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FOR KARNATAKA CLASS 10 PREPARATION

Karnataka SSLC Model Question Paper 2027 for Mathematics (Paper 1, English Medium) Key Answers

EXAM	YEAR	TYPE	SUBJECT
Karnataka Class 10	2027	Answer Key	Maths

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD
Malleshwaram, Bengaluru – 560003

S.S.L.C. MODEL QUESTION PAPER – 01 – 2026-27
MODEL ANSWERS

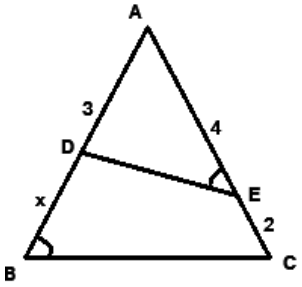
Subject: MATHEMATICS
(English Medium)

Subject Code: 81 – E

[Time: 3 Hours 15 Minutes]

[Max. Marks: 80]

Q.N.	Ans Key	Value Points	Marks allotted
1	(C)	If the pair of linear equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ have unique solution, then the correct relation among the following is A) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ 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
2	(A)	If the graph of a linear polynomial intersects x-axis at the point (3,0) then the polynomial is A) P(x) = x − 3 B) P(x) = x + 3 C) P(x) = 3x D) P(x) = 3 Ans: P(x) = x − 3	1

Q.N.	Ans Key	Value Points	Marks allotted
3	(D)	If the roots of the quadratic equation $x^2 + 6x + k = 0$ are real and equal, then the value of 'k' is A) 5 B) 8 C) -9 D) 9 Ans: 9	1
4	(B)	The common difference of the arithmetic progression -7, -9, -11, -13……. is A) 2 B) -2 C) -7 D) -9 Ans: -2	1
5	(A)	In the figure, $\angle ABC = \angle AED$, AD=3 units, AE=4 units and EC= 2 units then the value of x is, A) 5 units B) 6 units C) 3 units D) 1.5 units Ans: 5 units 	1
6	(B)	The value of $\sin 30^0 + \cos 60^0$ is, A) $\frac{1}{2}$ B)1 C) $\frac{1}{4}$ D) $\frac{3}{2}$ Ans: 1	1

<table>
<tr><td>Q.N.</td><td>Ans Key</td><td>Value Points</td><td>Marks allotted</td></tr>
<tr><td>7</td><td>(D)</td><td>A cone and a cylinder have the same base radius and equal volumes. If the height of the cylinder is 12 cm, then the height of the cone is,

A) 6 cm B) 12 cm

C) 4 cm D) 36 cm

Ans:
36 cm</td><td>1</td></tr>
<tr><td>8</td><td>(C)</td><td>The lower limit of the modal class in the given frequency distribution table is,

<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>
A)10 B)20

C)30 D)50

Ans:
30</td><td>1</td></tr>
<tr><td>Q.N.</td><td colspan="2">Value Points</td><td>Marks allotted</td></tr>
<tr><td>9</td><td colspan="2">II. Answer the following questions: $8 \times 1 = 8$

What is a composite number?

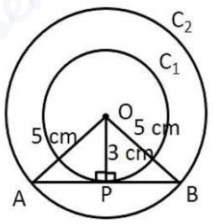
Ans: A number which can be expressed as product of two or more factors is called a composite number.</td><td>1</td></tr>
<tr><td>10</td><td colspan="2">Write the degree of the polynomial $p(x) = x^3 + 2x^2 - 5x^4 - 6$.

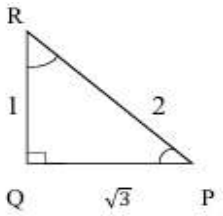
Ans: 4</td><td>1</td></tr>
<tr><td>11</td><td colspan="2">If the lines represented by the equations $x + 2y - 4 = 0$ and $3x + by - 12 = 0$ are coincident, then find the value of ‘b’.</td><td></td></tr>
</table>

Q.N.	Value Points	Marks allotted
	Ans: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ $\frac{1}{2}$ $\frac{1}{3} = \frac{2}{b} = \frac{-4}{-12}$ b = 2 x3 =6 $\frac{1}{2}$	1
12	If a_n S_n and S_{n-1} represent the nth term, sum of the first n terms and sum of first (n-1) terms then, express a_n in terms of S_n and S_{n-1}. Ans: a_n = S_n - S_{n-1}	1
13	State AAA criterion for similarity of triangles. Ans: "If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar"	1
14	Find the coordinates of the midpoint of the line segment joining the points P (3, 4) and Q (5, 6) Ans: $(x_1, y_1) = (3, 4)$ $(x_2, y_2) = (5, 6)$ $(x, y) = \left[\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right]$ $\frac{1}{2}$ $(x, y) = \left[\frac{3+5}{2}, \frac{4+6}{2}\right]$ $(x, y) = \left[\frac{8}{2}, \frac{10}{2}\right] = (4, 5)$ $\frac{1}{2}$	1
15	Write the formula to find the total surface area of a right circular cone of base radius 'r', and slant height 'l'. Ans: $\pi r (r + l)$	1
16	Find the probability of getting a head when a fair coin is tossed once. Ans: S={ H,T } n(S)=2 A={H} n(A)=1 $\frac{1}{2}$ Probability of getting head=P(A)=$\frac{n(A)}{n(S)}$= $\frac{1}{2}$ $\frac{1}{2}$	1

