CCE RR
UNREVISED FULL SYLLABUS

A

ಕರ್ನಾಟಕ ಶಾಲಾ ಪರೀಕ್ಷೆ ಮತ್ತು ಮೌಲ್ಯನಿರ್ಣಯ ಮಂಡಲಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು - 560 003

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD, MALLESHWARAM, BENGALURU - 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಜೂನ್ — 2023

S. S. L. C. EXAMINATION, JUNE — 2023

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 17. 06. 2023 | ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 17. 06. 2023 | CODE NO. : **81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

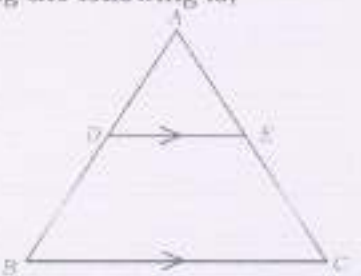
(ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Repeater)

(ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ / English Medium)

| ಗರಿಷ್ಠ ಅಂಕಗಳು : **80**

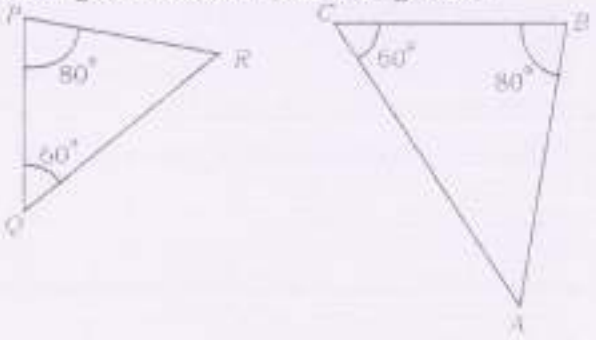
[Max. Marks : 80

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **8 × 1 = 8**	
1.		The H.C.F. of any two prime numbers is (A) 0 (B) 2 (C) 1 (D) – 1 *Ans. :*	
	(C)	1	1
2.		The degree of the polynomial $P(x) = 3x^3 - 8x^2 + 6x - 3$ is (A) 3 (B) 2 (C) 1 (D) 0 *Ans. :*	
	(A)	3	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
3.		The coordinates of the midpoint of the line segment joining the points (3, 4) and (5, 6) is (A) (− 4, − 5) (B) (4, 5) (C) (4, − 5) (D) (− 4, 5) *Ans.* :	
	(B)	(4, 5)	1
4.		The probability of winning a game is $\frac{3}{4}$. The probability of losing the same game is (A) $\frac{1}{2}$ (B) $\frac{3}{4}$ (C) $-\frac{1}{4}$ (D) $\frac{1}{4}$ *Ans.* :	
	(D)	$\frac{1}{4}$	1
5.		In triangle ABC if $DE \parallel BC$, then the correct relation among the following is;  (A) $\frac{AD}{BD} = \frac{AE}{EC}$ (B) $\frac{AB}{AD} = \frac{EC}{BD}$ (C) $\frac{AD}{AE} = \frac{CE}{BD}$ (D) $\frac{DE}{BC} = \frac{AE}{AD}$ *Ans.* :	
	(A)	$\frac{AD}{BD} = \frac{AE}{EC}$	1
6.		The distance between two parallel tangents in a circle of radius 3 cm is (A) 3 cm (B) 1·5 cm (C) 9 cm (D) 6 cm *Ans.* :	
	(D)	6 cm	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
7.		The formula to find the volume of a solid cylinder having base radius 'r' and height 'h' is (A) $V = 4\pi r^2$ (B) $V = \pi r^2 h$ (C) $V = \pi r l$ (D) $V = \frac{1}{3}\pi r^2 h$ *Ans. :*	
	(B)	$V = \pi r^2 h$	1
8.		If the n^{th} term of an arithmetic progression is $a_n = 2n + 1$ then its $(n-1)^{th}$ term is (A) $(2n-2)$ (B) $(2n+3)$ (C) $(2n-1)$ (D) $2n$ *Ans. :*	
	(C)	$(2n-1)$	1

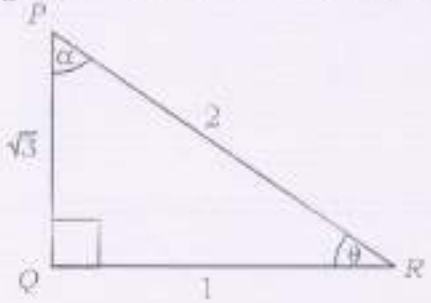
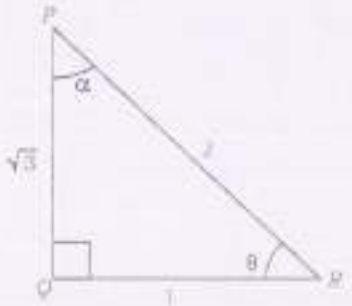
Qn. Nos.	Value Points	Marks allotted
II.	**Answer the following questions :** **$8 \times 1 = 8$**	
9.	According to Euclid's division lemma, if $13 = 4 \times 3 + r$, then find the value of 'r'. *Ans. :*	
	$r = 1$	1
10.	How many solutions do the pair of linear equations $x + 2y - 4 = 0$ and $3x + 2y - 5 = 0$ have ? *Ans. :* $a_1 = 1 \quad b_1 = 2 \quad c_1 = -4 \quad a_2 = 3 \quad b_2 = 2 \quad c_2 = -5$	
	$\frac{a_1}{a_2} = \frac{1}{3} \quad \frac{b_1}{b_2} = \frac{2}{2} = 1 \quad \therefore \frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ ½	
	$\therefore$ one (unique) solution ½	1
11.	If x, 7, 10 .... are in arithmetic progression then write the value of x. *Ans. :*	
	$x = 4$	1

