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FOR KARNATAKA CLASS 10 PREPARATION

Karnataka SSLC Model Question Paper 2027 for Mathematics (Paper 2, 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 2026-27: SET-2

MODEL ANSWERS

Subject: MATHEMATICS

(English Medium)

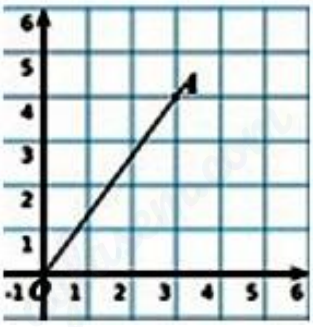
Subject Code: 81 – E

[Time: 3 Hours 15 Minutes]

[Max. Marks: 80]

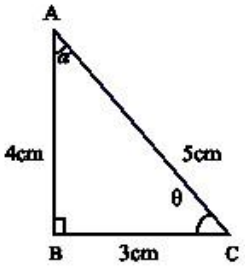
Qn. No.	Ans. Key	Value Points	Marks Allotted
I		**Multiple Choice Questions** $1 \times 8 = 8$	
1.		Rational number among the following is (A) $\sqrt{3}$ (B) $\sqrt{4}$ (C) $\sqrt{5}$ (D) $\sqrt{7}$ **Ans :**	
	(B)	$\sqrt{4}$	1

Qn. No.	Ans. Key	Value Points	Marks Allotted
2.		The Empirical relationship between the three measures of central tendency is (A) 3Mean= 2Median+ Mode (B) Mean = 3Median + Mode (C) 3Median = 2Mean + Mode (D) Mode = 3Mean + 2Mode **Ans :**	1
	(C)	3Median = 2Mean + Mode	
3.		The first term of an arithmetic progression is $'a'$ and the common difference is $'d'$.The n^{th} term of the progression is, (A) $a_n = a + (n-1)d$ (B) $a_n = a + (n+1)d$ (C) $a_n = a - (n-1)d$ (D) $a_n = n + 1$ **Ans :**	1
	(A)	$a_n = a + (n-1)d$	
4.		In the following, $sin^2 30° + cos^2 30°$ is equal to (A) sin 60° (B)2 sin 30° (C) cos 90° (D)2 cos 45° **Ans :**	1
	(B)	2 sin 30°	
5.		If the curved surface area of a cylinder is $100cm^2$ and its height is $10cm$, then the circumference of its base is, (A) 100 cm (B) 20 cm (C) 50 cm (D) 10 cm **Ans :**	1
	(D)	10 cm	

Qn. No.	Ans. Key	Value Points	Marks Allotted
6.	(D)	The lines represented by the pair of linear equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$ are, (A) Intersecting lines (B) Perpendicular lines (C) Coinciding lines (D) Parallel lines. **Ans :** Parallel lines.	1
7.	(C)	A bird flies along OA from point O to point A as shown in the figure. The distance covered by it is,  (A)4 units (B) 3 units (C)5 units (D)7 units **Ans :** 5 units	1
8.	(A)	In $\Delta ABC, AB = 4cm,\ BC = 3.5cm,\ AC = 2.5cm$ and in $\Delta DEF,\ DF = 7.5cm.$ If $\Delta ABC \sim \Delta DEF$, then the perimeter of ΔDEF is, (A) $30cm$ (B) $20cm$ (C) $10cm$ (D) $15cm$ **Ans :** $30cm$	1

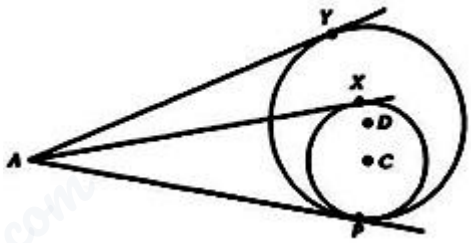
Qn. No.	Value Points	Marks Allotted
II.	**Answer the following questions:** $8 \times 1 = 8$	
9.	Write the formula to find the volume of a sphere with radius $'r'$. **Ans:** Volume of a sphere $= \frac{4}{3}\pi r^3$	1
10.	Write the quadratic equation $2m^2 = 2 - m$ in the standard form. **Ans:** $2m^2 + m - 2 = 0$	1
11.	Write the conditions for the two polygons of same number of sides to be similar. **Ans :** 1) Their corresponding angles are equal $\frac{1}{2}$ 2) Their corresponding sides are in the same ratio. $\frac{1}{2}$	1
12.	What is the maximum number of zeroes can a cubic polynomial have? **Ans :** 3	1
13.	If the 4^{th} term of an arithmetic progression is 11 and the 3^{rd} term is 7, then find its common difference. **Ans:** $d = a_4 - a_3 = 11 - 7$ $\frac{1}{2}$ $\therefore d = 4$ $\frac{1}{2}$	1
14.	Find the value of $p(2)$ in the polynomial $p(x) = x^2 - 1$. **Ans :** $p(2) = 2^2 - 1$ $\frac{1}{2}$ $= 4 - 1$ $\therefore p(2) = 3$ $\frac{1}{2}$	1