Q.N.	Value Points	Marks allotted
	III. Answer the following questions: **8 x 2 = 16**	
17	Find the L.C.M and H.C.F of 72 and 120 by prime factorization method. Ans: $72 = 2x\ 2\times2\times3\times3 = 2^3 x\ 3^2$ $\frac{1}{2}$ $120 = 2x\ 2\times2\times3\times5 = 2^3 x\ 3\ x\ 5$ $\frac{1}{2}$ HCF of $(72, 120) = 2^3 x\ 3 = 24$ $\frac{1}{2}$ LCM of $(72, 120) = 2^3 x\ 3^2 x\ 5 = 360$ $\frac{1}{2}$	2
18	Prove that $7 + \sqrt{5}$ is an irrational number. Ans: Let us assume that $7 + \sqrt{5}$ is rational number. Then we can find coprime a and b ($b\neq0$) such that $7 + \sqrt{5} = \frac{a}{b}$ $\frac{1}{2}$ Rearranging the equation, we get $\sqrt{5} = \frac{a}{b} - 7$ $\sqrt{5} = \frac{a}{b} - \frac{7}{1}$ $\sqrt{5} = \frac{a-7b}{b}$ $\frac{1}{2}$ Since a and b are integers, we get $\frac{a-7b}{b}$ is rational, and so $\sqrt{5}$ is rational. But this contradicts the fact that $\sqrt{5}$ is irrational. This contradiction has arisen because of our incorrect assumption that $7 + \sqrt{5}$ is rational. $\frac{1}{2}$ So, we conclude that $7 + \sqrt{5}$ is an irrational. $\frac{1}{2}$	**2**
19	Solve the given pair of linear equations by elimination method. $3x - y = 4$ $x + y = 8$	

Q.N.	Value Points	Marks allotted
	Ans: $3x - y = 4$ -------- (1) $x + y = 8$ ------- (2) $4x = 12$ $\frac{1}{2}$ $\therefore x = 3$ $\frac{1}{2}$ Substitute the value of x= 3 in equation (2) $x + y = 8$ $3 + y = 8$ $y = 8 - 3$ $\frac{1}{2}$ $y = 5$ $\frac{1}{2}$	2
20	Find the discriminant of the quadratic equation $3x^2 + 5x - 3 = 0$ and write the nature of roots. OR Find the roots of the quadratic equation $3x^2 - 5x + 2 = 0$ Ans: $3x^2 + 5x - 3 = 0$ $ax^2 + bx + c = 0$ a = 3, b = 5, c = −3 $\frac{1}{2}$ $\therefore$ Discriminant = $b^2 - 4ac$ $\frac{1}{2}$ $= (5)^2 - 4 \times 3 \times (-3)$ $= 25 + 36$ $= 61$ $\frac{1}{2}$ $\therefore$ Discriminant = $b^2 - 4ac > 0$ $\therefore$ Given quadratic equation has two distinct real roots. $\frac{1}{2}$ OR $3x^2 - 5x + 2 = 0$ $3x^2 - 3x - 2x + 2 = 0$ $\frac{1}{2}$ $3x(x-1) - 2(x-1) = 0$ $\frac{1}{2}$	2

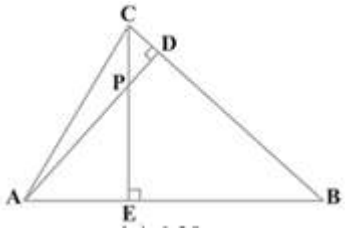
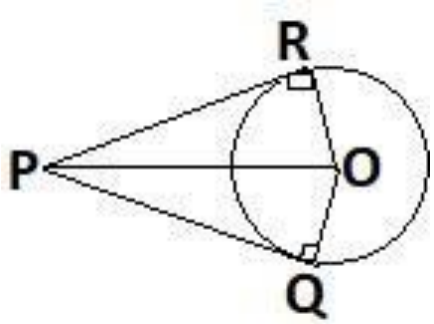
Q.N.	Value Points	Marks allotted
	$(x-1)(3x-2)=0$ $(x-1)=0$ or $(3x-2)=0$ $\frac{1}{2}$ $x=1$ or $x=\frac{2}{3}$ $\frac{1}{2}$	2
21	Find the sum of the first 20 terms of the arithmetic progression 6, 10, 14, ... using formula. Ans: a=6; d=4; n=20; s_{20}=? $S_n=\frac{n}{2}[2a+(n-1)d]$ $\frac{1}{2}$ $S_{20}=\frac{20}{2}[2x6+(20-1)4]$ $\frac{1}{2}$ $= 10\ [12+19x4]$ $= 10\ [\ 12+76]$ $= 10 \times 88$ $\frac{1}{2}$ $S_{20} = 880$ $\frac{1}{2}$	**2**
22	Two concentric circles with centre 'O"of radii 5 cm and 3 cm are drawn. Find the length of the chord of the larger circle which touches the smaller circle at point P.  Ans : Let chord AB of larger circle touch smaller circle at P. OP ⊥ AB and OP = 3 cm = radius of smaller circle. In Δ OPA: OA = 5cm , OP = 3cm, ∠OPA = 90° $\frac{1}{2}$  $AP^2 + OP^2 = OA^2$ $AP^2 = OA^2 - OP^2$ $\frac{1}{2}$ $= 25 - 9 = 16 \rightarrow AP = 4$ cm $\frac{1}{2}$	

