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FOR KARNATAKA CLASS 10 PREPARATION

Karnataka SSLC Model Question Paper 2027 for Mathematics (Paper 4, 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 – 04 – 2026-27

MODEL ANSWERS

Subject: MATHEMATICS

(English Medium)

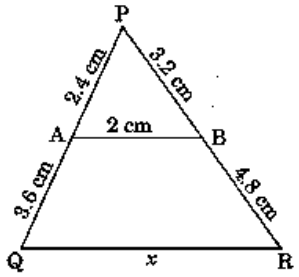
Subject Code: 81 – E

[Time: 3 Hours 15 Minutes]

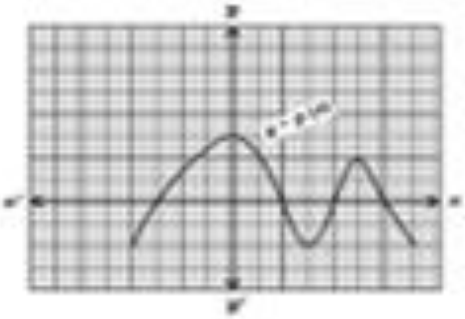
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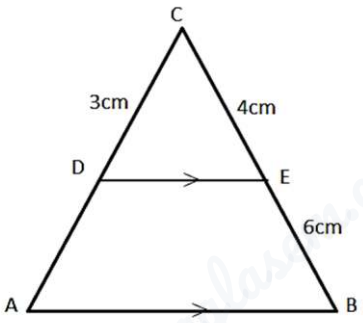
Q.No	Ans Key	Value Points	Marks allotted
1	(C)	**I. Multiple Choice Questions (1-marks for each correct answer)** $8 \times 1 = 8$ The maximum number of zeroes of a quadratic polynomial is, (A) 4 (B) 1 (C) 2 (D) 3 Ans: 2	1

Q.No	Ans Key	Value Points	Marks allotted
2	(B)	If the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ have infinite solutions, 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) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ Ans: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	1
3	(C)	If one of the roots of the quadratic equation $2x^2 + ax + 6 = 0$ is 2, then the value of 'a' is (A) 7 (B) $\frac{7}{2}$ (C) -7 (D) $\frac{-7}{2}$ Ans : -7	1
4	(C)	The formula to find the sum of first 'n' natural numbers is, (A) $S_n = n(n+1)$ (B) $S_n = n^2$ (C) $S_n = \frac{n(n+1)}{2}$ (D) $S_n = \frac{n(n-1)}{2}$ Ans: $S_n = \frac{n(n+1)}{2}$	1

Q.No	Ans Key	Value Points	Marks allotted
5	(B)	In the given figure, the value of 'x' is  (A) 4 cm (B) 5 cm (C) 6cm (D) 8 cm Ans: 5 cm	1
6	(C)	The formula to find mean of the grouped data by direct method is (A) $\bar{x} = \frac{\Sigma f_i}{\Sigma x_i}$ (B) $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma x_i}$ (C) $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$ (D) $\bar{x} = \Sigma f_i x_i$ Ans: $\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$	1
7	(D)	The volume of a cube with edge is 5 cm is (A) 125 cm^2 (B) 30 cm^3 (C) 100 cm^3 (D) 125 cm^3 Ans: 125 cm^3	1

Q.No	Ans Key	Value Points	Marks allotted
8	(B)	If $\sin A = \frac{1}{\sqrt{2}}$, then the value of A is, (A) 30^0 (B) 45^0 (C) 90^0 (D) 60^0 Ans: 45^0	1

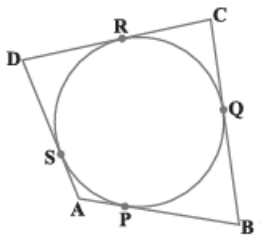
Q. No	Value points	Marks Allotted
9	**II. Answer the following questions:** $8 \times 1 = 8$ Write the number of zeroes of the polynomial p(x) in the given graph.  Ans: 4	1

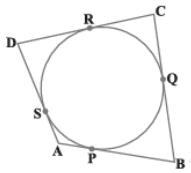
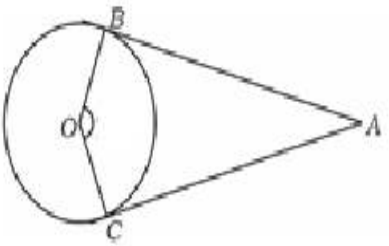
Q. No	Value points	Marks Allotted
10	If the lines represented by the equations $12x + py + 8 = 0$ and $4x + 2y + 2 = 0$ are parallel, then find the value of 'p'. Ans: If lines are parallel then $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ ½ $\Rightarrow \frac{12}{4} = \frac{p}{2}$ $\Rightarrow \frac{p}{2} = 3$ $\therefore p = 6$ ½	1
11	In an arithmetic progression the sum of the first 4 terms is 20 and the sum of first 3 terms is 12, then find the 4^{th} term of the progression. Ans: $a_4 = S_4 - S_3$ ½ $a_4 = 20 - 12$ $a_4 = 8$ ½	1
12	In ΔABC, DE || AB. If CD = 3 cm, EC = 4 cm, BE = 6 cm, then find the measure of DA. Ans: Since DE || AB $\frac{CD}{DA} = \frac{CE}{EB}$ $\frac{3}{DA} = \frac{4}{6}$ DE= $\frac{18}{4}$ DE= 4.5 cm 	1