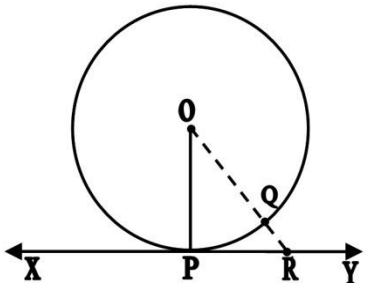
Qn. No.	Value Points	Marks Allotted
15.	Write the value of $P(E) + P(\overline{E})$ with reference to the probability of an event. **Ans :** $P(E) + P(\overline{E}) = 1$	1
16.	If the pair of liner equations in two variables are inconsistent, then how many solutions do they have? **Ans :** No solutions.	1
III	**Answer the following questions:** **8 x 2 = 16**	
17.	Find which term of the arithmetic progression 2, 7, 12.....is 47 using formula. **OR** In an arithmetic progression if the first term is 1 and 14th term is 53 then, find its n^{th} term. **Ans :** $a = 2, \quad n = ? \quad d = 5, a_n = 47$ $a_n = a + (n-1)d$ $\frac{1}{2}$ $47 = 2 + (n-1)5$ $47 - 2 = (n-1)5$ $\frac{1}{2}$ $\frac{45}{5} = (n-1)$ $\frac{1}{2}$ $9 + 1 = n$ $n = 10$ $\frac{1}{2}$ $\therefore$ 47 is the 10^{th} term of this progression.	2

Qn. No.	Value Points	Marks Allotted
	OR	
	Ans :	
	$a = 1,\ a_{14} = 53$	
	$\Longrightarrow a + 13d = 53$ $\frac{1}{2}$	
	$1 + 13d = 53$	
	$13d = 53 - 1$	
	$d = \frac{52}{13}$	
	$\therefore d = 4$ $\frac{1}{2}$	
	$a = 1,\quad n = n,\ d = 4, a_n = ?$	
	$a_n = a + (n-1)d$	
	$a_n = 1 + (n-1)4$ $\frac{1}{2}$	
	$a_n = 1 + 4n - 4$	
	$\therefore a_n = 4n - 3$ $\frac{1}{2}$	2
18.	In the figure, find the value of $sin\,\alpha + cos\,\theta$ 	
	Ans :	
	$sin\,\alpha = \frac{BC}{AC} = \frac{3}{5}$ $\frac{1}{2}$	
	$cos\,\theta = \frac{BC}{AC} = \frac{3}{5}$ $\frac{1}{2}$	
	$sin\,\alpha + cos\,\theta = \frac{3}{5} + \frac{3}{5}$ $\frac{1}{2}$	
	$\therefore sin\,\alpha + cos\,\theta = \frac{6}{5}$ $\frac{1}{2}$	**2**

Qn. No.	Value Points	Marks Allotted
19.	Solve the given pair of linear equations by elimination method. $4x + y = 13$ $x - y = 2$ **Ans :** $4x + y = 13$ $x - y = 2$ $5x = 15$ $\frac{1}{2}$ $\therefore x = 3$ $\frac{1}{2}$ Substituting $x = 3$ in the equation $x - y = 2$ $3 - y = 2$ $\frac{1}{2}$ $y = 3 - 2$ $\therefore y = 1$ $\frac{1}{2}$ $\therefore$ The solution is $x = 3$ *and* $y = 1$	2
20.	State the fundamental theorem of arithmetic. Write the prime factors of 30. **Ans :** Every composite number can be expressed as a product of primes, and this factorization is unique, apart from the order in which the prime factors occur. 1 Prime factors of 30 are 2, 3 and 5. 1	2
21.	If the quadratic equation $x^2 + bx + 9 = 0$ has two equal real roots, then find the value of $'b'$ and hence find the equation. **Ans :** $a = 1,\ b = b,\ c = 9$	

Qn. No.	Value Points	Marks allotted
22.	Given the roots are equal $\Rightarrow b^2 - 4ac = 0$ $\frac{1}{2}$ $(b)^2 - 4(1)(9) = 0$ $b^2 - 36 = 0$ $\frac{1}{2}$ $b^2 = 36$ $b = \pm\sqrt{36}$ $\therefore k = \pm 6$ $\frac{1}{2}$ $\therefore$ The quadratic equations are, $x^2 + 6x + 9 = 0$ or $x^2 - 6x + 9 = 0$ $\frac{1}{2}$	2
23.	Find the distance between the points $P(-5, 7)$ and $Q(-1, 3)$ using the distance formula. **Ans :** $P(-5,\ 7)$ and $Q(-1,\ 3)$ $x_1\ \ y_1 \qquad x_2\ \ y_2$ $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\frac{1}{2}$ $= \sqrt{[-1 - (-5)]^2 + (3 - 7)^2}$ $\frac{1}{2}$ $= \sqrt{(-1 + 5)^2 + (-4)^2}$ $= \sqrt{16 + 16}$ $\frac{1}{2}$ $= \sqrt{32}$ $\therefore d = 4\sqrt{2}\ units.$ $\frac{1}{2}$	2
	In the given figure, AP, AX and AY are the tangents drawn to the circles with centres C and D. Prove that AY=AX.	

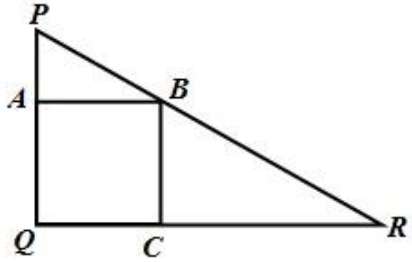
Qn. No.	Value Points	Marks Allotted
	 **Ans :** $AP = AX$ ----------(1) $\frac{1}{2}$ $AP = AY$ ----------(2) $\frac{1}{2}$ Comparing the equations (1) and (2) $AX = AY$ 1 Hence proved.	2
24.	In a school, there are 45 and 54 students in A and B sections of 10^{th} standard respectively. Find the minimum number of books to be purchased for the school library so that when distributed to section-A or section-B separately such that, each student get equal number of books. **OR** The HCF of two numbers is 14 and their LCM is 28 more than 10 times the HCF. If one of the numbers is 56, then find the other number. Also find the product of the numbers. **Ans :** Minimum number of books to be purchased $= L.C.M.(45, 54)$ $\frac{1}{2}$ $45 = 3 \times 3 \times 5$ $\frac{1}{2}$ $54 = 2 \times 3 \times 3 \times 3$ $\frac{1}{2}$ $L.C.M.(45, 54) = 3 \times 3 \times 2 \times 3 \times 5$ $= 270$ $\frac{1}{2}$ $\therefore$ Minimum number of books to be purchased $= 270$	2