Q.N.	Value Points	Marks allotted
	Since perpendicular from center bisects chord, AB = 2 × AP = 8 cm $\frac{1}{2}$ Length of chord AB = 8 cm	2
23	Find the distance between the points P (2, 4) and Q (8, 12) using distance formula. Ans: P(2, 4) = (x_1, y_1), Q(8, 12) = (x_2, y_2) $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\frac{1}{2}$ $= \sqrt{(8-2)^2 + (12-4)^2}$ $\frac{1}{2}$ $= \sqrt{6^2 + 8^2}$ $\frac{1}{2}$ $= \sqrt{36 + 64} = \sqrt{100} = 10$ $\frac{1}{2}$ ∴ **PQ = 10** Units	2
24	In the figure, find the value of sin P and tan R. **OR** If sin θ = $\frac{12}{13}$ and cos θ = $\frac{5}{13}$, then find the value of sec θ and tan θ  Ans: $sinP = \frac{opp}{hyp} = \frac{1}{2}$ 1 $tanR = \frac{opp}{adj} = \frac{\sqrt{3}}{1} = \sqrt{3}$ 1 **OR** $sec\theta = \frac{1}{Cos\theta} = \frac{1}{\frac{5}{13}} = \frac{13}{5}$ 1 $\therefore tan\theta = \frac{sin\theta}{cos\theta} = \frac{\frac{12}{13}}{\frac{5}{13}} = \frac{12}{5}$ 1	2

Q.N.	Value Points	Marks allotted
	IV. Answer the following questions: **9 x 3 = 27**	
25	Find the zeroes of the quadratic polynomial $P(x) = x^2 - 5x - 14$ and verify the relationship between the zeroes and the coefficients. OR Write the quadratic polynomial whose sum of the zeroes is 2 and the product of the zeroes is -8. Also find the zeroes of this polynomial. Ans: $p(x) = x^2 - 5x - 14$ $a=1 \quad b=-5 \quad c=-14$ $p(x)= x^2 - 5x - 14$ $p(x)= x^2 - 7x + 2x - 14$ $\frac{1}{2}$ $p(x)= x(x - 7)+ 2(x - 7)$ $p(x)= (x - 7)(x + 2)$ $x - 7= 0$ or $x + 2 = 0$ $x = 7$ or $x = -2$ $\frac{1}{2}$ $\therefore$ zeros of polynomials are $\alpha = 7$ and $\beta = -2$ sum of the zeros of polynomials $= 7 + (-2) = 5$ $\frac{1}{2}$ $= \frac{-(-5)}{1} = \frac{-\ coefficient\ of\ x}{coefficient\ of\ x^2}$ $\frac{1}{2}$ product of the zeros of polynomials $=(7) \times (-2) = -14$ $\frac{1}{2}$ $= \frac{-14}{1} = \frac{constant}{coefficient\ of\ x^2}$ $\frac{1}{2}$	3

Q.N.	Value Points	Marks allotted
	OR $\alpha + \beta = 2$, $\alpha \times \beta = -8$ Required quadratic polynomial is of form $P(x) = x^2 - (\alpha + \beta)x + \alpha\beta$ $\frac{1}{2}$ $= x^2 - 2x + (-8)$ $\frac{1}{2}$ $P(x) = x^2 - 2x - 8$ $\frac{1}{2}$ $P(x) = x^2 - 2x - 8$ $= x^2 - 4x + 2x - 8$ $\frac{1}{2}$ $= x(x-4) + 2(x-4)$ $= (x-4)(x+2)$ $\frac{1}{2}$ $x - 4 = 0$ or $x + 2 = 0$ $x = 4$ or $x = -2$ $\frac{1}{2}$ $\therefore$ zeros of polynomials 4 and -2	3
26	In a positive fraction, the sum of numerator and denominator is 5. If 1 is added to both numerator and denominator the new fraction obtained is $\frac{1}{12}$ more than the original fraction. Find the original fraction. Ans: Let the fraction be $\frac{x}{5-x}$ $\frac{1}{2}$ If 1 is added to both the numerator and the denominator The new fraction is: $\frac{x+1}{6-x}$ By data $\frac{x+1}{6-x} - \frac{x}{5-x} = \frac{1}{12}$ $\frac{1}{2}$	

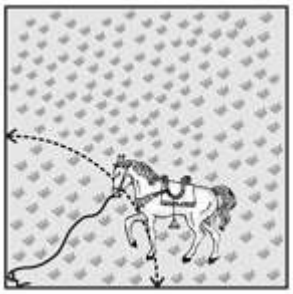
Q.N.	Value Points	Marks allotted
	$\frac{(x+1)(5-x)-x(6-x)}{(6-x)(5-x)} = \frac{1}{12}$ $\frac{5x-x^2+5-x-6x+x^2}{30-6x-5x+x^2} = \frac{1}{12}$ $\frac{5-2x}{x^2-11x+30} = \frac{1}{12}$ $\frac{1}{2}$ $12(5-2x) = x^2 - 11x + 30$ $60-24x = x^2 - 11x + 30$ $0 = x^2 - 11x + 24x + 30 - 60$ $x^2 + 13x - 30 = 0$ $\frac{1}{2}$ $x^2 + 15x - 2x - 30 = 0$ $x(x+15) - 2(x+15) = 0$ $(x+15)(x-2) = 0$ $x+15 = 0$ or $x-2=0$ $x = -15$ or **$x=2$** $\frac{1}{2}$ Considering $x=2$ numerator = 2 Denominator = 5-2=3 $\therefore$ fraction = $\frac{2}{3}$ $\frac{1}{2}$	3