Q. No	Value points	Marks Allotted
13	If the probability of winning a game is 0.8 then find the probability of losing the same game. Ans: $P(E) + P(\bar{E}) = 1$ ½ $0.8 + P(\bar{E}) = 1$ $P(\bar{E}) = 1 - 0.8$ $P(\bar{E}) = 0.2$ ∴The probability of losing the same game = 0.2 ½	1
14	If a and b are prime numbers, then write their H.C.F. Ans: 1	1
15	Two diagonals of a parallelogram intersect at a point 'O'. If the coordinates of the end points of one of the diagonals are (1, 1) and (7, 4) then find the coordinates of the point 'O'. Ans: $O(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ ½ $O(x, y) = \left(\frac{1+7}{2}, \frac{1+4}{2}\right)$ $O(x, y) = \left(\frac{8}{2}, \frac{5}{2}\right)$ $O(x, y) = \left(4, \frac{5}{2}\right)$ ½	1
16	Write the formula to find the surface area of a sphere whose radius is 'r' units. Ans: Surface area of sphere $= 4\pi r^2$	1

Q. No	Value points	Marks Allotted
17	**III. Answer the following questions:** **8 x 2 = 16** There are 10 terms in an arithmetic progression. If the last term is 34 and common difference is 3, then find the first term of the progression. **OR** Find the number of terms in the arithmetic progression 7, 13, 19.....205 Ans: $a_n=a+(n-1)d$ ½ $a_{10} = a +(10-1)(3)$ ½ $34 = a + 9(3)$ $34 = a + 27$ $a = 34 - 27$ ½ $a = 7$ ½ **OR** data: $a=7 \quad d=6 \quad n=? \quad a_n=205$ $a_n = a+(n-1)d$ ½ $205= 7+(n-1)6$ ½ $205= 7+6n-6$ $205= 6n+1$ $204=6n$ $n=\frac{204}{6}$ ½ $n = 34$ ½ ∴ Number of terms = 34	**2** **2**

Q. No	Value points	Marks Allotted
18	Determine the nature of the roots of the quadratic equation $x^2 - 9 = 0$ Ans: $x^2 - 9 = 0$ $x^2 = 9$ ½ $x = \sqrt{9}$ ½ $x = \pm 3$ ½ ∴Roots are real and distinct ½	2
19	Solve the given pair of linear equations. $5x - y = 14$ $x - y = -2$ Ans: $5x - y = 14$ ----------(1) $x - y = -2$ ----------(2) (-) (+) (+) ---------- $4x = 16$ ½ $x = \frac{16}{4}$ $x = 4$ ½ Substitute the value of 'x' in equation (2) $x - y = -2$ $4 - y = -2$ ½ $-y = -2 - 4$ $-y = -6$ $y = 6$ ½	2

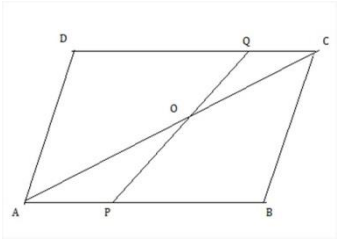
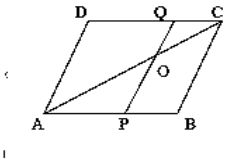
Q. No	Value points	Marks Allotted
20	Write the coordinates of the origin and also write the distance of the point D $(3, -4)$ from the x-axis. Ans: Coordinates of the origin are $(0, 0)$ 1 Distance of the point D $(3, -4)$ from the x-axis is 4 units. 1	2
21	Prove that $2 - \sqrt{5}$ is an irrational number. Ans: Let us assume , to the contrary, that 2 - $\sqrt{5}$ is rational. That is we can find co prime a and b (b≠ 0) such that 2 -$\sqrt{5} = \frac{a}{b}$ ½ $\therefore \sqrt{5} = 2 - \frac{a}{b}$ Rearranging this equation, we get $\sqrt{5} = \frac{2b-a}{b}$ ½ Since a and b are integers, we get $\frac{2b-a}{b}$ is rational, and so $\sqrt{5}$ is rational. But this contradicts the fact that $\sqrt{5}$ is irrational. ½ This contradiction has arisen because of our incorrect assumption that $2 - \sqrt{5}$ is rational. So, we conclude that $2 - \sqrt{5}$ is irrational ½	**2**
22	A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = AD + BC  	