Qn. Nos.	Value Points	Marks allotted
12.	Find the sum of the zeroes of the polynomial $P(x) = x^2 - 5x + 6$. *Ans.* : sum of zeroes $(\alpha+\beta)=\frac{-b}{a}=\frac{-(-5)}{1}=5$	1
13.	Find the value of the discriminant of the quadratic equation $x^2 - 5x + 1 = 0$. *Ans.* : $a = 1 \quad b = -5 \quad c = 1$ $b^2 - 4ac = (-5)^2 - 4\times1\times1 = 25 - 4$ ½ Value of discriminant = 21 ½	1
14.	Write the formula to find the area of a triangle PQR having vertices $P(x_1, y_1)$, $Q(x_2, y_2)$ and $R(x_3, y_3)$. *Ans.* : Area of $\Delta PQR(A)=\frac{1}{2}[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)]$	1
15.	In the figure, name the side of triangle PQR which is corresponding to the side AB of triangle ABC.  *Ans.* : PR	1

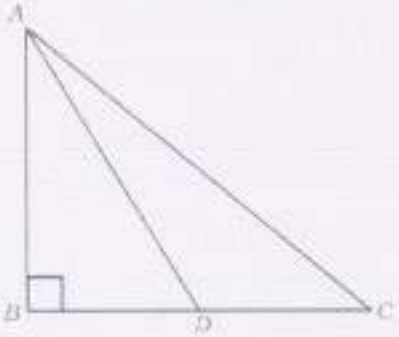
Qn. Nos.	Value Points	Marks allotted
16.	Write the formula to find the surface area of a sphere having radius 'r' units.	
	Ans. :	
	Surface area of sphere = $4\pi r^2$ sq.units	1
Note.	Give full marks for direct answer from question no. 9 to 16.	
III.	**Answer the following questions :** **8 × 2 = 16**	
17.	Prove that $2 + \sqrt{3}$ is an irrational number.	
	OR	
	Show that the rational number $\frac{29}{147}$ has non-terminating decimal expansion without performing long division.	
	Ans. :	
	Let $2+\sqrt{3}$ be rational	
	that is $2+\sqrt{3}=\frac{a}{b}$ where $a,\ b \in Z,\ b \neq 0$	½
	Rearranging the quation	
	$\sqrt{3}=\frac{a}{b}-2$	½
	$\sqrt{3}=\frac{a-2b}{b}$	
	Since a and b are integers, we get $\frac{a-2b}{b}$ rational and so	
	$\sqrt{3}$ is rational.	½
	But this contradicts the fact that $\sqrt{3}$ is irrational,	
	This contradiction has arisen of our incorret assumption.	
	∴ So we conclude $2+\sqrt{3}$ is an irrational number.	½ 2
	OR	

Qn. Nos.	Value Points	Marks allotted
	$147 = 3 \times 7^2$ ½	
	Here the denominator 147 can not be expressed in the form $2^n \times 5^m$ ½ + ½	
	$\therefore \frac{29}{147}$ has non-terminating	
	decimal expansion. ½	2
18.	Find the solution for the given pair of linear equations :	
	$x + y = 10$	
	$2x - y = 8$	
	Ans. :	
	$x + y = 10$ ..... (1)	
	$2x - y = 8$ ..... (2) Adding (1) and (2)	
	$3x = 18$ ½	
	$x = \frac{18}{3}$ ½	
	$\boxed{x = 6}$	
	Subsituting $x = 6$ in equation (1)	
	$x + y = 10$ ½	
	$6 - y = 10$	
	$y = 10 - 6$	
	$\boxed{y = 4}$ ½	
	Note : Any other suitable method is followed to get the correct answer full marks should be given.	2
19.	Find the 21^{st} term of the arithmetic progression 5, 9, 13, ... by using formula.	
	Ans. :	
	5, 9, 13 ..... here	
	$a = 5 \quad d = 9 - 5 = 4 \quad n = 21 \quad a_{21} = ?$ ½	
	$a_n = a + (n-1)\,d$ ½	
	$a_{21} = 5 + (21-1) \times 4$ ½	

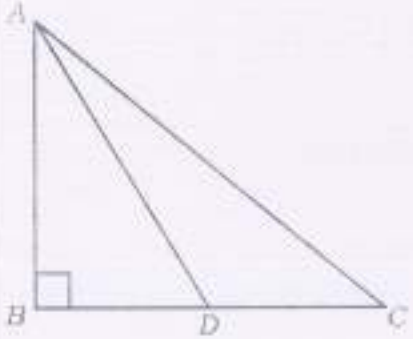
Qn. Nos.	Value Points	Marks allotted
	$a_{21} = 5 + 20 \times 4$ $a_{21} = 5 + 80$ $\boxed{a_{21} = 85}$ ½	2
20.	Find the roots of the equation $x^2 - 3x + 1 = 0$ using quadratic formula. **OR** Solve the equation $x^2 - 3x - 10 = 0$ by completing the square method. *Ans. :* $x^2 - 3x + 1 = 0$ comparing with $ax^2 + bx + c = 0$ $a = 1 \quad b = -3 \quad c = 1$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ½ $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 1 \times 1}}{2 \times 1}$ ½ $x = \frac{3 \pm \sqrt{9 - 4}}{2}$ ½ $x = \frac{3 \pm \sqrt{5}}{2}$ $\therefore \quad x = \frac{3 - \sqrt{5}}{2}$ or $x = \frac{3 - \sqrt{5}}{2}$ ½ OR $x^2 - 3x - 10 = 0$ half the coefficient of x $b = -\frac{3}{2}$ $b^2 = \left(\frac{-3}{2}\right)^2 = \frac{9}{4}$ $x^2 - 3x = 10$ adding b^2 to both sides ½ $x^2 - 3x + \frac{9}{4} = 10 + \frac{9}{4}$	