Qn. No.	Value Points	Marks Allotted
	OR **Ans :** Given $HCF = 14$, Let the number be $A = 56$, B=? $A \times B$ =? and $LCM = 10(HCF) + 28$ $= 10(14) + 28$ $\therefore LCM = 168$ $\frac{1}{2}$ We know, $A \times B = H \times L$ $\frac{1}{2}$ $56 \times B = 14 \times 168$ $B = \frac{14 \times 168}{56}$ $\therefore B = 42$ $\frac{1}{2}$ $A \times B = 2352$ $\frac{1}{2}$	2
IV 25.	**Answer the following questions:** **9 x 3 = 27** Prove that, "The tangent at any point of a circle is perpendicular to the radius through the point of contact." **Ans:**  $\frac{1}{2}$ Data : XY is the tangent at P to the circle with centre O. $\frac{1}{2}$ To prove : $OP \perp XY$ $\frac{1}{2}$ Construction : Mark any point R on XY and join OR through Q. $\frac{1}{2}$	

Qn. No.	Value Points	Marks Allotted
26.	Proof: $OR > OQ$ $\frac{1}{2}$ $OQ = OP$ ($\because$ radii of the same circle) $\therefore \quad OR > OP$ $\Longrightarrow OP$ is the least distance from O to XY. $\therefore OP \perp XY$ $\frac{1}{2}$ Hence proved.	3
	Prove that, $\sqrt{\frac{1+\cos A}{1-\cos A}} = cosec\, A + \cot A$. **OR** Prove that, $sec\theta(1 - sin\theta)(sec\theta + tan\theta) = 1$. **Ans :** $Consider\ LHS = \sqrt{\frac{1+\cos A}{1-\cos A}}$ $= \sqrt{\frac{(1+\cos A)\ (1+\cos A)}{(1-\cos A)\ \ (1+\cos A)}}$ $\frac{1}{2}$ $= \sqrt{\frac{(1+cosA)^2}{1-cos^2 A}}$ $\frac{1}{2}$ $= \sqrt{\frac{(1+cosA)^2}{sin^2 A}}$ $\frac{1}{2}$ $= \frac{1+cosA}{\sin A}$ $\frac{1}{2}$ $= \frac{1}{sinA} + \frac{cosA}{sinA}$ $\frac{1}{2}$ $= cosecA + cotA$ $\frac{1}{2}$ $= RHS$ Hence proved	3

Qn. No.	Value Points	Marks Allotted
	OR	
	Anr :	
	$Consider\ LHS = sec\theta(1 - sin\theta)(sec\theta + tan\theta)$	
	$= (sec\theta - sec\theta.sin\theta)(sec\theta + tan\theta)$ $\frac{1}{2}$	
	$= (sec\theta - \frac{1}{cos\theta}.sin\theta)(sec\theta + tan\theta)$ 1	
	$= (sec\theta - tan\theta)(sec\theta + tan\theta)$ $\frac{1}{2}$	
	$= (sec^2\theta - tan^2\theta)$ $\frac{1}{2}$	
	$= 1$ $\frac{1}{2}$	3
	$= RHS$	
	Hence proved	
27.	In a quadratic polynomial sum of the zeroes is 1 and the difference of the zeroes is 7. Find the quadratic polynomial.	
	Ans:	
	Let the zeroes be $\alpha\ and\ \beta$	
	Given; $\alpha + \beta = 1$	
	$\alpha - \beta = 7$	
	$2\alpha = 8$ 1	
	$\therefore \alpha = 4$ $\frac{1}{2}$	
	substituting $\alpha = 4$ in $\alpha + \beta = 1$	
	$4 + \beta = 1$	
	$\therefore \beta = -3$ $\frac{1}{2}$	
	$\alpha\beta = (4)(-3)$	
	$\therefore \alpha\beta = -12$ $\frac{1}{2}$	
	The quadratic polynomial is of the form $p(x) = x^2 - (\alpha + \beta)x + \alpha\beta$	
	$\therefore p(x) = x^2 - x - 12$ $\frac{1}{2}$	3

Qn. No.	Value Points	Marks Allotted
28.	The ages of the students A and B are 19 years and 15 years respectively. Find how many years it will take so that the product of their ages becomes equal to 480. **OR** A dealer sells an article for Rs.24 and gains as much percent as the cost price. Find the cost price of the article. **Ans :** Let after x years the product of ages of A and B will be 480 After, x years– age of A is $(19+x)$ years and age of B is $(15+x)$ years $\frac{1}{2}$ Given; $(19+x)(15+x)=480$ $\frac{1}{2}$ $285+19x+15x+x^2=480$ $285+34x+x^2-480=0$ $x^2+34x-195=0$ $\frac{1}{2}$ $x^2+39x-5x-195=0$ $x(x+39)-5(x+39)=0$ $\frac{1}{2}$ $(x+39)(x-5)=0$ $x+39=0$ *or* $x-5=0 \implies x=-39$ or $x=5$ $\frac{1}{2}$ $x=-39$; Number of years cannot be negative. $\therefore x=5$ $\frac{1}{2}$ $\therefore$ After 5 years product of their ages is 480.	3

