$= 70 + \left(\frac{100}{20}\right)$

$= 70 + 5$

$= 75$ ½

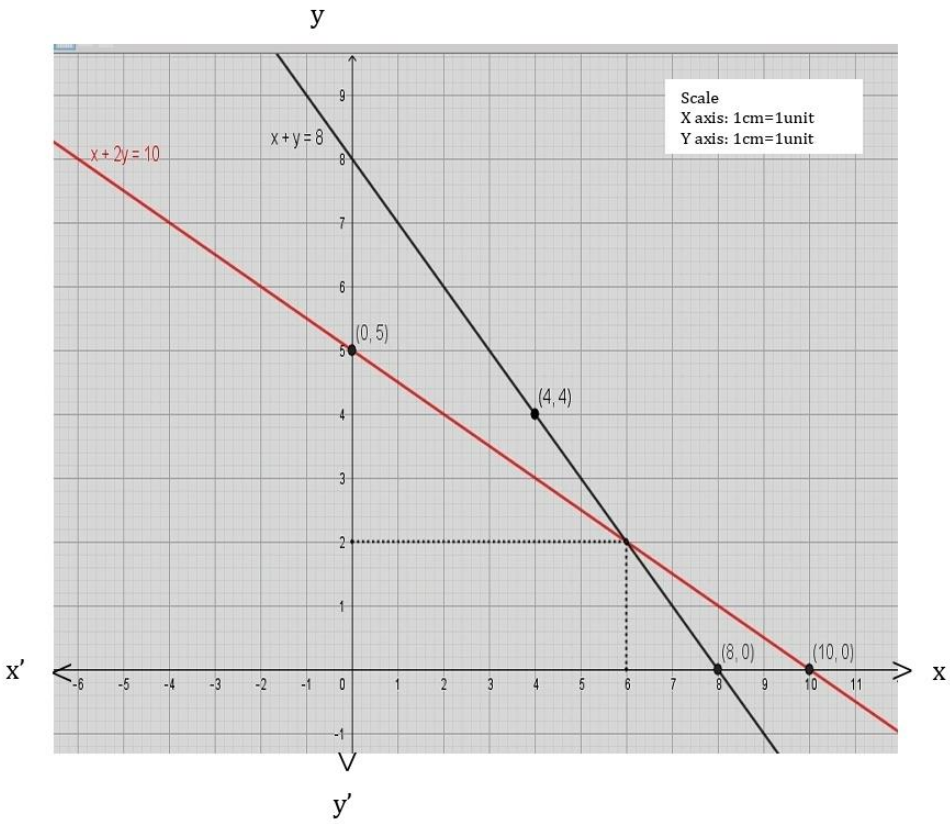
3

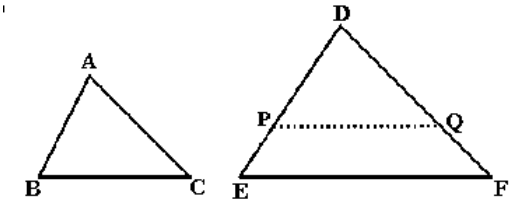
OR

Q. No	Value points	Marks allotted
	Here class interval of the mode is 30 – 40 l =30, f_0 =4, f_1 =12, f_2 =3, h = 10 (1) $Mode = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ $= 30 + \left[\frac{12-4}{2(12)-4-3}\right] \times 10$ (1) $= 30 + \left[\frac{8}{24-7}\right] \times 10$ $= 30 + \frac{80}{17}$ $= 30 + 4.7$ Mode =34.7 (1)	3
34	**V. Answer the following questions: 4 x 4 = 16** In an arithmetic progression the first term is 22, nth term is -11 and the sum of the first 'n' terms is 66. Find the number of terms of the progression , common difference and the 7th term. **OR** An arithmetic progression contains 30 terms. 17th term of the progression is 4 more than thrice of its 5th term. The 10th term of the progression is 31. Find the last three terms of the progression and also find the progression. Ans: Data $a = 22, a_n = -11, S_n = 66$ n =?, d=? and 7th term=?	