Qn. Nos.	Value Points		Marks allotted
	$\left(x-\frac{3}{2}\right)^2=\frac{49}{4}$ Taking square root on both the sides.	½	
	$\sqrt{\left(x-\frac{3}{2}\right)^2}=\pm\sqrt{\frac{49}{4}}$		
	$x-\frac{3}{2}=\pm\frac{7}{2}$		
	$x=\frac{3}{2}\pm\frac{7}{2}$		
	$x=\frac{3}{2}+\frac{7}{2}$, $x=\frac{3}{2}-\frac{7}{2}$	½	
	$x=\frac{3+7}{2}$, $x=\frac{3-7}{2}$		
	$x=\frac{10}{2}$, $x=\frac{-4}{2}$		
	$x=5$ $x=-2$	½	2
21.	In the given figure, find the values of cos α and tan θ. 		
	Ans. : 		
	$\cos\alpha=\frac{\sqrt{3}}{2}$	1	
	$\tan\theta=\frac{\sqrt{3}}{1}=\sqrt{3}$	1	2

Qn. Nos.	Value Points	Marks allotted
22.	A box consists of 9 cards which are numbered from 10 to 18. If one card is drawn at random from the box then find the probability of getting a prime number. *Ans. :* $n(s)=9$ ½ $n(A)=\{11,13,17\}=3$ ½ $P(A)=\frac{n(A)}{n(S)}$ ½ $P(A)=\frac{3}{9}=\frac{1}{3}$ ½	2
23.	In triangle ABC, $\angle ABC = 90°$ and D is the midpoint of BC. Prove that $AC^2 = AD^2 + 3CD^2$.	



Ans. :



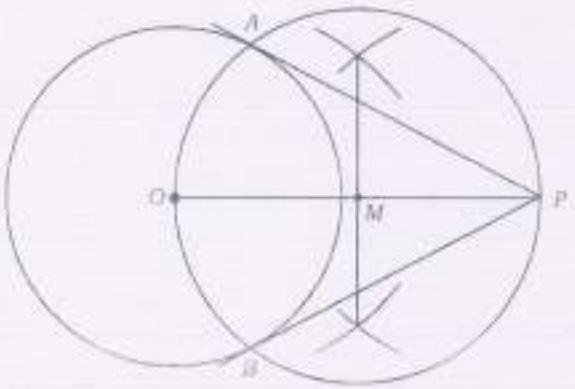
In triangle ABC, $\angle B = 90°$

$\therefore\ AC^2 = AB^2 + BC^2$ ..... (1) ½

In triangle ABD, $\angle B = 90°$

$\therefore\ AD^2 = AB^2 + BD^2$

$\therefore\ AB^2 = AD^2 - BD^2$ ..... (2) ½

Qn. Nos.	Value Points	Marks allotted
	Substitute (2) in equation (1)	
	$AC^2 = AD^2 - BD^2 + BC^2$	
	$BD = CD, \quad BC = 2CD$ ½	
	$AC^2 = AD^2 - CD^2 + (2CD)^2$	
	$AC^2 = AD^2 - CD^2 + 4CD^2$	
	$AC^2 = AD^2 + 3CD^2$ ½	2
24.	Construct two tangents to a circle of radius 3 cm from a point 7 cm away from its centre.	
	Ans. :	
		
	Constructing the circle ½	
	Bisecting *OP* ½	
	Constructing tangents *AP*, *BP* 1	2
IV.	**Answer the following questions :** **9 × 3 = 27**	
25.	Find the sum of the first 40 positive integers divisible by 6.	
	OR	
	The second and third terms of an arithmetic progression are 14 and 18 respectively. Find the sum of the first 26 terms of the Arithmetic progression using the formula.	

Qn. Nos.	Value Points		Marks allotted
	Ans. :		
	$6 + 12 +$ ..... 40 terms	½	
	$a = 6 \quad d = 12 - 6 = 6 \quad n = 40$		
	$S_n = \frac{n}{2}[2a + (n-1)d]$	1	
	$S_{40} = \frac{40}{2}[2 \times 6 + (40-1)\,6]$	½	
	$S_{40} = 20[12 + 39 \times 6]$		
	$S_{40} = 20[12 + 234]$	½	
	$S_{40} = 20[246]$		
	$\boxed{S_{40} = 4920}$	½	
	Note : Any other suitable method is followed to get the correct answer full marks should be given.		3
	OR		
	$a_2 = 14 \qquad a_3 = 18 \qquad n = 26$		
	$a_3 - a_2 = 18 - 14$		
	$\boxed{d = 4}$	½	
	$a_2 = 14 \qquad a + d = 14$		
	$a + 4 = 14$		
	$a = 14 - 4$		
	$\boxed{a = 10}$	½	
	$a = 10 \quad d = 4 \quad n = 26$		
	$S_n = \frac{n}{2}[2a + (n-1)d]$	1	
	$S_{26} = \frac{26}{2}[2 \times 10 + (26-1) \times 4]$		
	$S_{26} = 13[20 + 25 \times 4]$		
	$S_{26} = 13[20 + 100]$	½	
	$S_{26} = 13 \times 120$		
	$\boxed{S_{26} = 1560}$	½	3