Q.N.	Value Points	Marks allotted
27	In the figure, altitudes AD and CE of Δ ABC intersect each other at the point P. Prove that: (i) Δ AEP ~ Δ CDP (ii) Δ ABD ~ Δ CBE  Ans: (i) In ΔAEP and ΔCDP ∠AEP = ∠CDP = 90° $\frac{1}{2}$ ∠APE = ∠CPD (vertically opposite angles) $\frac{1}{2}$ ∴ ΔAEP ~ ΔCDP (AA similarity criteria) $\frac{1}{2}$ (ii) In ΔABD and ΔCBE ∠ADB = ∠CEB = 90° $\frac{1}{2}$ ∠ABD = ∠CBE (common angle) $\frac{1}{2}$ ∴ ΔABD ~ ΔCBE (AA similarity criteria) $\frac{1}{2}$	3
28	Prove that "the lengths of tangents drawn from an external point to a circle are equal".  Given : PQ and PR are the two tangents drawn from the external point P to a circle of centre O. To Prove : PQ = PR	

Q.N.	Value Points	Marks allotted
	Construction : Join OP, OQ, OR Proof : In Δ OQP and ΔORP OQ = OR (∵ Radii of same circle) OP = OP (∵Common side) $\angle OQP = \angle ORP = 90^0$ ∴ Δ OQP $\cong$ ΔORP (RHS congruence rule) ∴ PQ = PR (CPCT) Data , Figure: 1 mark To prove, construction : ½ marks Proof : 1 ½ marks	3
29	Find the ratio in which the line segment joining the points A (1, – 5) and B (– 4, 5) is divided by the x-axis. Also find the coordinates of the point of division. OR Find the coordinates of the point of trisection of the line segment joining the points (2, -2) and (-7, 4). Ans: The point on the x-axis is of the form (X, 0) ∴ P (x, y) = (x , 0) Let ratio be k : 1 ∴ $m_1 : m_2 = k : 1$ A**(1, -5) =** (x_1, y_1) B**(-4, 5) =** (x_2, y_2) $P(x, y) = \left[\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right]$ $\frac{1}{2}$ $P(x, 0) = \left[\frac{k(-4)+1(1)}{k+1}, \frac{k(5)+1(-5)}{k+1}\right]$ $\frac{1}{2}$ $(x, 0) = \left[\frac{-4k+1}{k+1}, \frac{5k-5}{k+1}\right]$ $x = \frac{-4k+1}{k+1}$ ---(1) $\frac{1}{2}$	

Q.N.	Value Points	Marks allotted
	$0 = \frac{5k-5}{k+1}$ $0(k+1) = 5k - 5$ $0 = 5k - 5$ $5k = 5 \quad k = \frac{5}{5} = 1 \quad \therefore k = 1$ $\therefore m_1 : m_2 = 1 : 1$ $\frac{1}{2}$ Put $k = 1$ in eqn. (1) $x = \frac{-4(1)+1}{1+1}$ $\frac{1}{2}$ $x = \frac{-4+1}{1+1} = \frac{-3}{2}$ $x = \frac{-3}{2}$ The coordinates of the point of division = $(x, 0) = (\frac{-3}{2}, 0)$ $\frac{1}{2}$ OR  $A(2, -2) = (x_1, y_1)$, $B(-7, 4) = (x_2, y_2)$ $m_1 : m_2 \Rightarrow 1 : 2$ $P(x, y) = ?$ $P(x, y) = \left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$ $\frac{1}{2}$ $P(x, y) = \left[\frac{1(-7)+2(2)}{1+2}, \frac{1(4)+2(-2)}{1+2}\right]$ $\frac{1}{2}$ $= \left[\frac{-7+4}{3}, \frac{4-4}{3}\right]$ $P(x, y) = \left[\frac{-3}{3}, \frac{0}{3}\right] = [-1, 0]$ $\frac{1}{2}$ The point Q divides AB internally in the ratio 2 : 1 $Q(x, y) = \left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$ $Q(x, y) = \left[\frac{2(-7)+1(2)}{2+1}, \frac{2(4)+1(-2)}{2+1}\right]$ $\frac{1}{2}$	3