Q. No	Value points		Marks allotted
	$S_n = \frac{n}{2}(a + a_n)$	½	4
	$66 = \frac{n}{2}(22 - 11)$	½	
	$66 = \frac{n}{2}(11)$		
	$11n = 132$		
	$n = \frac{132}{11}$		
	$= 12$		
	Number of terms =12	½	
	$a_n = a + (n-1)d$	½	
	$-11 = 22 + (12-1)d$	½	
	$11d + 22 = -11$		
	$11d = -33$		
	$d = -3$	½	
	$a_7 = a+6d$		
	$a_7 = 22 + 6(-3)$		
	$a_7 = 22 - 18$		
	$a_7 = 4$	½	
	OR		
	$a_{10} = 31$		
	$a+9d=31$ ----------(1)	½	
	$a_{17} = 3a_5 + 4$		
	$a + 16d = 3(a + 4d) + 4$		
	$a + 16d = 3a + 12d + 4$		
	$a - 3a + 16d - 12d = 4$		

Q. No	Value points		Marks allotted
	$-2a + 4d = 4$ (Divide by 2)	½	
	$- a + 2d = 2$ …….. (1)		
	$-a + 2d = 2$		
	$a + 9d = 31$		
	$11d = 33$		
	$d = \frac{33}{11}$		
	$d = 3$	½	
	substitute value of "d" in equation (2)		
	$a + 9d = 31$		
	$a + 9(3) = 31$		
	$a + 27 = 31$		
	$a = 31 - 27$		
	$a = 4$	½	
	The last three terms of an A.P are a_{30}, a_{29}, a_{28}		
	$a_{30} = a + 29d$ $a_{29} = a + 28d$ $a_{28} = a + 27d$		
	$a_{30} = 4 + 29(3)$ $a_{29} = 4 + 28(3)$ $a_{28} = 4 + 27(3)$		
	$a_{30} = 4 + 87$ $a_{29} = 4 + 84$ $a_{28} = 4 + 81$		
	$a_{30} = 91$ $a_{29} = 88$ $a_{28} = 85$	1	
	Arithmetic Progression = a, a+d, a+2d ……		
	$= 4, 4 + 3, 4 + 2(3)$……		
	$= 4, 7, 10$……	1	4

Q. No	Value points	Marks allotted
35	Solve the given pair of linear equations by graphical method. $x + 2y = 10$ $x + y = 8$ Scale : x axis and Y axis: 1 cm = 1unit. **x + 2y = 10** | X | 0 | 10 | | Y | 5 | 0 | | (x,y) | (0,5) | (10,0) | **x + y = 8** | X | 4 | 8 | | Y | 4 | 0 | | (x,y) | (4,4) | (8,0) |  **From the graph x= 6 & y = 2** For two tables 1+1 : 2marks Drawing 2 lines : 1 mark Finding values of x and y : 1 mark	4

Q. No	**Value points**	Marks allotted
36.	Prove that "If in two triangles, sides of one triangle are proportional to (i.e., in the same ratio of) the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar." **OR** Prove that "If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar". Ans : Data : In ΔABC and ΔDEF $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$ ----- (1)  To prove : $\angle A = \angle D, \angle B = \angle E$ and $\angle C = \angle F$ and $\Delta ABC \cong \Delta DEF$ Construction : Mark Points P and Q on DE and DF so that AB = DP and AC = DQ then join PQ	

Proof : $\frac{AB}{DE}=\frac{AC}{DF} \Longrightarrow \frac{DP}{DE}=\frac{DQ}{DF}$ ($DP = AB,\ DQ = AC$)

$\Longrightarrow \frac{DE}{DP}=\frac{DF}{DQ}$ (Inverse ratios)

$\Longrightarrow \frac{DE}{DP}-1,\ \frac{DF}{DQ}-1,$

$\Longrightarrow \frac{DE-DP}{DP}=\frac{DF-DQ}{DQ}$

$\Longrightarrow \frac{PE}{DP}=\frac{QE}{DQ}$

$\Longrightarrow \frac{DP}{PE}=\frac{DQ}{QF}$ (inverse ratios)

PQ ||EF (Thales theorem)

$\angle P = \angle E$ and $\angle Q = \angle F$

Δ DPQ = Δ DEF (AA similarity criteria)

There fore $\frac{DP}{DE}=\frac{DQ}{DF}=\frac{PQ}{EF}$ ------ (2)

If $AB = DP,\ AC = DQ$

$\frac{DP}{DE}=\frac{DQ}{DF}=\frac{BC}{EF}$ ------- (3)

From (2)and (3)

$BC = PQ$

In Δ ABC and Δ DPQ

$BC = PQ$

$AB = DP$

$AC = DQ$

Δ ABC $\cong$ Δ DPQ

$\angle A = \angle D,\ \angle B = \angle P,\ \& \angle C = \angle Q,$

4

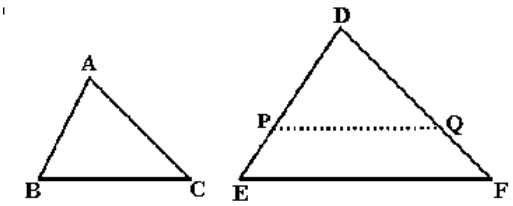
$\Longrightarrow \angle A = \angle D,\ \angle B = \angle E,\ \&\ \angle C = \angle F$