Qn. Nos.	Value Points	Marks allotted
26.	Divide $P(x) = x^3 - 3x^2 + 5x - 3$ by $g(x) = x^2 - x + 1$, then find the quotient $q(x)$ and remainder $r(x)$.	
	Ans. :	
	$x^2 - x + 1 \overline{)\, x^3 - 3x^2 + 5x - 3 \,(\, x - 2}$	
	$x^3 - x^2 + x$	
	$(+)\quad(-)\quad(+)$	
	$-2x^2 + 4x - 3$	2
	$-2x^2 + 2x - 2$	
	$(+)\quad(-)\quad(+)$	
	$2x - 1$	
	$q(x) = x - 2$ ½	
	$r(x) = 2x - 1$ ½	3
27.	Prove that $(\sec A - \cos A)(\cot A + \tan A) = \tan A \cdot \sec A$.	
	OR	
	If A, B and C are interior angles of a triangle then prove that $1 + \tan^2\left(\frac{A+B}{2}\right) = \operatorname{cosec}^2\left(\frac{C}{2}\right)$.	
	Ans. :	
	L.H.S	
	$= (\sec A - \cos A)(\cot A + \tan A)$	
	$= \left(\frac{1}{\cos A} - \cos A\right)\left(\frac{1}{\tan A} + \tan A\right)$ ½	
	$= \left(\frac{1 - \cos^2 A}{\cos A}\right)\left(\frac{1 + \tan^2 A}{\tan A}\right)$ ½	
	$= \left(\frac{\sin^2 A}{\cos A}\right)\left(\frac{\sec^2 A}{\tan A}\right)$ ½	

Qn. Nos.	Value Points		Marks allotted
	$= \left(\frac{\sin A \times \sin A}{\cos A}\right)\left(\frac{1}{\cos^2 A} \times \frac{\cos A}{\sin A}\right)$	½	
	$= \left(\frac{\sin A}{\cos A}\right)\left(\frac{1}{\cos A}\right)$	½	
	$= \tan A \cdot \sec A$ = R. H. S	½	
	Alternate method :		
	L. H. S		
	$= \left(\frac{1}{\cos A} - \cos A\right)\left(\frac{\cos A}{\sin A} + \frac{\sin A}{\cos A}\right)$	½	
	$= \left(\frac{1-\cos^2 A}{\cos A}\right)\left(\frac{\cos^2 A + \sin^2 A}{\sin A \cos A}\right)$	½	
	$= \left(\frac{\sin^2 A}{\cos A}\right)\left(\frac{1}{\sin A . \cos A}\right)$	1	
	$= \left(\frac{\sin A}{\cos A}\right) \times \frac{1}{\cos A}$	½	3
	$= \tan A \cdot \sec A$ = R. H. S	½	
	OR		
	$A + B + C = 180^\circ$	½	
	$A + B = 180 - C$ ÷2	½	
	$\frac{A+B}{2} = \frac{180}{2} - \frac{C}{2}$		
	$\frac{A+B}{2} = 90^\circ - \frac{C}{2}$ take $\sec^2$ on both sides	½	
	$\sec^2\left(\frac{A+B}{2}\right) = \sec^2\left(90^\circ - \frac{C}{2}\right)$	½	
	$\sec^2\left(\frac{A+B}{2}\right) = \operatorname{cosec}^2\left(\frac{C}{2}\right)$	½	
	$1 + \tan^2\left(\frac{A+B}{2}\right) = \operatorname{cosec}^2\left(\frac{C}{2}\right)$	½	3

Qn. Nos.	Value Points	Marks allotted
28.	The points A, B and C are collinear. If $A(1, 0)$, $B(4, 4)$ and $AC = 8$ cm, then find the coordinates of point C.	
	Ans. :	
	$A(1, 0)$ $B(4, 4)$	
	Distance between $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
	$= \sqrt{(4-1)^2 + (4-0)^2}$ ½	
	$= \sqrt{3^2 + 4^2}$	
	$= \sqrt{9+16}$	
	$= \sqrt{25}$	
	$= 5$ cm	
	$\therefore BC = AC - AB$	
	$= 8 - 5$ ½	
	$= 3$ cm	
	Co-ordinates of C =	
	$P(x, y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$ ½	
	$A(x_1, y_1) = (1, 0)$ $B(4, 4)$ $C = (x_2, y_2)$	
	$m_1 : m_2 = 5 : 3$	
	$(4,4) = \left(\frac{5(x_2) - 3(1)}{5+3}, \frac{5(y_2) - 3(0)}{5+3}\right)$ ½	
	$(4,4) = \left(\frac{5x_2 + 3}{8}, \frac{5y_2 + 0}{8}\right)$	
	$(4,4) = \left(\frac{5x_2 + 3}{8}, \frac{5y_2 + 0}{8}\right)$	
	$\frac{5x_2 + 3}{8} = 4$, $\frac{5y_2}{8} = 4$ ½	
	$5x_2 + 3 = 32$ $5y_2 = 32$	
	$5x_2 = 32 - 3$ $5y_2 = 32$	
	$5x_2 = 29$ $y_2 = \frac{32}{5}$	
	$x_2 = \frac{29}{5}$, $y_2 = \frac{32}{5}$ ½	3

Qn. Nos.	Value Points	Marks allotted

29. Calculate the mean for the data in the following frequency distribution table :

Class-interval	*Frequency* (f_i)
5 – 15	4
15 – 25	6
25 – 35	5
35 – 45	6
45 – 55	4
	$\Sigma f_i = 25$

OR

Calculate the mode for the data in the following frequency distribution table :