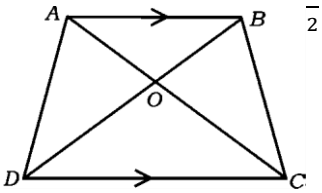
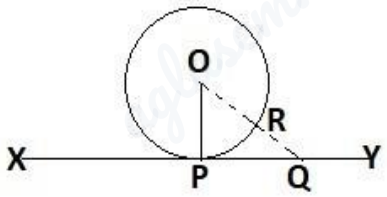
Q. No	Value points	Marks Allotted
	OR Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line segments joining the points of contact at the centre.  Ans: From the figure, (i) DR = DS, (ii) BP = BQ, (iii) AP = AS, (iv) CR = CQ ½ (Tangents drawn from an external point a circle are equal) Now, adding the LHS and RHS of the above equations, we get, DR+BP+AP+CR = DS+BQ+AS+CQ ½ By rearranging them, we get, (BP+AP) +(DR+CR) = (DS+AS)+ (CQ+BQ) ½ AB + CD = AD + BC ½ **OR**  Data: A is an external point to a circle with centre O. AB and AC are tangents. To Prove: ∠BOC + ∠BAC = 180° ½	2

Q. No	Value points	Marks Allotted
	Proof: $\angle OBA = \angle OCA = 90°$ In Quadrilateral OBAC, $\angle BOC + \angle OCA + \angle BAC + \angle OBA = 360°$ (Angle sum property of quadrilateral) ½ $\angle BOC + 90° + \angle BAC + 90° = 360°$ ½ $\angle BOC + \angle BAC + 180° = 360°$ $\angle BOC + \angle BAC = 360° - 180°$ $\angle BOC + \angle BAC = 180°$ ½	2
23	Evaluate: $2\tan^2 45^0 + \cos^2 30^0 - \sin^2 60^0$ Ans: $= 2(1)^2 + \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2$ 1 $= 2(1) + \frac{3}{4} - \frac{3}{4}$ ½ $= 2$ ½	2
24	The length and breadth of a rectangular field are 147m and 56m respectively. Calculate the maximum length of a rod that can be used to measure both length and breadth exactly. How many times this rod has to be used to measure the length of the field? 3 | 147 7 | 49 7 2 | 56 2 | 28 2 | 14 7 $147 = 3 \times 7^2$ $56 = 2^3 \times 7$ 1 HCF(147,56) is 7 ½ Maximum length of the rod = 7m This rod sholud be used 21 times to measure the field ½	2

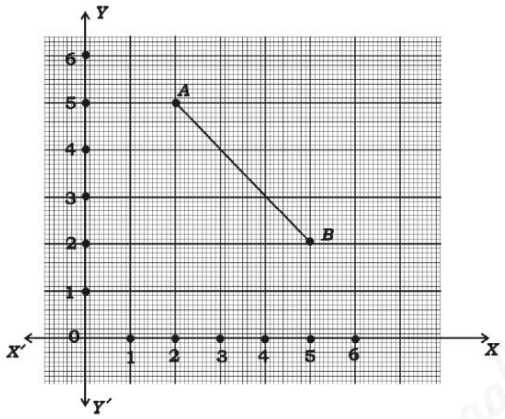
Q. No	Value points	Marks Allotted
25	**Answer the following questions:** **9 x 3 = 27** Write the quadratic polynomial whose sum of the zeroes is 2 and product of the zeroes is -15. Also and find the zeroes of this polynomial. Ans: $\alpha + \beta = 2$, $\alpha \times \beta = -15$ quadratic polynomial $P(x) = x^2 - (\alpha + \beta)\, x + \alpha\beta$ ½ $P(x) = x^2 - 2x - 15$ ½ $P(x) = x^2 - 2x - 15$ $P(x) = x^2 - 5x + 3x - 15$ ½ $P(x) = x(x-5) + 3(x-5)$ ½ $P(x) = (x-5)(x+3)$ ½ $x - 5 = 0$ or $x + 3 = 0$ $x = 5$ or $x = -3$ ∴zeroes of polynomials are 5 and -3 ½	3
26	An umbrella has 8 ribs which are equally spaced . Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella. 	

Q. No	Value points	Marks Allotted
	OR A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115°. Find the total area cleaned at each sweep of the blades. Ans: Total ribs in the umbrella = 8 The radius of the umbrella When it to be flat =45cm Angle between consecutive ribs at the centre $= \frac{360^0}{8} = 45^0$ ½ Area of sector $= \frac{\theta}{360^0} \times \pi r^2$ ½ $= \frac{45^0}{360^0} \times \frac{22}{7} \times 45^2$ ½ $= \frac{1}{8} \times \frac{22}{7} \times 45^2$ ½ $= \frac{44550}{56}$ ½ $= 795.5 \text{ cm}^2$ ½ OR Radius of the sector = length of the wiper = 25 cm ½ Area of the sector formed by the wiper $= \frac{\theta}{360^0} \times \pi r^2$ ½ $= \frac{115^0}{360^0} \times \pi r^2$ $= \frac{115^0}{360^0} \times \frac{25}{7} \times 25 \times 25$ ½ $= \frac{23}{72} \times \frac{22}{7} \times 625$ $= \frac{158125}{252} \text{ cm}^2$ ½ The total area covered by blades of two wipers $= 2 \times \frac{158125}{252} \text{ cm}^2$ ½ $= \frac{158125}{126} = 1254.96 \text{ cm}^2$ ½	3 3