$\&\ \Delta ABC \sim \Delta DEF$

OR

Data :In ΔABC and ΔDEF

$\angle A = \angle D$, and $\frac{AB}{DE} = \frac{AC}{DF}$



To prove : $\Delta ABC \sim \Delta DEF$

Construction: Mark Points P and Q on DE and DF so that $AB = DP$ and

$AC = DQ$ then join PQ

Proof : In ΔABC and ΔDPQ

$AB = DP$ (construction)

$AC = DQ$ (construction)

$\angle A = \angle D$, (data)

$\Delta ABC \cong \Delta DPQ$ (SAS)

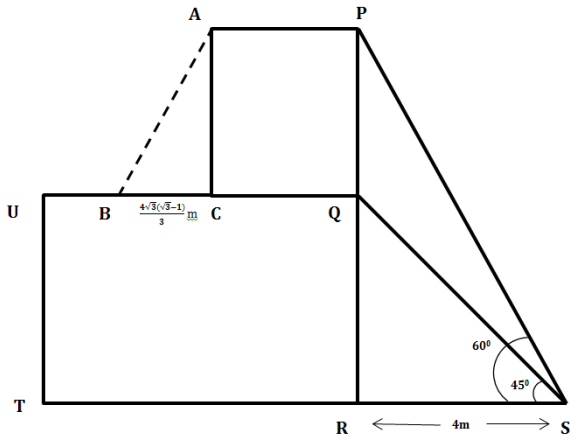
$\angle B = \angle P$,

$\angle C = \angle Q$, (corresponding angles of similar triangles) -----(1)

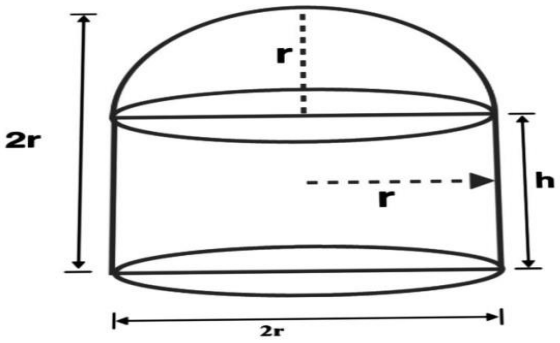
$\frac{AB}{DE} = \frac{AC}{DF}$ (data)

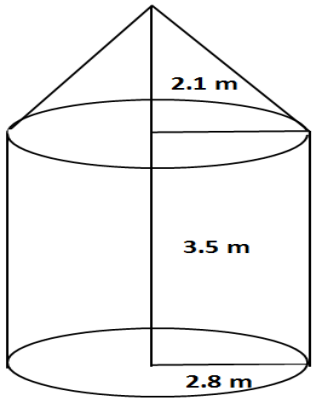
$\frac{DP}{DE} = \frac{DQ}{DF}$ ($AB = DP$ & $AC = DQ$)

PQ || EF (converse of Thales theorem)

	$\angle E = \angle P$, $\angle F = \angle Q$, --------(2) From (1)and (2) $\angle B = \angle E$, $\angle C = \angle F$, and $\angle A = \angle D$, $\Delta ABC \sim \Delta DEF$ Data : ½ mark Figure : ½ mark To Prove : ½ mark Construction: ½ mark Proof : 2 marks	4
Q. No	**Value points**	Marks allotted
37	A ladder 'AB' is used to climb the terrace of a room (APQC) in the first floor of a building (QRTU) as shown in the figure. The foot of the ladder 'B' is at a distance of $\frac{4\sqrt{3}(\sqrt{3}-1)}{3}$ m from the point 'C'. From a point 'S' on the ground which is 4m away from the building the angle of elevations to the point 'P' on the terrace and to the point 'Q' on the base of the room are 60^0 and 45^0 respectively. Find the length of the ladder and the ∠ABC made by the ladder with the wall. Ans:  Given :- Distance from the building, RS = 4 m	