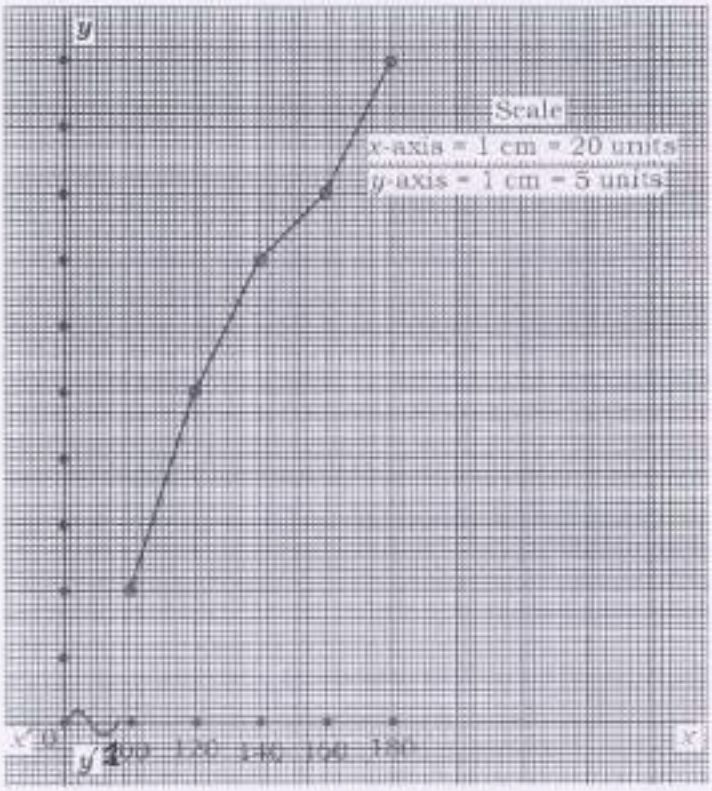
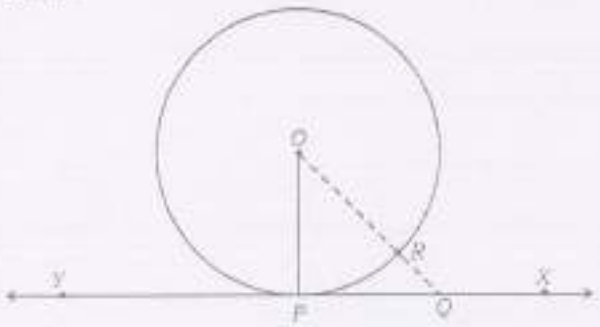
Class-interval	*Frequency*
10 – 15	3
15 – 20	3
20 – 25	7
25 – 30	6
30 – 35	6

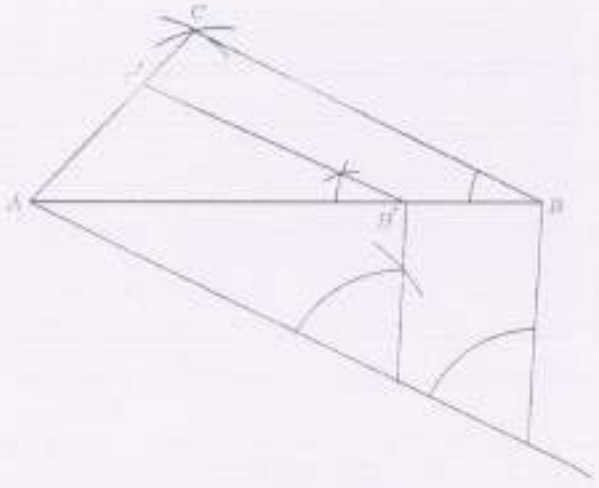
Ans. :

C.I	f_i	x_i	$f_i x_i$
5-15	4	10	40
15-25	6	20	120
25-35	5	30	150
35-45	6	40	240
45-55	4	50	200
	$\sum f_i = 25$		$\sum f_i x_i = 750$

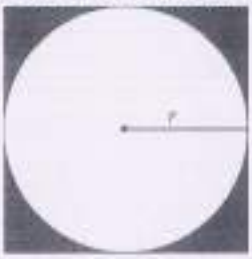
Qn. Nos.	Value Points	Marks allotted
	Finding Mid-points 1	
	Finding $f_i x_i$ 1	
	Mean $(\overline{X}) = \frac{\sum f_i x_i}{\sum f_i} = \frac{750}{25}$ ½	
	$\boxed{\overline{X} = 30}$ ½	
	Note : Any other suitable method is followed to get the corect answer full marks should be given.	3
	OR	
	From the freqency distribution table we find that, $f_0 = 3 \quad f_1 = 7 \quad f_2 = 6 \quad h = 5$ and $l = 20$ 1	
	Mode $= l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ ½	
	$= 20 + \left[\frac{7-3}{2\times7-3-6}\right] \times 5$ ½	
	$= 20 + \left[\frac{4}{14-9}\right] \times 5$ ½	
	$= 20 + \left[\frac{4}{5}\right] \times 5$	
	Mode = 20 + 4 ½	
	$\boxed{\text{Mode} = 24}$	3
30.	The daily income of 50 workers of a factory were recorded as follows. Draw "less than type" ogive for the given data.	