Q.N.	Value Points	Marks allotted
	$= \left[\frac{-14+2}{3}, \frac{8-2}{3}\right]$ $\frac{1}{2}$ Q(x, y) $= \left[\frac{-12}{3}, \frac{6}{3}\right] = (-4, 2)$ $\frac{1}{2}$ ∴Trisection points of A and B are : (-1, 0) & (-4, 2)	3
30	Prove that $\frac{sinA}{1-cotA} + \frac{cosA}{1-tanA} = sinA + cosA$. **OR** Evaluate : $\frac{2cos(90^0-30^0)+tan45^0-\sqrt{3}cosec60^0}{\sqrt{3}sec30^0+2cos60^0+cot45^0}$ Ans: LHS $= \frac{sinA}{1-cotA} + \frac{cosA}{1-tanA}$ $= \frac{sinA}{1-\frac{cosA}{sinA}} + \frac{cosA}{1-\frac{sinA}{cosA}}$ $\frac{1}{2}$ $= \frac{sinA}{\frac{sinA-CosA}{sinA}} + \frac{cosA}{\frac{cosA-sinA}{cosA}}$ $\frac{1}{2}$ $= \frac{sin^2A}{sinA-cosA} + \frac{cos^2A}{cosA-sinA}$ $\frac{1}{2}$ $= \frac{sin^2A}{sinA-cosA} - \frac{cos^2A}{sinA-cosA}$ $\frac{1}{2}$ $= \frac{sin^2A-cos^2A}{sinA-cosA}$ $= \frac{(SinA+CosA)(SinA-CosA)}{SinA-CosA}$ $\frac{1}{2}$ $= sinA + cosA$ = RHS $\frac{1}{2}$ OR	3

Q.N.	Value Points	Marks allotted
	$\frac{2cos(90^0-30^0)+tan45^0-\sqrt{3}cosec60^0}{\sqrt{3}sec30^0+2cos60^0+cot45^0}$ $= \frac{2cos(60^0)+tan45^0-\sqrt{3}cosec60^0}{\sqrt{3}sec30^0+2cos60^0+cot45^0}$ $\frac{1}{2}$ $= \frac{2\left(\frac{1}{2}\right)+1-\sqrt{3}\left(\frac{2}{\sqrt{3}}\right)}{\sqrt{3}\left(\frac{2}{\sqrt{3}}\right)+2\left(\frac{1}{2}\right)+1}$ $1\frac{1}{2}$ $= \frac{1+1-2}{2+1+1}$ $\frac{1}{2}$ $= \frac{2-2}{4}$ $= 0$ $\frac{1}{2}$	3
31	A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find (i) the area of that part of the field in which the horse can graze. (ii) the increase in the grazing area if the rope were 10 m long instead of 5 m.  Ans: Length of the rope , r = 5m , $\theta = 90^0$ Area of sector = ? Area of sector $= \frac{\theta}{360} \times \pi r^2$ $\frac{1}{2}$ $= \frac{90}{360} \times 3.14 \times (5)^2$ $\frac{1}{2}$ $= \frac{1}{4} \times 3.14 \times 25$ $= 3.14 \times 6.25$ $= 19.625$ m^2 .....(1) $\frac{1}{2}$	

Q.N.	Value Points	Marks allotted
	ii) Length of the rope , r=10 m , $\theta = 90^0$ Area of sector =? Area of sector $= \frac{\theta}{360} \times \pi r^2$ $= \frac{90}{360} \times 3.14 \times (10)^2$ $\frac{1}{2}$ $= \frac{1}{4} \times 3.14 \times 100$ $= 3.14 \times 25$ $= 78.5 \text{ m}^2$ .....(2) $\frac{1}{2}$ ∴ The increase in the grazing area $= 78.5 - 19.625$ $= 58.875 \text{ m}^2$ $\frac{1}{2}$	3
32	Find the Mean for the following frequency distribution table. Class Interval | Frequency 10 – 14 | 2 15 – 19 | 3 20 – 24 | 5 25 – 29 | 3 30 – 34 | 2 OR Find the Median for the following frequency distribution table. Class Interval | 100-150 | 150-200 | 200-250 | 250-300 | 300-350 Frequency | 6 | 3 | 5 | 20 | 10	

Q.N.	Value Points	Marks allotted

Ans:

Class Interval	f	x_i	$f_i x_i$
10-14	2	12	24
15-19	3	17	51
20-24	5	22	110
25-29	3	27	81
30-34	2	32	64
	Σf_i =15		$\Sigma f_i\, x_i$=330

$$\text{Mean} = \frac{\Sigma f_i x_i}{\Sigma f_i} = \frac{330}{15} = 22$$

Completing table : 2 marks

Finding mean : 1 mark — 3

OR

C . I	frequency f	c.f
100-150	6	6
150-200	3	9
200-250	5	14
250-300	20	34
300-350	10	44
	N=44	

L=250

cf = 14

h =50

f=20

$\frac{N}{2} = \frac{44}{2} = 22$

Table and data 1

$$\text{Median} = L + \left(\frac{\frac{N}{2} - cf}{f}\right) \times h \qquad \frac{1}{2}$$