Q. No	Value points	Marks Allotted
27	In the figure, ABCD is a parallelogram. If point P divides AB in the ratio 2:3 and the point Q divides DC in the ratio 4 : 1, then prove that $OA = 2 \times OC$.  **OR** In the trapezium ABCD, AB || DC. Diagonals AC and BD intersect each other at the point O. Prove that $AO \cdot DO = CO \cdot BO$ Ans: In ΔOAP and ΔOQC $\angle OAP = \angle QCO$ (∵AB ∥ CD alternate angles) ½ $\angle AOP = \angle QOC$ (∵vertically opposite angle) ½ $\angle APO = \angle OQC$ (∵ third angle) $\therefore \Delta OAP \sim \Delta OQC$ (∵A A criteria) ½  $\frac{OA}{OC} = \frac{AP}{CQ}$ so CQ = $\frac{1}{5}$ CD and AP = $\frac{2}{5}$AB $\frac{OA}{OC} = \frac{\frac{2}{5}AB}{\frac{1}{5}CD}$ ½ But AB = CD (opposite sides of the parallelogram) $\frac{OA}{OC} = \frac{\frac{2}{5}AB}{\frac{1}{5}AB}$ ½ $\frac{OA}{OC} = \frac{2}{5} \times \frac{5}{1}$ $\frac{OA}{OC} = 2$ $\therefore OA = 2\ OC$ ½	3

Q. No	Value points	Marks Allotted
	OR Ans: In Δ AOB and Δ DOC $\angle$ AOB= $\angle$ DOC (vertically opposite angles) ½ $\angle$ABO =$\angle$ ODC (alternate angles) ½ $\angle$ BAO =$\angle$OCD (alternate angles)  $\frac{1}{2}$ $\therefore \Delta AOB \sim \Delta COD$ (AA criteria) ½ $\frac{AO}{CO} = \frac{BO}{DO}$ ½ $\Rightarrow$ AO$\times$ DO = BO $\times$ CO ½	3
28	Prove that, "The tangent at any point of a circle is perpendicular to the radius through the point of contact."  $\frac{1}{2}$ Data : XPY is a tangent to a circle with centre O. 'P' is point of contact ½ To Prove : OP $\perp$ XY ½ Construction: Mark a point Q on the tangent XY and join OQ . OQ intersects the circle at R ½ Proof : OP = OR [Radii of same circle] Now OQ = OR + RQ $\Rightarrow$ OQ > OR $\Rightarrow$ OQ > OP [$\because$ OP = OR] ½ Therefore OP is the shortest distance to the tangent from the center O, $\therefore$ OP $\perp$ XY [$\because$ Perpendicular distance is always the shortest distance] ½	3

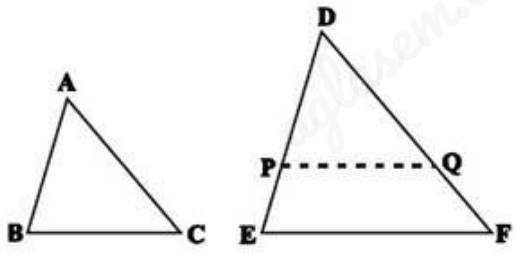
Q. No	Value points	Marks Allotted
29	A game consists of tossing a coin three times and noting its outcome each time. Person 'A' wins if all the tosses give the same result and loses otherwise. Person 'B' wins if the outcome is at least two heads and loses otherwise. Calculate which person has the greater probability of losing the game. Ans: S={ HHH,HHT,HTH,HTT, THH, THT, TTH, TTT} n(S)=8 ½ 'A' wins if he get A={HHH, TTT } n(A) = 2 $P(A) = \frac{n(A)}{n(S)} = \frac{2}{8} = \frac{1}{4}$ 1 'B' wins if he get B={HHH, HHT,HTH,THH } n(B) = 4 $P(B) = \frac{n(B)}{n(S)} = \frac{4}{8} = \frac{1}{2}$ 1 ∴ person "A' has the greater probability of losing the game ½	3
30	Aniruddha bought some pens for ₹60. If he had bought 5 more pens for the same amount, the price of each pen would have been reduced by ₹1. Find the number of pens he bought and the price of each pen. **Ans :** Let the number of pens bought be 'x'. Total cost = ₹60 price per pen = $\frac{60}{x}$ If he bought 5 more pens, the new number of pens would be x + 5. New price per pen = $\frac{60}{x+5}$ According to the question, the price per pen exceeds the new price per pen by ₹1 $\frac{60}{x} - \frac{60}{x+5} = 1$ ½	

Q. No	Value points	Marks Allotted
	$\frac{60(x+5)-60x}{x(x+5)} = 1$ $60x + 300 - 60x = x^2 + 5x$ $300 = x^2 + 5x$ $x^2 + 5x - 300 = 0$ ½ $x^2 + 20x - 15x - 300 = 0$ ½ $x(x+20) - 15(x+20) = 0$ $(x-15)(x+20) = 0$ $x - 15 = 0$ or $x + 20 = 0$ $x = 15, x = -20$ ½ Since the number of pens cannot be negative, $x = 15$ ½ Cost of each pen = $\frac{60}{15}$ = ₹4 ½	3
31	In the figure, find the coordinates of the point which divides the line segment 'AB' internally in the ratio 1:2 using section formula.  Ans: Coordinates of the point A : A (2, 5) = (x_1, y_1) Coordinates of the point B : B (5, 2) = (x_2, y_2) ½ $m_1 : m_2 = 1 : 2$, P (x, y) = ?	