Qn. No.	Value Points	Marks Allotted
	OR	
	Ans :	
	Let the cost price (CP) $= Rs.x$ $\quad \therefore$ Profit % $= x$ $\quad \frac{1}{2}$	
	Given; Selling price (SP) $= Rs.24$	
	$Profit\ \% = \frac{SP-CP}{CP} \times 100$ $\quad \frac{1}{2}$	
	$x = \frac{24-x}{x} \times 100$	
	$x^2 = 2400 - 100x$ $\quad \frac{1}{2}$	
	$x^2 + 100x - 2400 = 0$	
	$x^2 + 120x - 20x - 2400 = 0$ $\quad \frac{1}{2}$	
	$x(x + 120) - 20(x + 120) = 0$	
	$(x + 120)(x - 20) = 0$	
	$x + 120 = 0\ or\ x - 20 = 0 \implies x = -120$ or $x = 20$ $\quad \frac{1}{2}$	
	$x = -120$ price cannot be negative . $\quad \therefore x = 20$ $\quad \frac{1}{2}$	
	$\therefore$ The cost price of the article is Rs.20	3
29.	The triangle PQR is right angled at $\angle Q$ with sides $PQ = 6cm$ and $QR = 12cm$. A square ABCQ is inscribed in the triangle as shown in the figure. Find the length of the side of the square. 	

Qn. No.	Value Points	Marks Allotted
	Answer : Let the length of the side of the square be x units. In ΔPAB and ΔPQR, $\angle P = \angle P$ (Common angles) $\angle PAB = \angle PQR = 90°$ $\therefore \Delta PAB \sim \Delta PQR$ 1 $\Rightarrow \frac{PA}{PQ} = \frac{AB}{QR}$ $\frac{1}{2}$ $\frac{6-x}{6} = \frac{x}{12}$ $\frac{1}{2}$ $\frac{12(6-x)}{6} = x$ $2(6-x) = x$ $12 - 2x = x$ $\frac{1}{2}$ $12 = 3x$ $\therefore x = 4$ $\frac{1}{2}$ $\therefore$ Length of the side of the inscribed square is $4cm$	3
30.	Find the Mean for the following data. Class interval | Frequency 2-6 | 4 6-10 | 8 10-14 | 2 14-18 | 1 18-22 | 5 **OR**	

Qn. No.	Value Points	Marks Allotted

Find the Mode for the following data.

Class interval	Frequency
0-10	6
10-20	9
20-30	15
30-40	9
40-50	1

Ans

Class interval	Frequency (f_i)	Mid point (x_i)	$f_i x_i$
2-6	4	4	16
6-10	8	8	64
10-14	2	12	24
14-18	1	16	16
18-22	5	20	100
	$\sum f_i = 20$		$\sum f_i x_i = 220$

2

Mean $\bar{x} = \frac{f_i x_i}{f_i}$ $\frac{1}{2}$

$= \frac{220}{20}$

$\therefore \bar{x} = 11$ $\frac{1}{2}$

3

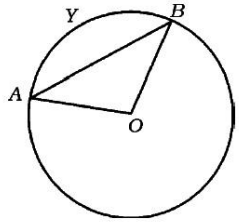
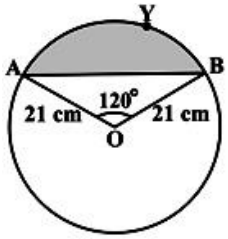
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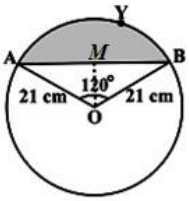
Ans:

$f_0 = 9,\ f_1 = 15,\ f_2 = 9,\ l = 20,$ and $h = 30 - 20 = 10.$ 1

$Mode = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$ $\frac{1}{2}$

Qn. No.	Value Points	Marks allotted
	$= 20 + \left(\frac{15-9}{2(15)-9-9}\right) \times 10$ $\frac{1}{2}$	
	$= 20 + \left(\frac{6}{30-18}\right) \times 10$	
	$= 20 + \frac{6\times10}{12}$ $\frac{1}{2}$	
	$= 20 + 5$	
	$\therefore Mode = 25$ $\frac{1}{2}$	3
31.	A box contains 20 discs with numbers 1 to 20 written on them. A disc is drawn at random from the box. Find the probability that the number obtained on the disc is (i) divisible by 2 but not by 3. (ii) which is both perfect square and perfect cube.	
	Ans	
	$n(s) = 20$ $\frac{1}{2}$	
	(i) Let A be the event of getting a number divisible by 2 and not divisible by 3	
	$A = (2, 4, 8, 10, 14, 16, 20)$ $\frac{1}{2}$	
	$n(A) = 7$	
	$P(A) = \frac{n(A)}{n(S)}$ $\frac{1}{2}$	
	$\therefore P(A) = \frac{7}{20}$ $\frac{1}{2}$	
	(ii) Let B be the event of getting a number which is both perfect square and perfect cube.	

Qn. No.	Value Points	Marks allotted
	$B = (1)$ $\frac{1}{2}$ $n(B) = 1$ $P(B) = \frac{n(B)}{n(S)}$ $\therefore P(B) = \frac{1}{20}$ $\frac{1}{2}$	3
32.	In the figure, the area of the sector $OAYB$ is $462cm^2$. If $\angle AOB = 120°$, then find the length of the arc AYB.  **OR** In the figure, if radius of the circle is $21cm$ and $\angle AOB = 120°$, then find the area of the segment AYB shown in the figure.  **Ans:** Area of sector OAYB $= 462cm^2$ and $\theta = 120°$ $\frac{\theta}{360^o} \times \pi r^2 = Area\ of\ the\ sector$ $\frac{1}{2}$ $\frac{120°}{360^o} \times \frac{22}{7} \times r^2 = 46$ $\frac{1}{2}$ $\Longrightarrow \frac{1}{3} \times \frac{22}{7} \times r^2 = 462$ $r^2 = \frac{462 \times 7 \times 3}{22}$ $\frac{1}{2}$ $r^2 = 21 \times 21$	