$$= 250 + \left(\frac{22-14}{20}\right) \times 50 \qquad \frac{1}{2}$$

$$= 250 + \left(\frac{400}{20}\right) \qquad \frac{1}{2}$$

$$= 250 + 20$$

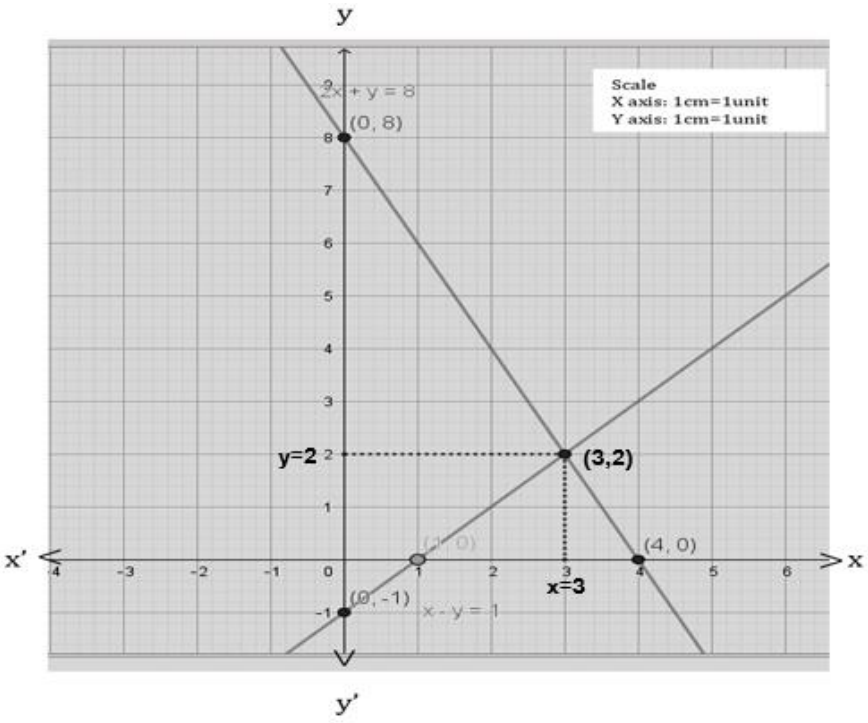
$$= 270 \qquad \frac{1}{2}$$

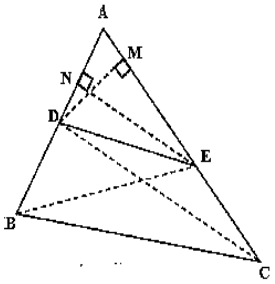
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Q.N.	Value Points	Marks allotted
33.	Two fair dice are rolled simultaneously. Find the probability of getting i) two different digits on the top faces ii) the product of the digits on the top faces to be 6 iii) the difference of digits on the top faces to be 1 Ans: n(S) = 6 x 6 = 36 i) Two same digits: {(1,1), (2,2), (3,3), (4,4), (5,5), (6,6)} = 6 ∴Two different digits = 36 - 6 = 30 P(A) = $\frac{n(A)}{n(S)}$ $\frac{1}{2}$ P(different digits) = $\frac{30}{36}$ = $\frac{5}{6}$ $\frac{1}{2}$ ii) B= {(1,6), (2,3), (3,2), (6,1)} n(B) =4 $\frac{1}{2}$ P(B) = $\frac{4}{36} = \frac{1}{9}$ $\frac{1}{2}$ iii) C= {(1,2), (2,1), (2,3), (3,2), (3,4), (4,3), (4,5), (5,4), (5,6), (6,5)} n(c) = 10 $\frac{1}{2}$ P(C) = $\frac{10}{36} = \frac{5}{18}$ $\frac{1}{2}$	3
34	**V. Answer the following questions:** **4 x 4 = 16** In an arithmetic progression of 40 terms the sum of first 9 terms is 153 and the sum of last 6 terms is 687. Find the first term and the common difference of the progression and also find the sum of all terms of the progression. OR The digits of a positive integer having 3 digits are in arithmetic progression and the sum of the digits is 9. The number obtained by reversing the digits is 396 more than the original number. Find the number.	

Q.N.	Value Points	Marks allotted
	Ans: n=40 $S_9 = 153$ $S_{40} - S_{34} = 687$ (Sum of 35^{th} term to 40^{th} term)	
	$S_n = \frac{n}{2}[2a + (n-1)\,d]$ $\frac{1}{2}$	
	$S_9 = \frac{9}{2}[2a + (9-1)\,d] = 153$	
	$\Rightarrow \quad 2a + 8d = \frac{153\ x\ 2}{9}$	
	$2a + 8d = 34$ ----------(1) $\frac{1}{2}$	
	Sum of 35^{th} term to 40^{th} term $= \frac{6}{2}[a_{35} + a_{40}] = 687$ $\frac{1}{2}$	
	$3(a+34d+a+39d)=687$	
	$2a+ 73d = \frac{687}{3}$	
	$2a+ 73d =229$ ----------(2) $\frac{1}{2}$	
	$(2)-(1) \Rightarrow 65d = 195 \Rightarrow d=3$ $\frac{1}{2}$	
	substitute d=3 in (1) we get $2a +24 =34$	
	$a=\frac{10}{2}$	
	$a=5$ $\frac{1}{2}$	
	$S_{40} = \frac{40}{2}[2x5 + (40-1)\,3]$ $\frac{1}{2}$	
	$= 20(10+ 39x3)$	
	$= 20(10+ 117)$	
	$= 20 \times 127 = 2540$ $\frac{1}{2}$	
		4
	OR	