Daily income in Rs.	*Number of workers (cumulative frequency)*
Less than 100	10
Less than 120	25
Less than 140	35
Less than 160	40
Less than 180	50

Qn. Nos.	Value Points	Marks allotted
	Ans. : 	
	Drawing axis and writing scale 1	
	Marking points 1	
	Drawing ogive 1	3
31.	Prove that "The tangent at any point of a circle is perpendicular to the radius through the point of contact".	
	Ans. :  ½	
	Data : 'O' is the centre of the circle XY is a tangent to the circle at P ½	

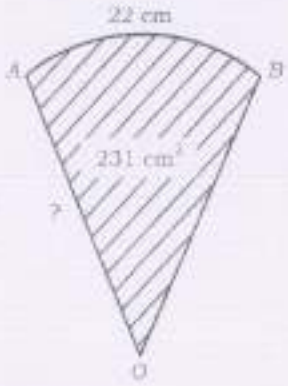
Qn. Nos.	Value Points	Marks allotted
	To prove : $OP \perp XY$ ½ Construction:Take a point Q on XY other than P and join OQ. ½ Proof $OQ = OR + RQ$ $OP = OR$ (Radii of same circle) $\therefore$ $OQ = OP + RQ$ $\therefore$ $OQ > OP$ ½ OP is the shortest of all the distances from O to XY $\therefore$ $OP \perp XY$ ½ Note : If the theorem is proved as given in the text-book give full marks.	3
32.	Construct a triangle with sides 5 cm, 6 cm and 8 cm. Then construct another triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the first triangle. *Ans.* :  Construction of given triangle 1 Construction of acute angle with division ½ Drawing parallel lines ½ Obtaining required triangle 1	3

Qn. Nos.	Value Points	Marks allotted
33.	The sides of a square touch the circle of radius 'r' as shown in the figure. If the area of the shaded region is 42 cm^2 then find the radius of the circle.	

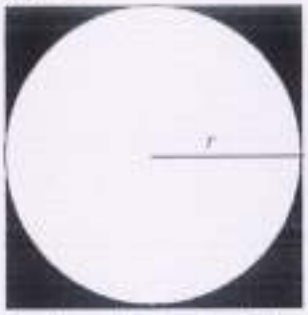


OR

In the figure the area of the sector OAB is 231 cm^2 and length of the arc AB is 22 cm. Find the radius of the sector.



Ans. :



3

Radius of the circle be = r

$\therefore$ Side of a square = $2r$ ½

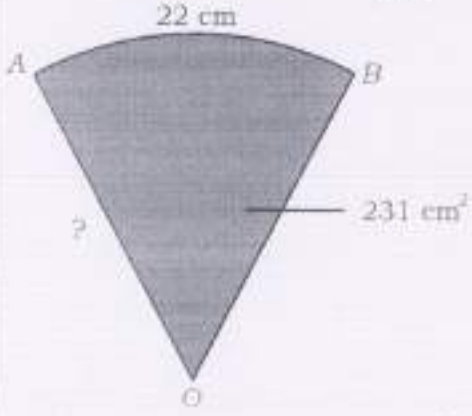
$\therefore$ Area of shaded region =

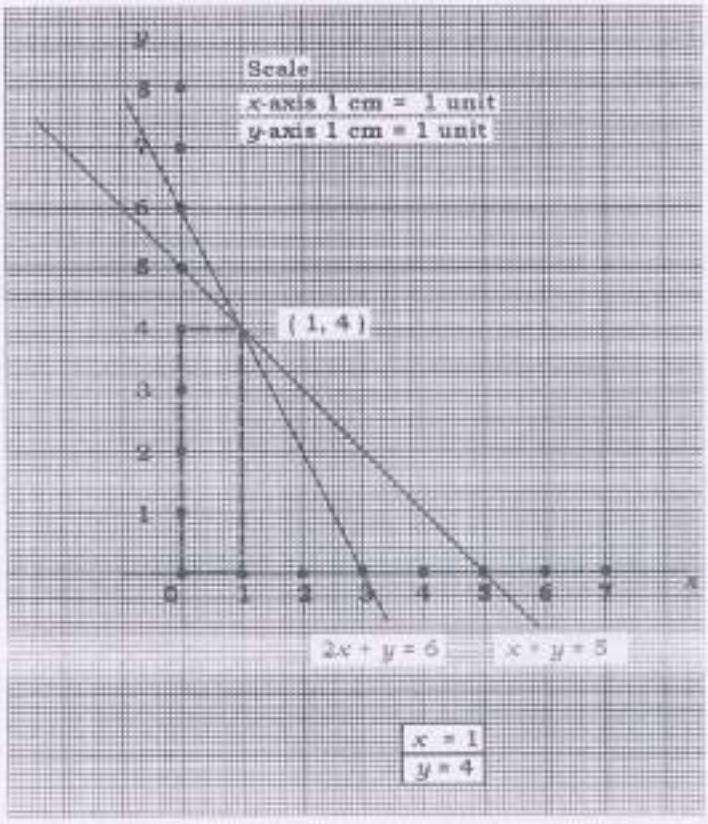
Area of the square – Area of the circle ½

$42 = (2r)^2 - \pi r^2$

$42 = 4r^2 - \pi r^2$

$= r^2(4 - \pi)$ ½

Qn. Nos.	Value Points		Marks allotted
	$= r^2\left(4-\frac{22}{7}\right)$		
	$= r^2\left(\frac{28-22}{7}\right)$	½	
	$42 = r^2 \times \frac{6}{7}$	½	
	$r^2 = \frac{42 \times 7}{6}$		
	$r^2 = 49$		
	$r = \sqrt{49}$	½	
	$r = 7$ cm		
	OR		
			
	Area of the sector $OAB = 231\ cm^2$		
	$\frac{\theta}{360} \times \pi r^2 = 231\ cm^2$ ..... (1)	1	
	Length of the arc $AB = 22$ cm		
	$\frac{\theta}{360} \times 2\pi r = 22$ ..... (2)	1	
	(1) ÷ (2)		
	$\frac{\frac{\theta}{360^\circ} \times \pi r^2}{\frac{\theta}{360^\circ} \times 2\pi r} = \frac{231}{22}$	½	
	$\frac{r}{2} = \frac{21}{2}$		
	$r = 21$ cm	½	3