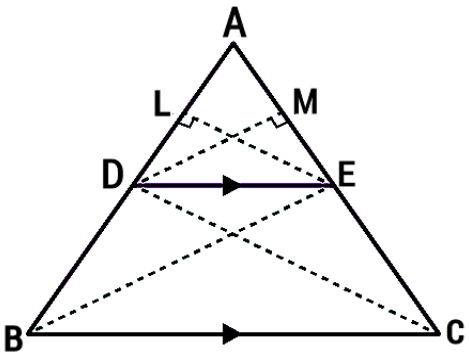
Qn. No.	Value Points	Marks allotted
	$\therefore r = 21\ cm$ $\frac{1}{2}$ Length of an arc $= \frac{\theta}{360^o} \times\ 2\pi r$ $\frac{1}{2}$ Length of the arc AYB $= \frac{120^o}{360^o} \times\ 2\ \times \frac{22}{7} \times\ 21$ $\therefore$ Length of the arc AYB $= 44$ cm $\frac{1}{2}$ **OR** **Ans:** In the figure, draw $OM \perp AB$  Area of the segment AYB $= Area(Sector\ OAYB) - Area(\Delta OAB)$ $Area(Sector\ OAYB) = \frac{\theta}{360^o} \times\ \pi r^2$ $= \frac{120^\circ}{360^o} \times \frac{22}{7} \times 21 \times 21$ $\therefore$ Area of sector OAYB $= 462 cm^2$ 1 $\angle AOM = \theta = 60^\circ$ $\cos 60^\circ = \frac{OM}{OA}$ $\frac{1}{2} = \frac{OM}{21}$ $OM = \frac{21}{2}\ cm$ $\frac{1}{2}$ $\sin 60^\circ = \frac{AM}{OA}$ $\frac{\sqrt{3}}{2} = \frac{AM}{21}$	3

Qn. No.	Value Points	Marks allotted
	$AM = \frac{21\sqrt{3}}{2}\ cm$ $AB = 2AM$ $= 2 \times \frac{21\sqrt{3}}{2}$ $AB = 21\sqrt{3}\ cm$ $\frac{1}{2}$ $Area(\Delta OAB) = \frac{1}{2} \times AB \times OM$ $= \frac{1}{2} \times 21\sqrt{3} \times \frac{21}{2}$ $Area(\Delta OAB) = \frac{441\sqrt{3}}{4}\ cm^2$ $\frac{1}{2}$ Area of the segment AYB $= 462 - \frac{441\sqrt{3}}{4}$ $= \frac{462\times4-441\sqrt{3}}{4}$ Area of the segment AYB $= \frac{21}{4}(88 - 21\sqrt{3})\ cm^2$ $\frac{1}{2}$	3
33.	Find the ratio in which the point $(-4, 6)$ divides the line segment joining the points $(-6,10)$ *and* $(3, -8)$ internally. **Ans:** $(-6, 10)$ *and* $(3, -8)$ and $(-4, 6)$ $m_1 : m_2 = ?$ $x_1\ y_1$ $x_2\ y_2$ $x\ y$ $P(x,y) = \left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$ $\frac{1}{2}$ $(-4,6) = \left[\frac{m_1(3)+m_2(-6)}{m_1+m_2}, \frac{m_1(-8)+m_2(10)}{m_1+m_2}\right]$	

Qn. No.	Value Points	Marks allotted
	$(-4,6) = \left[\frac{3m_1-6m_2}{m_1+m_2}, \frac{-8m_1+10m_2}{m_1+m_2}\right]$ $\frac{1}{2}$	
	Equating the $x-coordinates$,	
	$\Rightarrow -4 = \frac{3m_1-6m_2}{m_1+m_2}$ $\frac{1}{2}$	
	$-4(m_1+m_2) = 3m_1-6m_2$	
	$-4m_1-4m_2 = 3m_1-6m_2$ $\frac{1}{2}$	
	$6m_2-4m_2 = 3m_1+4m_1$ $\frac{1}{2}$	
	$2m_2 = 7m_1$	
	$\Rightarrow \frac{m_1}{m_2} = \frac{2}{7}$	
	$\therefore m_1 : m_2 = 2:7$ $\frac{1}{2}$	3
V	**Answer the following questions:** **4 x 4 = 16**	
34.	Prove that, "If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio."	
	OR	
	Prove that, "if in two triangles, sides of one triangle are proportional to the sides of the other triangle, then their corresponding angles are equal and hence the two triangles are similar."	

Qn. No.	Value Points	Marks allotted

Ans :



$\frac{1}{2}$

Data : In $\Delta ABC,\ DE \parallel BC$ $\frac{1}{2}$

To prove : $\frac{AD}{DB} = \frac{AE}{EC}$ $\frac{1}{2}$

Construction : Draw $DM \perp AC$ and $EL \perp AB$ $\frac{1}{2}$

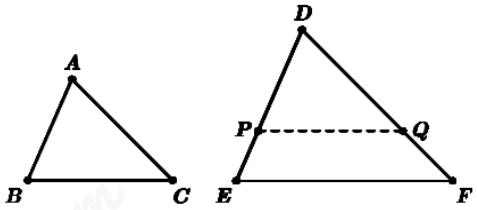
Proof:

Statements	Reasons	
$\frac{Ar(\Delta ADE)}{Ar(\Delta BDE)} = \frac{\frac{1}{2} \text{x } AD \text{ x } EL}{\frac{1}{2} \text{x } DB \text{ x } EL}$	Ar(Triangle) $= \frac{1}{2} \times base \times$ height	
$\frac{Ar(\Delta ADE)}{Ar(\Delta BDE)} = \frac{AD}{DB} \quad \rightarrow (1)$		$\frac{1}{2}$
$\frac{Ar_{(\Delta ADE)}}{Ar_{(\Delta CDE)}} = \frac{\frac{1}{2} \text{x } AE \text{ x } DM}{\frac{1}{2} \text{x } EC \text{ x } DM}$	Ar(Triangle) $= \frac{1}{2} \times base \times$ height	
$\frac{Ar(\Delta ADE)}{Ar(\Delta CDE)} = \frac{AE}{EC} \quad \rightarrow (2)$		$\frac{1}{2}$
$Ar(\Delta BDE) = Ar(\Delta CDE) \rightarrow (3)$	ΔBDE and ΔCDE are standing on the same base and between the same parallels $DE \parallel BC$	$\frac{1}{2}$
$\therefore \frac{AD}{DB} = \frac{AE}{EC}$ Hence proved.	From equations (1) , (2) and (3)	$\frac{1}{2}$ =4

OR

Qn. No.	Value Points	Marks allotted

Ans :



$\frac{1}{2}$

Data : In ΔABC and ΔDEF, $\frac{DE}{AB} = \frac{DF}{AC} = \frac{EF}{BC}$ ----- (1) $\frac{1}{2}$

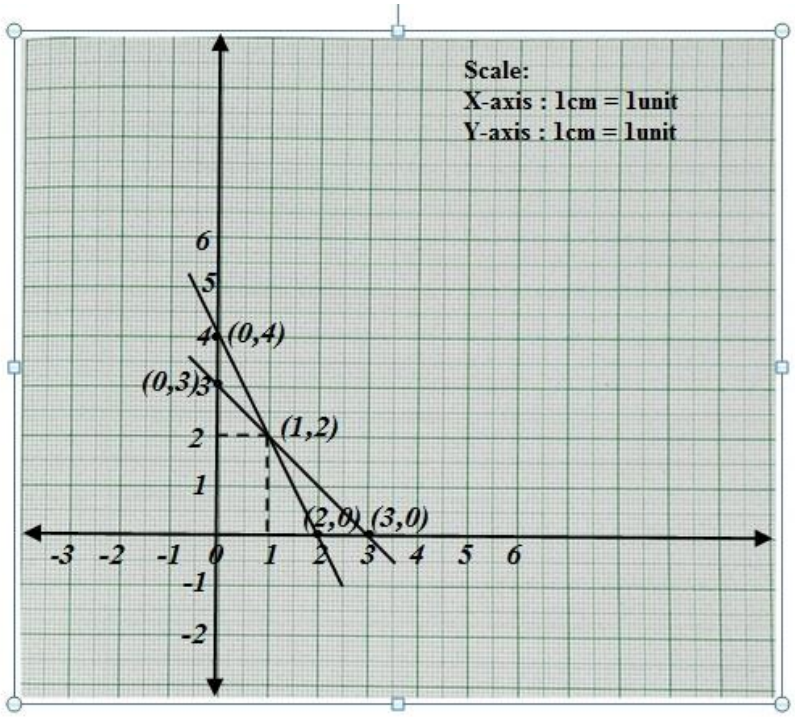
To prove : $\angle A = \angle D$, $\angle B = \angle E$ and $\angle C = \angle F$, and $\Delta ABC \sim \Delta DEF$ $\frac{1}{2}$

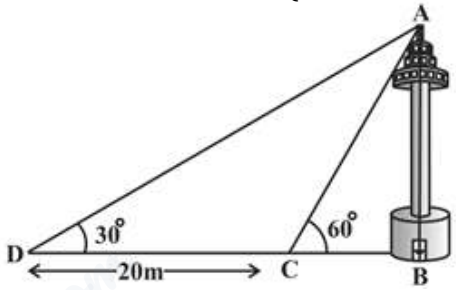
Construction: In ΔDEF, draw a line segment PQ such that,

$DP = AB$ and $DQ = AC$. $\frac{1}{2}$

Proof:

Statements	Reasons	
$\frac{DE}{AB} = \frac{DF}{AC} \implies \frac{DE}{DP} = \frac{DF}{DQ}$	Data and Construction	
$\frac{DE}{DP} - 1 = \frac{DF}{DQ} - 1$		
$\frac{DE-DP}{DP} = \frac{DF-DQ}{DQ}$		
$\frac{PE}{DP} = \frac{QF}{DQ}$		$\frac{1}{2}$
$\implies PQ \parallel EF$	Converse of B.P.T.	
$\therefore \left.\begin{matrix}\angle P = \angle E \\ \angle Q = \angle F\end{matrix}\right\} --(2)$	Corresponding angles	
$\Delta DPQ \sim \Delta DEF$	A.A.A. Criterion	$\frac{1}{2}$
$\therefore \frac{DE}{DP} = \frac{DF}{DQ} = \frac{EF}{PQ}$ ----(3)		
$\implies PQ = BC$ ----- (4)	From equations (1) and (3) and construction	
$\Delta ABC \cong \Delta DPQ$	From equation (4) and construction; S.S.S. congruency	$\frac{1}{2}$
$\therefore \angle A = \angle D$, $\angle B = \angle P$ and $\angle C = \angle Q$	(C.P.C.T)	
$\implies \angle A = \angle D$, $\angle B = \angle E$ and $\angle C = \angle F$	From Equation (2)	$\frac{1}{2}$
$\therefore \Delta ABC \sim \Delta DEF$	A.A. A. criterion	
Hence proved.		=4