Q. No	Value points	Marks Allotted
	$P(x, y) = \left[\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right]$ ½ $= \left[\frac{1(5) + 2(2)}{1 + 2}, \frac{1(2) + 2(5)}{1 + 2}\right]$ ½ $= \left[\frac{5 + 4}{3}, \frac{2 + 10}{3}\right]$ ½ $= \left[\frac{9}{3}, \frac{12}{3}\right]$ ½ $= (3, 4)$ $P(x, y) = (3, 4)$ ½	3
32	Find the Mode for the following frequency distribution table. class interval | 10 -20 | 20 -30 | 30 -40 | 40 -50 | 50 - 60 frequency | 3 | 9 | 6 | 7 | 5 **OR** Find the Median for the following frequency distribution table. class interval | frequency 0 – 10 | 4 10 – 20 | 9 20 – 30 | 15 30 – 40 | 14 40 – 50 | 8 Ans: Here class interval of the mode is $20 - 30$ $l = 20$ $f_0 = 3$ $f_1 = 9$ $f_2 = 6$ $h = 10$ 1	

Q. No	Value points		Marks Allotted
	$Mode = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$	½	
	$= 20 + \left[\frac{9-3}{2(9)-3-6}\right] \times 10$	½	
	$= 20 + \left[\frac{6}{9}\right] \times 10$	½	
	$= 20 + 6.66$		
	$= 26.66$	½	
	OR		
	class interval | frequency | cf 0 – 10 | 4 | 4 10 – 20 | 9 | 13 20 – 30 | 15 | 28 30 – 40 | 14 | 42 40 – 50 | 8 | 50	½	
	l=20 cf =13 h =10 f=15		
	$\frac{n}{2} = \frac{50}{2} = 25$	1	
	$\text{Median} = l + \left(\frac{\frac{n}{2} - Cf}{f}\right) \times h$	½	
	$= 20 + \left(\frac{25-13}{15}\right) \times 10$	½	
	$= 20 + \left(\frac{120}{15}\right)$		
	$= 20 + 8$		
	$= 28$	½	3

Q. No	Value points	Marks Allotted
33.	Prove that: $\frac{1+\cos A}{\sin A} - \frac{\sin A}{1+\cos A} = 2\cot A$ OR Prove that: $(cosecA - sinA)(tanA + cotA) = cotA.cosecA$ Ans: LHS $= \frac{1+CosA}{SinA} - \frac{SinA}{1+CosA}$ $= \frac{(1+CosA)^2 - Sin^2A}{SinA(1+CosA)}$ ½ $= \frac{1+Cos^2A+2CosA-Sin^2A}{SinA(1+CosA)}$ ½ $= \frac{1+Cos^2A+2CosA-(1-Cos^2A)}{SinA(1+CosA)}$ ½ $= \frac{1+Cos^2A+2CosA-1+Cos^2A}{SinA(1+CosA)}$ $= \frac{2Cos^2A+2CosA}{SinA(1+CosA)}$ ½ $= \frac{2CosA(CosA+1)}{SinA(1+CosA)}$ $= \frac{2CosA}{SinA}$ ½ $= 2cotA$ = RHS ½ **OR** LHS = (cosec A – sin A)(tanA + cot A) $= \left(\frac{1}{SinA} - SinA\right)\left(\frac{SinA}{CosA} + \frac{CosA}{SinA}\right)$ 1 $= \left(\frac{1-Sin^2A}{SinA}\right)\left(\frac{Sin^2A+Cos^2A}{SinA.CosA}\right)$ ½ $= \left(\frac{Cos^2A}{SinA}\right)\left(\frac{1}{SinA.CosA}\right)$ ½ $= \left(\frac{CosA}{SinA}\right)\left(\frac{1}{SinA}\right)$ ½ $= cotA.cosecA$ = RHS ½	3 3

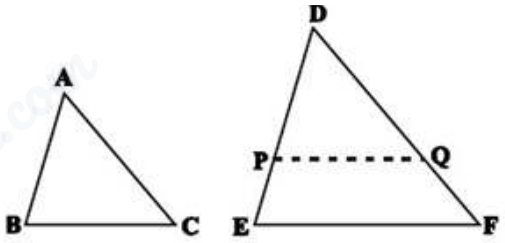
Q. No	Value points	Marks Allotted
34	**V. Answer the following questions:** **4 x 4 = 16** Prove that "If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar". **OR** Prove that "If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or in proportion) and hence the two triangles are similar". **Ans:**  ½ **Data**: In $\Delta ABC \ and \ \Delta DEF$ $\frac{AB}{DE} = \frac{AC}{DF}$ *and* ∠A =∠ D ½ **To prove**: $\Delta ABC \sim \Delta DEF$ ½ **Construction**: Mark points P and Q on the sides DE and DF respectively, such that DP = AB and DQ = AC. join PQ. ½	