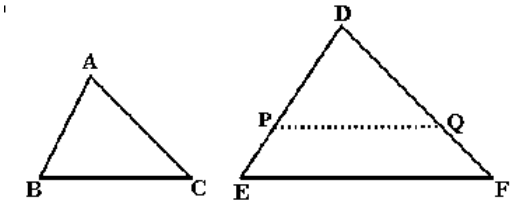
Q.N.	Value Points	Marks allotted
	Let the three digits of the number in arithmetic progression be (a - d), a and (a + d) where Hundreds digit = a - d Tens digit = a Units digit = a + d $\frac{1}{2}$ By data a - d + a + a + d = 9 3a = 9 a = 3 $\frac{1}{2}$ So the three digits are (3 - d), 3, and (3 + d) Original number = 100(3 - d) + 10(3) + (3 + d) = 300 - 100d + 30 + 3 + d = 333 – 99d ----------(1) $\frac{1}{2}$ The number obtained by reversing the digits = 100(3 + d) + 10(3) + (3 - d) = 300 + 100d + 30 + 3 - d = 333 + 99d ----------(2) $\frac{1}{2}$ By data 333 + 99d = 333 - 99d + 396 $\frac{1}{2}$ 99d + 99d = 396 198d = 396 d = $\frac{396}{198}$ = 2 $\frac{1}{2}$ Substituting a = 3 and d = 2 Hundreds digit = 3 - 2 = 1 Tens digit = 3 Units digit = 3 + 2 = 5 $\frac{1}{2}$ The original number = 135. $\frac{1}{2}$	4

Q.N.	Value Points	Marks allotted
35.	Solve the given pair of linear equations by graphical method. $2x + y = 8$ $x - y = 1$ Ans: $2x + y = 8$ | x | 0 | 4 | | y | 8 | 0 | | (x,y) | (0,8) | (4,0) | $x - y = 1$ | x | 0 | 1 | | y | -1 | 0 | | (x,y) | (0,-1) | (1,0) |  Two tables 1+1 : 2marks Drawing 2 lines : 1 mark Finding values of x and y : 1 mark	4

Q.N.	Value Points	Marks allotted
36	State and prove Basic Proportionality theorem (Thales Theorem). 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: Statement : "If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points , the other two sides are divided in the same ratio" (Thales theorem) Data : InABC , the line DE drawn parallel to intersects AB and AC at D and E To prove : $\frac{AD}{DB} = \frac{AE}{EC}$  Construction : join BE and DC , draw **DM⊥AC**, and **EN⊥A**B Proof : InΔADE & ΔBDE $\frac{Area\ of \Delta ADE}{Area\ of\ \Delta DBE} = \frac{\frac{1}{2}AD \times EN}{\frac{1}{2}BD \times EN}$ $\frac{Area\ of \Delta ADE}{Area\ of\ \Delta DBE} = \frac{AD}{BD}$ ----------1 In ΔADE & ΔECD $\frac{Area\ of \Delta ADE}{Area\ of\ \Delta ECD} = \frac{\frac{1}{2}AE \times DM}{\frac{1}{2}EC \times DM}$ $\frac{Area\ of \Delta ADE}{Area\ of\ \Delta ECD} = \frac{AE}{EC}$ ----------2 ΔBDE and Δ DEC stand on same base DE and in between BC ‖ DE ∴ Area of Δ BDE = Area of Δ ECD From (1) and (2) $\frac{AD}{DB} = \frac{AE}{EC}$ Figure:½ mark Data: ½ mark To Prove: ½ mark Construction: ½ mark Proof : 2 mark	4

Q.N.	Value Points	Marks allotted

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: take P and Q points 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)
$\therefore \angle B = \angle P$,
$\angle C = \angle Q$, (corresponding angles of similar triangles) ------ (1)
$\frac{AB}{DE} = \frac{AC}{DF}$ (data)

$\frac{DP}{DE} = \frac{DQ}{DF}$ (AB = DP & AC = DQ)
$\therefore$ PQ || EF (converse of Thales)
$\therefore \angle E = \angle P$,
$\angle F = \angle Q$, --------(2)

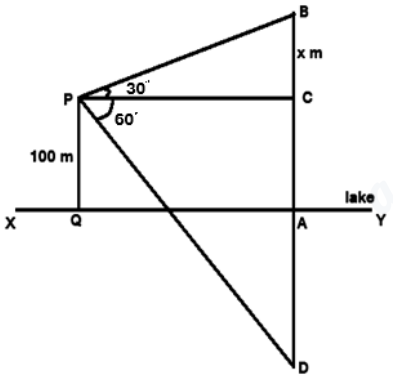
From (1)and (2)
$\angle B = \angle E$, $\angle C = \angle F$, and $\angle A = \angle D$,

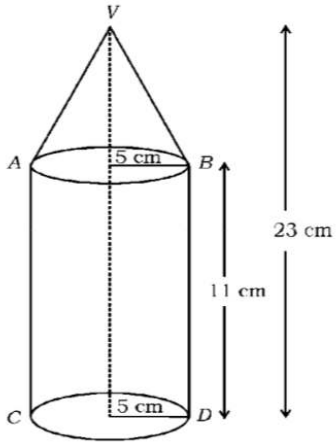
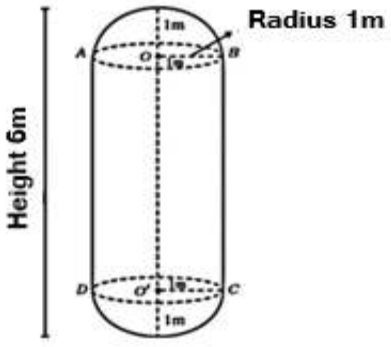
$\therefore \Delta ABC \sim \Delta DEF$