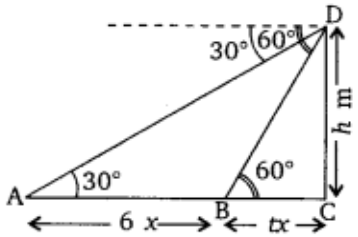
Qn. No.	Value Points	Marks allotted
35.	Solve the given pair of linear equations by graphical method. $2x + y = 4$ $x + y = 3$ **Ans :** $2x + y = 4$ x | 0 | 2 y | 4 | 0 $x + y = 3$ x | 0 | 3 y | 3 | 0  $\therefore$ *The Solution is* $x = 1$ *and* $y = 2$ Two tables 1+1 : 2marks Drawing 2 lines : 1 mark Finding values of x and y : 1 mark	4
36.	Sum of the first five terms of an arithmetic progression is 75 less than the sum of the next five terms. If the sum of 2nd term and 12th term of the same progression is 50, then find the progression. **Ans :** Given; $a_2 + a_{12} = 50$ Let Sum of the first 5 terms $= S_5$ Sum of the next 5 terms $= S_{10} - S_5$ $\frac{1}{2}$	

Qn. No.	Value Points	Marks allotted
	Given; $S_5 = S_{10} - S_5 - 75$ $\frac{1}{2}$ $75 = S_{10} - S_5 - S_5$ $75 = S_{10} - 2S_5$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $75 = \frac{10}{2}[2a + (10-1)d] - 2 \times \frac{5}{2}[2a + (5-1)d]$ 1 $75 = 5[2a + 9d - 2a - 4d]$ $\frac{1}{2}$ $75 = 25d$ $\frac{75}{25} = d$ $\therefore d = 3$ $\frac{1}{2}$ Given; $a_2 + a_{12} = 50$ $a + d + a + 11d = 50$ $2a + 12(3) = 50$ $2a = 14$ $\therefore a = 7$ $\frac{1}{2}$ $\therefore$ The arithmetic progression is 7, 10, 13, 16..... $\frac{1}{2}$	4
37.	A television tower stands vertically on a bank of a canal. From a point on the other bank directly opposite the tower, the angle of elevation of the top of the tower is 60°. From another point $20m$ away from this point, on the line joining this point to the foot of the tower, angle of elevation of the top of the tower is 30°. Find the height of the tower and the width of the canal. (Use $\sqrt{3} = 1.732$)  	

Qn. No.	Value Points	Marks allotted

OR

A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30°, which is approaching the foot of the tower with a uniform speed. 6 seconds later, the angle of depression of the car is found to be 60°. Find the time taken by the car to reach the foot of the tower from this point.



Ans :

Let width of the canal be $BC = x\ cm$

In ΔABC,

$tan60° = \frac{AB}{BC}$ $\frac{1}{2}$

$\sqrt{3} = \frac{AB}{x}$

$AB = x\sqrt{3}m$ -------(1) $\frac{1}{2}$

In ΔABD,

$tan30° = \frac{AB}{BD}$ $\frac{1}{2}$

$\frac{1}{\sqrt{3}} = \frac{x\sqrt{3}}{20+x}$ [substituting equation(1)] 1

$20 + x = 3x$ $\frac{1}{2}$

$2x = 20$

$\therefore x = 10m$ $\frac{1}{2}$

$\therefore$ The width of the canal is $10\ m$

Height of the tower $= AB$

$= 10 \times \sqrt{3}$

$= 10 \times 1.732$

$\therefore$Height of the tower $= 17.32\ m$ $\frac{1}{2}$ 4

Qn. No.	Value Points	Marks allotted

OR

Ans:

Given; height of the tower $DC = h$,

Time taken by the car to reach B from A $= 6$ seconds.

Let the time taken by the car to reach C from B be $'t'$ seconds.

Let the speed of the car be $'x'$. $\frac{1}{2}$

We know, Speed $= \frac{distance}{time} \Longrightarrow distance = time \times speed$

$\therefore$ The distance $AC = 6x + tx = (6 + t)x$ $\frac{1}{2}$

The distance $BC = tx$ and

In ΔDBC,

$tan60° = \frac{DC}{BC}$ $\frac{1}{2}$

$$\sqrt{3} = \frac{h}{tx}$$

$h = tx\sqrt{3}$ $\frac{1}{2}$

In ΔDAC,

$tan30° = \frac{DC}{AC}$ $\frac{1}{2}$

$$\frac{1}{\sqrt{3}} = \frac{h}{(6+t)x}$$

$\Longrightarrow \frac{1}{\sqrt{3}} = \frac{tx\sqrt{3}}{(6+t)x}$ [substituting for 'h'] $\frac{1}{2}$

$3t = 6 + t$

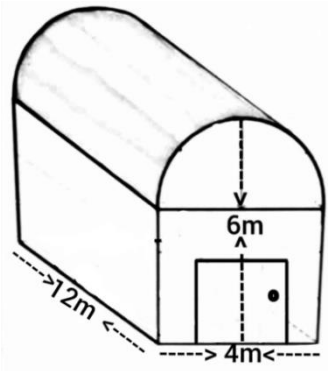
$2t = 6$

$\therefore t = 3$ $\frac{1}{2}$

Total time taken by the car to reach the foot of the tower from Point A

$= 6 + 3$

$= 9$ seconds $\frac{1}{2}$ 4

Qn. No.	Value Points	Marks allotted
38.	A warehouse is in the shape of a cuboid surmounted by a half cylinder as shown in the figure. A merchant plans to paint the outer surface of the warehouse excluding the door of dimension $2m \times 3m$ installed in the front wall. The length and breadth of the warehouse are $12m$ and $4m$ respectively and its total height is $6m$. If half a litre of paint covers one square metre, then how many litres of paint has to be purchased by the merchant to paint the warehouse?  **OR** A girl purchases a hemispherical wooden pen stand of radius $7cm$ as shown in the figure. 5 conical holes are drilled on it. If the radius of the base of each hole is $0.7cm$ and depth is $2.4cm$ then, find the total surface area of the pen stand and also find the volume of wood in it.  **Ans :** Radius of the half cylindrical roof; $r = \frac{4}{2} = 2m$ Height of the half cylindrical roof = Length of the warehouse $h = 12m$ $\frac{1}{2}$	