Q. No	Value points	Marks Allotted
	Proof: In ΔABC and ΔDPQ AB = DP (construction) ∠A = ∠D (data) AC = DQ (construction) ΔABC ≅ ΔDPQ .... (1) by SAS criterion congruence ½ $\frac{AB}{DE} = \frac{AC}{DF}$ $\frac{DP}{DE} = \frac{DQ}{DF}$ (∵ DP = AB, DQ = AC) ∴ PQ || EF (∵ Converse of thales theorem) ½ ∴ ∠P = ∠E and ∠Q =∠F (corresponding angles) Consider ΔABC and ΔDPQ: AB = DP (by construction) ∠A = ∠D (given) AC = DQ (by construction) Therefore, ΔABC~ΔDPQ (SAS) ½ ∠B=∠P,∠C=∠Q (CPCT) So, ∠B = ∠P = ∠E , ∠C = ∠Q = ∠F Since all three corresponding angles are equal (∠A = ∠D,∠B = ∠E,∠C= ∠F), ΔABC~DEF (AAA) ½	4

Q. No	Value points	Marks Allotted

OR

Ans. :



½

Data : In triangles ABC,

$\angle A = \angle D, \angle B = \angle E, \angle C = \angle F$ ½

To prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ½

Construction: Cut AB=DP and AC = DQ on DE & DF at P & Q.
join PQ ½

Proof: In ΔABC and ΔDPQ ,

AB = DP , AC = DQ (construction)

$\angle BAC = \angle PDQ$ (data)

$\Delta ABC \cong \Delta DPQ$ (SAS congruency rule) ½

$\angle ABC = \angle DPQ$

But $\angle ABC = \angle DEF$

$\therefore \angle DPQ = \angle DEF$ ½

PQ ||EF (Since corresponding angles equal) ½

$\frac{DP}{DE} = \frac{PQ}{EF} = \frac{DQ}{DF}$------(1)

But AB = DP , BC = DQ

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ½

4

Q. No	Value points	Marks Allotted
35	The sum of first 5 terms of an arithmetic progression is 70 and the sum of first 10 terms is 290. Find the progression. Find which term of this progression is 48 more than its 10^{th} term. Let 'a' be the first term and 'd' be the common difference of the AP. Sum of first 5 terms $S_5 = 70$ $S_n = \frac{n}{2}[2a + (n - 1)d]$ ½ $S_5 = \frac{5}{2}[2a + (5 - 1)d]$ $70 = \frac{5}{2}[2a + 4d]$ $a + 2d = 14$ $a = 14 - 2d$ ..... (1) ½ Sum of first 10 terms $S_{10} = 290$ $S_n = \frac{n}{2}[2a + (n - 1)d]$ $S_{10} = \frac{10}{2}[2a + (10 - 1)d]$ $290 = 5[2a + 9d]$ $2a + 9d = 58$ $2(14 - 2d) + 9d = 58$ (from 1) ½ $28 - 4d + 9d = 58$ $5d = 58 - 28$ $5d = 30$ $d = 6$ ½	

Q. No	Value points	Marks Allotted
	$a=14-2d$ $a=14-2(6)$ $a=14-12$ $a=2$ ½ ∴ Required A P is $2, 8, 14, 20, 26 \ldots..$ ½ $a_n = a_{10} + 48$ ½ $a + (n-1)d = a + 9d + 48$ $2 + (n-1)6 = 2 + (9)6 + 48$ $2 + (n-1)6 = 2 + 54 + 48$ $2 + (n-1)6 = 104$ $(n-1)6 = 104 - 2$ $n-1 = \frac{102}{6}$ $n-1 = 17$ $n = 18$ 18^{th} term of the progression is 48 more than its 10th term. ½	4