Qn. Nos.	Value Points	Marks allotted
V.	**Answer the following questions :** **4 × 4 = 16**	
34.	Find the solution of the given pair of linear equations by graphical method : $x + y = 5$ $2x + y = 6$ *Ans. :* 	

$x + y = 5$

x	0	5
y	5	0

$2x + y = 6$

x	0	3
y	6	0

For table construction 1 + 1

Drawing two lines by marking points 1

Marking point of intersection and writing values of x and y 1

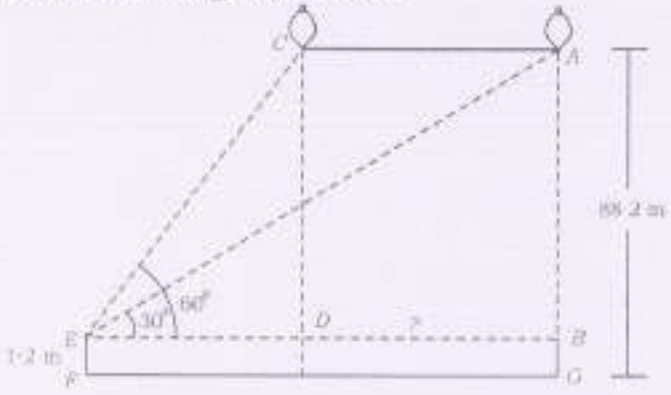
Note : Any other points may be considered to get straight lines

4

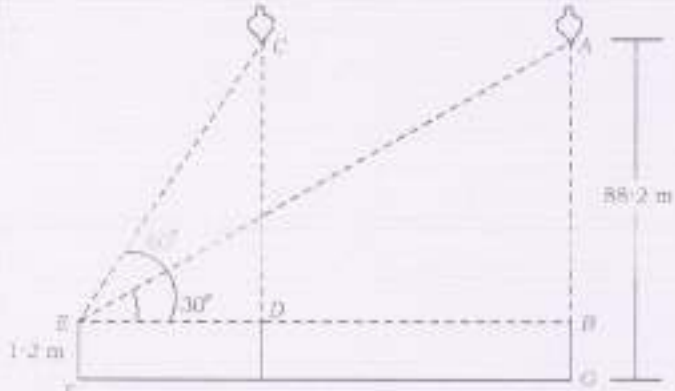
Qn. Nos.	Value Points	Marks allotted
35.	The denominator of a fraction is 3 more than its numerator. If the sum of this fraction and its reciprocal is $\frac{29}{10}$ then find the fraction.	
	OR	
	A student bought some books for Rs. 60. Had he bought 5 more books for the same amount each book would have cost him Re. 1 less. Find the number of books bought by him.	
	Ans. :	
	Let the numerator of the fraction be x	
	$\therefore$ Denominator $x + 3$	
	$\therefore$ Required fraction $\frac{x}{x+3}$	½
	According to data $\frac{x}{x+3}+\frac{x+3}{x}=\frac{29}{10}$	½
	$\frac{x\times x+(x+3)(x+3)}{(x+3)x}=\frac{29}{10}$	½
	$\frac{x^2+(x+3)^2}{x(x+3)}=\frac{29}{10}$	
	$\frac{x^2+x^2-2(x)(3)-(3)^2}{x^2+3x}=\frac{29}{10}$	½
	$\frac{x^2+x^2+6x+9}{x^2+3x}=\frac{29}{10}$	
	$\frac{2x^2+6x+9}{x^2+3x}=\frac{29}{10}$	½
	$10(2x^2+6x+9)=29(x^2+3x)$	
	$20x^2+60x+90=29x^2+87x$	
	$29x^2+87x-20x^2-60x-90=0$	
	$9x^2+27x-90=0+9$	
	$x^2+3x-10=0$	½

Qn. Nos.	Value Points		Marks allotted
	$x^2+5x-2x-10=0$		
	$x(x+5)-2(x+5)=0$	½	
	$(x+5)\ (x-2)=0$		
	$x+5=0 \qquad x-2=0$		
	$x=-5 \qquad x=2$		
	$\therefore$ Required fraction $= \frac{x}{x+3}=\frac{2}{2+3}=\frac{2}{5}$	½	4
	OR		
	Let the number of books be $= x$	½	
	Total cost of books = Rs. 60		
	$\therefore$ Cost of each book $= \frac{60}{x}$	½	
	If he bought 5 more books then number of books $= x+5$	½	
	then, cost of each book $= \frac{60}{x+5}$		
	According to data		
	$\frac{60}{x}-\frac{60}{x+5}=1$	½	
	$\frac{60(x+5)-60x}{x(x+5)}=1$	½	
	$\frac{60x+300-60x}{x^2+5x}=1$		
	$x^2+5x-300=0$		
	$x^2+20x-15x-300=0$	½	
	$x(x+20)-15(x+20)=0$	½	
	$(x+20)\ (x-15)=0$		
	$x=-20 \quad$ or $\quad x=15$		
	$\therefore$ Number of books $(x) = 15$	½	4

Qn. Nos.	Value Points	Marks allotted
36.	A 1·2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88·2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60°. After some time the angle of elevation reduces to 30° (see the figure). Find the distance travelled by the balloon during the interval.	