Qn. No.	Value Points	Marks allotted
	Length of the wall; $L = 12m$ Breadth; $B = 4m$ Height of the wall: $H = 6 - 2 = 4m$ $\begin{pmatrix} Outer\ surface \\ area\ of\ the \\ warehouse \end{pmatrix} = LSA\begin{pmatrix} cuboidal \\ warehoue \end{pmatrix} + TSA\begin{pmatrix} Half \\ cylindrical \\ roof \end{pmatrix} - \begin{pmatrix} Area\ of \\ the\ Door \end{pmatrix}$	$\frac{1}{2}$
	$LSA\begin{pmatrix} cuboidal \\ warehoue \end{pmatrix} = 2(LH + BH)$ $= 2(12 \times 4 + 4 \times 4)$ $= 2(64)$ $LSA\begin{pmatrix} cuboidal \\ warehoue \end{pmatrix} = 128\ m^2$	1
	$TSA\begin{pmatrix} Half\ cylindrical \\ roof \end{pmatrix} = \frac{1}{2}(TSA\ of\ Cylinder)$ $= \frac{1}{2}[2\pi rh + 2\pi r^2]$ $= \frac{1}{2} \times 2\pi r(h + r)$ $= \frac{22}{7} \times 2 \times (12 + 2)$ $= \frac{22}{7} \times 28$ $TSA(Half\ cylindrical\ roof) = 88\ m^2$	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$
	$Area\ of\ the\ Door = 2 \times 3$ $\therefore Area\ of\ the\ Door = 6m^2$	$\frac{1}{2}$
	Outer surface area of the warehouse $= 128 + 88 - 6$ $\therefore$ Outer surface area of the warehouse $= 210\ m^2$	$\frac{1}{2}$
	If $\frac{1}{2}$ litre of paint covers 1 m^2, then Quantity of paint to be purchased $= \frac{1}{2} \times 210 = 105$ litres	$\frac{1}{2}$ 5

Qn. No.	Value Points	Marks allotted

OR

Ans :

Radius of the pen stand; $R = 7cm$

Radius of each conical hole; $r = 0.7cm$

Height of each conical hole= Depth; $h = 2.4\ cm$

Slant height of conical hole ; $l = \sqrt{h^2 + r^2}$

$$= \sqrt{(2.4)^2 + (0.7)^2}$$

$$= \sqrt{5.76 + 0.49}$$

$$= \sqrt{6.25}$$

$$\therefore l = 2.5\ cm \quad \frac{1}{2}$$

$$\begin{pmatrix} Total\ surface \\ area\ of \\ pen\ stand \end{pmatrix} = TSA\begin{pmatrix} Hemi \\ sphere \end{pmatrix} + CSA\begin{pmatrix} 5\ Conical \\ Holes \end{pmatrix} - Area\begin{pmatrix} (5\ circular \\ bases) \end{pmatrix} \quad \frac{1}{2}$$

$$TSA(Hemisphere) = 3\pi R^2$$

$$= 3 \times \frac{22}{7} \times 7 \times 7$$

$$\therefore TSA(Hemisphere) = 462\ cm^2 \quad \frac{1}{2}$$

$$CSA\begin{pmatrix} 5\ Conical \\ Holes \end{pmatrix} = 5 \times \pi rl$$

$$= 5 \times \frac{22}{7} \times 0.7 \times 2.5$$

$$\therefore CSA\begin{pmatrix} 5\ Conical \\ Holes \end{pmatrix} = 27.5\ cm^2 \quad \frac{1}{2}$$

$$Area(5\ circular\ bases) = 5 \times \pi r^2$$

$$= 5 \times \frac{22}{7} \times 0.7 \times 0.7$$

$$\therefore Area(5\ circular\ bases) = 7.7cm^2 \quad \frac{1}{2}$$

Total surface area of pen stand $= 462 + 27.5 - 7.7$

$\therefore$ Total surface area of pen stand $= 481.8\ cm^2$ $\frac{1}{2}$

Qn. No.	Value Points		Marks allotted
	Volume of wood $= Vol.(\ Hemisphere) - Vol.(\ 5\ conical\ holes)$	$\frac{1}{2}$	
	$Volume(\ Hemisphere) = \frac{2}{3}\pi r^3$		
	$= \frac{2}{3} \times \frac{22}{7} \times 7 \times 7 \times 7$		
	$= \frac{44 \times 49}{3}$		
	$\therefore Volume(Hemisphere) = 718.67 cm^3$	$\frac{1}{2}$	
	$Volume(\ 5\ conical\ holes) = 5 \times \frac{1}{3}\pi r^2 h$		
	$= 5 \times \frac{1}{3} \times \frac{22}{7} \times 0.7 \times 0.7 \times 2.4$		
	$= \frac{18.48}{3}$		
	$\therefore Volume(\ 5\ conical\ holes) = 6.16\ cm^3$	$\frac{1}{2}$	
	Volume of wood $= 718.67 - 6.16$		
	$\therefore$Volume of wood $= 712.51\ cm^3$	$\frac{1}{2}$	5
	*********		