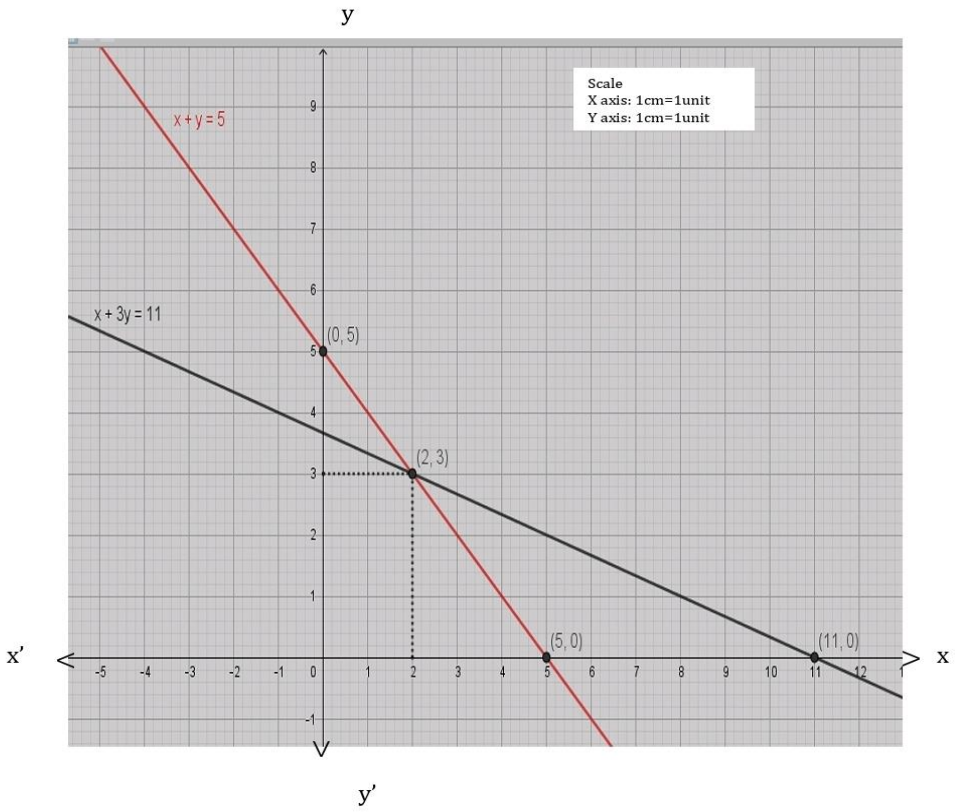
Q. No	Value points	Marks Allotted
36	Solve the given pair of linear equations by graphical method. $x + 3y = 11$ $x + y = 5$	

x + 3y = 11

X	2	11
Y	3	0
(x,y)	(2,3)	(11,0)

x + y = 5

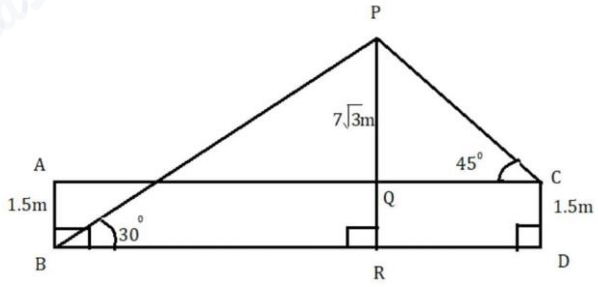
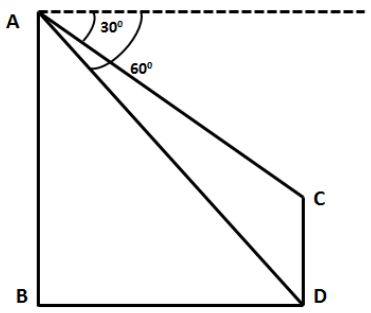
X	0	5
Y	5	0
(x,y)	(0,5)	(5,0)

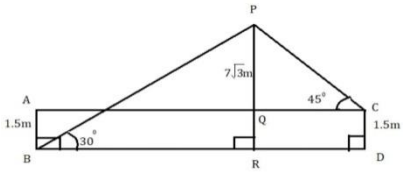


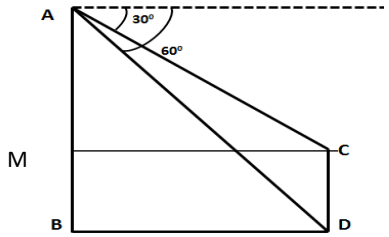
From the graph x= 2 & y = 3

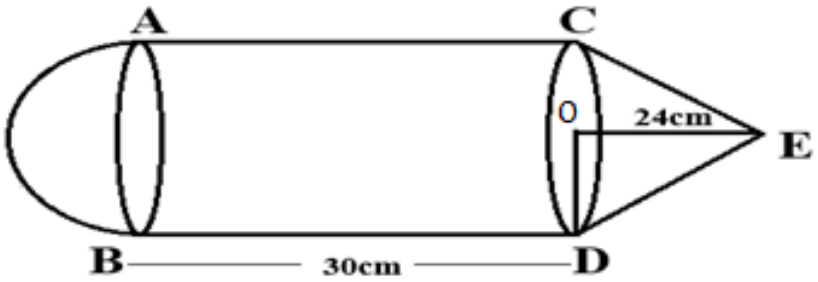
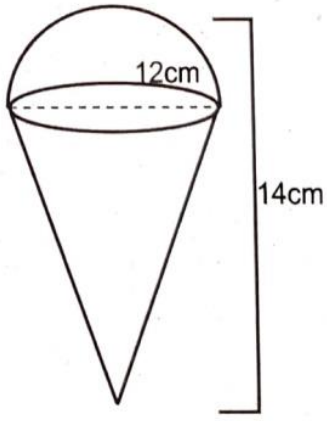
4

For two tables 1+1 : 2marks
Drawing 2 lines : 1 mark
Finding values of x and y : 1 mark

Q. No	Value points	Marks Allotted
37	Two poles of height 1.5m are standing vertically on either side of a flag post on a level ground as shown in the figure. The height of the flag post is $7\sqrt{3}$m and the angle of elevation from the foot of the pole AB to the top of the flag post is 30^0 and angle of elevation from the top of pole CD to the top of the flag post is 45^0. Find the distance between the poles. ($take\ \sqrt{3}=1.7$)  **OR** A building(AB) and a lamp post (CD) are standing vertically on a level ground as shown in the figure. The angles of depression of the top and bottom of the lamp post from the top of the building are found to be 30^0 and 60^0 respectively. If the height of the building is 60m, then find the (i) distance between the building and lamp post (ii) height of the lamp post. 	