Ans. :



Height of a ballon from horizontal line } $88·2 - 1·2 = 87$ m ½

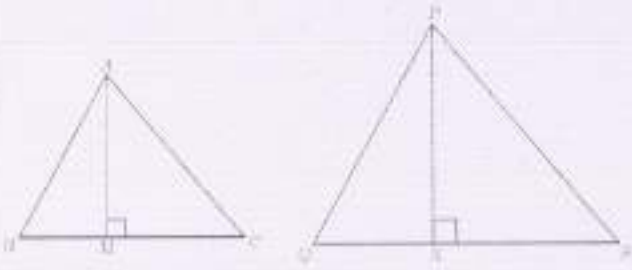
In ΔAEB $\tan\theta = \frac{AB}{BE}$ ½

$$\tan 30° = \frac{87}{BE}$$

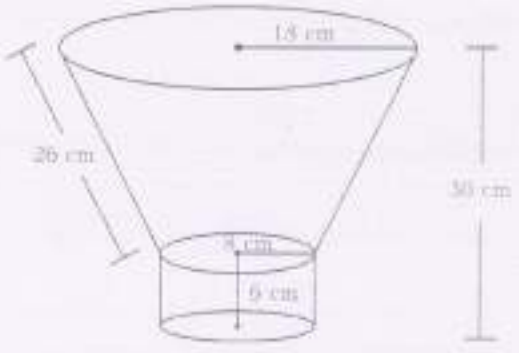
$$\frac{1}{\sqrt{3}} = \frac{87}{BE}$$ ½

$$BE = 87\sqrt{3}$$

In ΔCED $\tan\theta = \frac{CD}{DE}$ ½

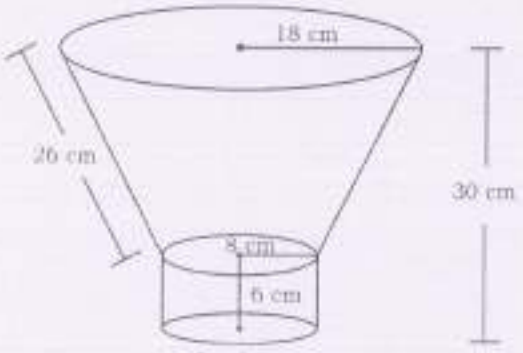
Qn. Nos.	Value Points	Marks allotted
	$\tan 60° = \frac{87}{DE}$	
	$\sqrt{3} = \frac{87}{DE}$ ½	
	$DE = \frac{87}{\sqrt{3}} = \frac{29 \times \cancel{3}^{\sqrt{3}}}{\cancel{\sqrt{3}}_{1}}$ ½	
	$DE = 29\sqrt{3}$	
	Distance travelled by the balloon = ½	
	$AC = DB = BE - DE$	
	$87\sqrt{3} - 29\sqrt{3}$ ½	
	$58\sqrt{3}$ m	4
37.	Prove that "the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides".	
	Ans. :	
	 ½	
	Data : $\Delta ABC \sim \Delta PQR$ ½	
	$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$	
	To prove : $\frac{ar(ABC)}{ar(PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$ ½	
	Construction : Draw $AM \perp BC$ and $PN \perp QR$ ½	
	Proof : $\frac{ar(ABC)}{ar(PQR)} = \frac{\frac{1}{2} BC \times AM}{\frac{1}{2} QR \times PN}$	
	$\frac{ar(ABC)}{ar(PQR)} = \frac{BC \times AM}{QR \times PN}$ ..... (1) ½	
	In ΔABM and ΔPQN	
	$\angle B = \angle Q$ ($\because \Delta ABC \sim \Delta PQR$)	
	$\angle M = \angle N = 90°$ (construction)	

Qn. Nos.	Value Points	Marks allotted
	$\Delta ABM \sim \Delta PQN$ ($A - A$ similarity criterion)	
	$\frac{AM}{PN} = \frac{AB}{PQ}$ ..... (2) ½	
	$\Delta ABC \sim \Delta PQR$ (Given)	
	$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ..... (3)	
	$\therefore \frac{ar(ABC)}{ar(PQR)} = \frac{AB}{PQ} \times \frac{AM}{PN}$ (From (1) and (3))	
	$= \frac{AB}{PQ} \times \frac{AB}{PQ}$ ½	
	$= \left(\frac{AB}{PQ}\right)^2$	
	Using (3) we get	
	$\frac{ar(ABC)}{ar(PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$ ½	4
VI.	**Answer the following question :** **1 × 5 = 5**	
38.	A dustbin in the form of a frustum of a cone is mounted on the circular base of a hollow cylinder as shown in the figure. The radii of circular top and bottom of the dustbin and its slant height are 18 cm, 8 cm and 26 cm respectively. The radius and height of the cylinder are 8 cm and 6 cm respectively. If the total height of the given solid is 30 cm, then find the volume of the dustbin and also the curved surface area of the entire solid.	



Qn. Nos.	Value Points	Marks allotted

Ans. :



$r_1 = 18 \qquad r_2 = 8 \qquad l = 25$

Height of the cylinder = 6 cm

Height of the frustum = (30 – 6) = 24 cm ½

Volume of the furstum $(V) = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$ ½

$$(V) = \frac{1}{3} \times \frac{22}{7} \times 24(18^2 + 8^2 + 18 \times 8)$$

$$V = \frac{1}{3} \times \frac{22}{7} \times 24^8 (324 + 64 + 144) \quad ½$$

$$V = \frac{176 \times 532^{76}}{7}$$

$V = 13376 \text{ cm}^3$ ½

C.S.A of entire solid =

C.S.A of frustum + C.S.A of cylinder 1

$= \pi(r_1 + r_2)l + 2\pi rh$

$= \frac{22}{7}(18 + 8) \times 26 + 2 \times \frac{22}{7} \times 8 \times 6$ ½

$= \frac{22}{7}(26 \times 26) + 2 \times \frac{22}{7} \times 48$

$= \frac{22}{7}(676 + 96)$ ½

C.S.A of entire solid $= \frac{22}{7} \times 772$ ½

$= \frac{16984}{7}$

$= 2426{\cdot}28 \text{ cm}^2$ ½ 5