	Angle of elevation to point Q, $\angle QSR = 45^0$ Angle of elevation to point P, $\angle PSR = 60^0$ In right-angled Δ QRS: $\tan 45^0 = \frac{QR}{RS} \Rightarrow 1 = \frac{QR}{4} \Rightarrow$ QR = 4 m ½ In right-angled triangle Δ PRS: $\tan 60^0 = \frac{PR}{RS} \Rightarrow \sqrt{3} = \frac{PR}{4} \Rightarrow$ PR = $4\sqrt{3}$ m. ½ PQ = PR – QR = $\mathbf{4\sqrt{3}} - 4 = 4(\sqrt{\mathbf{3}} - 1)$ m ½	
Q. No	**Value points**	Marks allotted
	Since APQC is a rectangle (the room structure on the first floor), the opposite side AC (wall) is equal to PQ : AC = PQ = $4(\sqrt{3} - 1)$ m ½ In right-angled triangle Δ ABC: $\tan B = \frac{AC}{BC}$ ½ $\tan B = \frac{4(\sqrt{3}-1)}{\frac{4\sqrt{3}(\sqrt{3}-1)}{3}}$ $\tan B = \frac{1}{\frac{\sqrt{3}}{3}}$ m. $\tan B = \frac{3}{\sqrt{3}}$ $\tan B = \sqrt{3}$ $\tan B = \tan 60^0$ $\angle ABC^0 = 60^0$ ∠ABC made by the ladder with the wall is 60^0. ½ In right-angled triangle Δ ABC: $\sin 60^0 = \frac{AC}{AB}$ ½ $\frac{\sqrt{3}}{2} = \frac{4(\sqrt{3}-1)}{AB}$	

	AB = $\frac{8(\sqrt{3}-1)}{\sqrt{3}}$ = $\frac{8(3-\sqrt{3})}{3}$ m ∴The length of the ladder is $\frac{8(3-\sqrt{3})}{3}$ m. ½	4
Q. No	**Value points**	Marks allotted
38	**VI. Answer the following question:** **1 x 5 = 5** A cylindrical hall has a hemispherical roof and the total height of the hall is equal to the diameter of the hemisphere. Find the area of the floor if the capacity of the hall is 48510m^3. If the inner surface of the hall is to be painted, then find the area to be painted.  **OR** 50 tents are to be built in a village for an upcoming fair. The lower part of each tent is cylindrical with base radius 2.8m and height 3.5m and the upper part is conical with the same base radius as that of the cylinder. If the height of the cone is 2.1m then find the area of the canvas used to make 50 such tents.	



Q. No	Value points	Marks allotted
	Ans :- Let radius of the hemisphere = radius of cylinder = '**r'** m. • Diameter of hemisphere = '2**r'** m. • Total height of the hall = '2**r'** m. • Height of the cylinder, h = Total height − radius of hemisphere = 2r − r = 'r' m. ½ Total Volume of the hall = Volume of Cylinder + Volume of Hemispherical Roof = 48510 cm^3 ½ $\pi r^2 h + \frac{2}{3}\pi r^3 = 48510$ ½ $\pi r^2 r + \frac{2}{3}\pi r^3 = 48510$ $\pi r^3 + \frac{2}{3}\pi r^3 = 48510$ $\frac{5}{3}\pi r^3 = 48510$ ½ $\frac{5}{3} X \frac{22}{7} X r^3 = 48510$ $\frac{110}{21} r^3 = 48510$ $r^3 = \frac{48510 \times 21}{110}$ $r^3 = 441 \times 21 = 21^3$ r = 21 m ½	

	Area of the floor is circular with radius 'r' = πr^2 ½ $= \frac{22}{7}$ x 21 x 21 $= 1386\ m^2$ ½ Area to be painted = CSA of Cylinder + CSA of Hemisphere ½ $= 2\pi rh + 2\pi r^2$ ½ $= 2\pi r^2 + 2\pi r^2$ $= 4 \times \frac{22}{7} \times 21 \times 21$ $= 4 \times 22 \times 3 \times 21$ $= 5544\ m^2$ ½	5
Q. No	**Value points**	Marks allotted
	OR **Ans :-** Cylinder : Base radius r = 2.8m height h = 3.5m Cone : Base radius r = 2.8m height h_c = 2.1m Slant height of the cone , l = $\sqrt{r^2 + {h_c}^2}$ ½ $= \sqrt{2.8^2 + 2.1^2}$ ½ $= \sqrt{7.84 + 4.41}$ $= \sqrt{12.25}$ ½ = 3.5 m ½ **Area of canvas for 1 tent:** Canvas area = CSA of Cylinder + CSA of Cone ½ $= 2\pi rh + \pi rl$ ½ $= \pi r (2h + l)$	

	$= \frac{22}{7}$ x 2.8(2 x 3.5 + 3.5)	½	5
	= 92.4 m^2	½	
	Area of canvas for 50 tents: 92.4 x 50 = 4620 m^2	1	