Figure:½ mark
Data: ½ mark
To Prove : ½ mark
Construction: ½ mark
Proof : 2 marks

4

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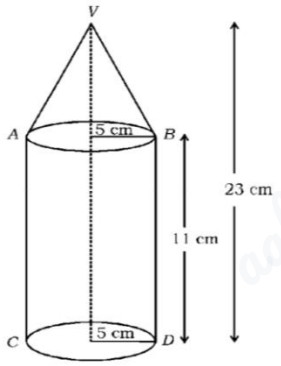
Q.N.	Value Points	Marks allotted
37	The angle of elevation of a bird at B from a point 100m above the surface of a lake is 30^0 and the angle of depression of its reflection(D) in the lake from the same point is 60^0. Find the height of the bird from the surface the lake. Ans:  AB is the height of the bird from the surface of the lake In the figure, PQ=AC=100 m and BC=x m $\tan 30^0 = \frac{BC}{PC}$ $\frac{1}{2}$ $\frac{1}{\sqrt{3}} = \frac{x}{PC}$ $\Longrightarrow$ PC = $x\sqrt{3}$ ---------(1) $\frac{1}{2}$ $\tan 60^0 = \frac{CD}{PC}$ $\frac{1}{2}$ $\sqrt{3} = \frac{100+100+x}{PC}$ $\frac{1}{2}$ $\Longrightarrow$ PC = $\frac{200+x}{\sqrt{3}}$ ----------(2) $\frac{1}{2}$ From (1) and (2) $x\sqrt{3} = \frac{200+x}{\sqrt{3}}$ $3x = 200 + x$ $\frac{1}{2}$ $3x - x = 200$ $2x = 200$ $x = \frac{200}{2} = 100$ $\frac{1}{2}$ $\therefore$ Height of the bird from the surface of the lake, AB = 100 + 100= 200 m $\frac{1}{2}$	4

Q.N.	Value Points	Marks allotted
	VI. Answer the following question: **1 x 5 = 5**	
38	A solid is in the shape of a cone placed on the cylinder as shown in the figure. The radii of both the cylinder and the cone are equal to 5 cm. If the height of the cylinder is 11 cm and the total height of the solid is 23 cm, then find the curved surface area and volume of the solid.  OR A milk tank is in the shape of a cylinder with hemispheres of same radii attached to both ends of it as shown in figure. If the total height of the tank is 6 m and the radius is 1 m, calculate the maximum quantity of milk in litres that can be filled in the tank. 	

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Q.N.	Value Points	Marks allotted

Ans:



Height of cone $h_c = 23-11 = 12$ cm $\frac{1}{2}$

Radius of cone r = 5cm

Slant height of cone $l^2 = r^2 + h^2$ $\frac{1}{2}$

$l^2 = 5^2 + 12^2$

$l^2 = 169$

$l = 13$ cm $\frac{1}{2}$

CAS of given solid = CSA of cone + CSA of cylinder

$= \pi rl + 2\pi rh$ $\frac{1}{2}$

$= \pi r (l + 2h)$

$= \frac{22}{7} \times 5 (13+2\times11)$ $\frac{1}{2}$

$= 550$ cm^2 $\frac{1}{2}$

Volume of given solid = volume of cone + volume of cylinder $\frac{1}{2}$

$= \frac{1}{3}\pi r^2 h_c + \pi r^2 h_{cy}$ $\frac{1}{2}$

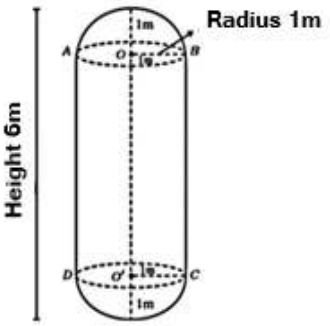
$= \pi r^2 \{\frac{1}{3} h_c + h_{cy}\}$

$= \frac{22}{7} \times 5 \times 5 \{\frac{1}{3} \times 12 + 11\}$ $\frac{1}{2}$ 5

$= \frac{8250}{7} = 1178.57$ cm^3 $\frac{1}{2}$

Q.N.	Value Points	Marks allotted

OR



Radius of hemisphere r = 1m
Radius of cylinder r = 1m
Height of cylinder h = 4m $\frac{1}{2}$

Volume of solid = Volume of cylinder + 2 (volume of hemisphere) $\frac{1}{2}$

$= \pi r^2 h + 2\left(\frac{2}{3}\pi r^3\right)$ $\frac{1}{2}$

$= \pi r^2 \left(h + \frac{4}{3} r\right)$ $\frac{1}{2}$

$= \frac{22}{7} \times 1 \times 1 \left(4 + \frac{4}{3} \times 1\right)$ $\frac{1}{2}$

$= \frac{22}{7} \times \frac{16}{3} = \frac{352}{21}\ m^3$ 1

Now, $1\ m^3 = 1000\ l$ $\frac{1}{2}$

∴ Max quantity of milk that can be filled in the tank = $\frac{352}{21}\ m^3$

$= \frac{352}{21} \times 1000\ l$ $\frac{1}{2}$

$= 16.7619 \times 1000\ l$

$= 16761.9\ l$ $\frac{1}{2}$

5