Q. No	Value points	Marks Allotted
	Heights of the poles, AB = CD = 1.5 m Height of the flag post PR = $7\sqrt{3}$m Angle of elevation to point B, $\angle PBR = 30^0$ Angle of elevation to point C, $\angle PCQ = 60^0$  In right-angled Δ PBR: $\tan 30^0 = \frac{PR}{BR}$ ½ $\frac{1}{\sqrt{3}} = \frac{7\sqrt{3}}{BR}$ BR = 7 $(\sqrt{3})^2$ m BR = 7 X 3 BR = 21 m ½ Height PQ = PR − QR = $7\sqrt{3}$- 1.5 = 7X 1.7 −1.5 =10.4 m 1 In right-angled triangle PQC $\tan 45^0 = \frac{PQ}{QC}$ ½ $1 = \frac{10.4}{QC}$ QC = 10.4 RD = QC = 10.4 ½ Total distance between the poles BD = BR + RD ½ = 21+ 10.4 = 31.4m ∴ The distance between the poles is **31.4m**. ½	**4**

Q. No	Value points	Marks Allotted
	OR Given :- Heights of the building, AB = 60 m Let the height of the lamp post CD = h m  In right-angled triangle ABD $\tan 60^0 = \frac{AB}{BD}$ $\sqrt{3} = \frac{60}{BD}$ $BD = \frac{60}{\sqrt{3}}$ $= \frac{60}{\sqrt{3}} X \frac{\sqrt{3}}{\sqrt{3}}$ $= 20\sqrt{3}$ m 2 The distance between the building and the lamp post is = $20\sqrt{3}$m BD = MC = $20\sqrt{3}$m ½ In right-angled triangle AMC $\tan 30^0 = \frac{AM}{MC}$ ½ $\frac{1}{\sqrt{3}} = \frac{60-h}{20\sqrt{3}}$ ½ 60-h = 20 h = 40 m ∴Height of the lamp post = 40 m ½	4

Q. No	Value points	Marks Allotted
38	**VI. Answer the following questions:** **1 X 5 = 5** A solid is made by joining a cone and a hemisphere on either sides of a cylinder with the same radius as that of the cylinder as shown in the figure. The height of the cylinder and the cone are 30cm and 24cm respectively. If the volume of the cylinder is 4620cm^3 , then find the total surface area of the solid.  **OR** Sanvi made a solid as shown in the figure. The total height of the solid is 14cm and the diameter of the hemisphere and cone is 12cm. Find the total surface area and volume of the solid.  	

Q. No	Value points	Marks Allotted
	Ans :- Given : Height of cylinder h_{cyl} = 30 cm Height of cone h_{cone} = 24 cm Volume of cylinder $V_{cyl} = 4620 cm^2$ $\pi r^2 h = 4620$ ½ $\frac{22}{7} X\ r^2 X\ 30 = 4620$ $r^2 = 49$ r = 7 cm ½ Slant height (l) of the cone: $l = \sqrt{r^2 + h_c^{\ 2}}$ ½ $= \sqrt{7^2 + 24^2}$ $= \sqrt{49 + 576}$ $= \sqrt{625}$ = 25 cm ½ Total Surface Area (TSA) of the solid: TSA of the solid = CSA of hemisphere + CSA of cylinder + CSA of cone ½ $= 2\pi r^2 + 2\pi rh + \pi rl$ 1 $= \pi r (2r + 2h + l)$ ½ $= \frac{22}{7} X\ 7 (2 \times 7 + 2 (30) + 25)$ ½ $= 2178\ cm^2$ Total Surface area of the solid is $2178\ cm^2$ ½	5

Q. No	**Value points**	**Marks Allotted**
	OR Diameter of base = 12cm Radius r = 6 cm Total height of solid = 14 cm Height of hemisphere = Radius r = 6 cm Height of cone (h) = Total height − Height of hemisphere = 14 − 6 = 8 cm ½ Slant height of cone $l = \sqrt{r^2 + h^2}$ ½ $= \sqrt{6^2 + 8^2}$ $= \sqrt{36 + 64}$ $= \sqrt{100}$ = 10 cm ½ Total Surface Area of solid: TSA = CSA of hemisphere + CSA of cone ½ $= 2\pi r^2 + \pi rl$ ½ $= \pi r (2r + l)$	

	$= \frac{22}{7} X\ 6\ (2\ (6) + 10)$	
	$= \frac{2904}{7}\ cm^2$ ½	
	Total volume of solid = Volume of hemisphere + Volume of cone ½	
	$= \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^3 h$ ½	
	$= \frac{1}{3}\pi r^2 (r + h)$	
	$= \frac{1}{3} x \frac{22}{7} x\ 36\ x\ (12+6)$ ½	
	$= \frac{5280}{7}\ cm^3$ ½	5