CCE RR/PR/PF/NSR/NSPR
FULL SYLLABUS

A

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

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

ಜೂನ್ 2024 ರ ಪರೀಕ್ಷೆ - 2

JUNE 2024 EXAMINATION – 2

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ಸಂಕೇತ ಸಂಖ್ಯೆ : 81-E **CODE NO. : 81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಆಂಗ್ಲ ಮಾಧ್ಯಮ / English Medium)

(ಶಾಲಾ ಪುನರಾವರ್ತಿತ ಅಭ್ಯರ್ಥಿ / ಖಾಸಗಿ ಪುನರಾವರ್ತಿತ ಅಭ್ಯರ್ಥಿ / ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / ಎನ್.ಎಸ್.ಆರ್. / ಎನ್.ಎಸ್.ಪಿ.ಆರ್.)

(Regular Repeater / Private Repeater / Private Fresh / NSR / NSPR)

ದಿನಾಂಕ : 18. 06. 2024] **[ಗರಿಷ್ಠ ಅಂಕಗಳು : 80**

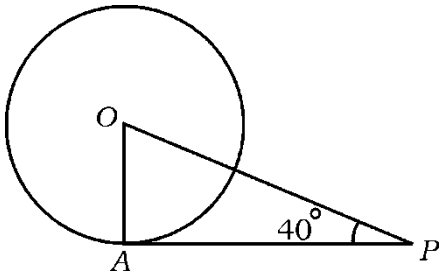
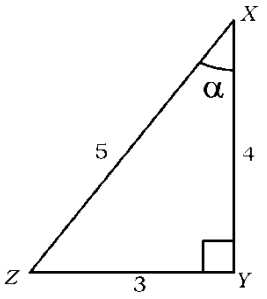
Date : 18. 06. 2024] **[Max. Marks : 80**

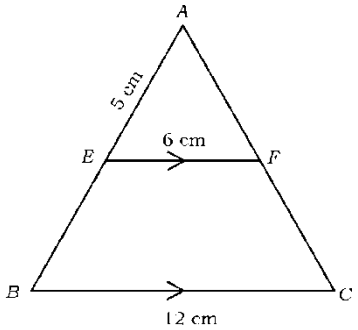
Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **8 × 1 = 8**	
1.		If *'A'* and *'B'* are any two positive integers, *'H'* and *'L'* are HCF and LCM of these integers respectively, then the correct relationship in the following is (A) $H \times B = L \times B$ (B) $H \times L = A \times B$ (C) $H + L = A + B$ (D) $H - L = A - B$. *Ans.* :	
	(B)	$H \times L = A \times B$	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
2.		The discriminant of the equation $x^2 + 4x + 4 = 0$ is (A) 0 (B) 12 (C) 16 (D) 48 *Ans.* :	
	(A)	0	1
3.		$\frac{\sin(90^\circ - \theta)}{\cos(90^\circ - \theta)}$ is equal to (A) $\sin\theta$ (B) $\cos\theta$ (C) $\tan\theta$ (D) $\cot\theta$ *Ans.* :	
	(D)	$\cot\theta$	1
4.		The distance of the point $M(4, 3)$ from the origin is (A) 5 units (B) 7 units (C) $\sqrt{5}$ units (D) $\sqrt{7}$ units *Ans.* :	
	(A)	5 units	1
5.		If a fair die is rolled twice, then the number of all the possible outcomes is (A) 12 (B) 24 (C) 36 (D) 6 *Ans.* :	
	(C)	36	1
6.		If the diameter of a circle is 14 cm, then its circumference is (A) 28 cm (B) 44 cm (C) 56 cm (D) 88 cm *Ans.* :	
	(B)	44 cm	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
7.		The volume of a cube of edge 5 cm is (A) $15\ cm^3$ (B) $30\ cm^3$ (C) $100\ cm^3$ (D) $125\ cm^3$ *Ans.* :	
	(D)	$125\ cm^3$	1
8.		An arithmetic progression contains 20 terms. If the first term is 2 and last term is 78, then the arithmetic progression is (A) 2, 5, 8, ... (B) 2, 7, 12, ... (C) 2, 6, 10, ... (D) 2, 4, 6, ... *Ans.* :	
	(C)	2, 6, 10	1

Qn. Nos.	Value Points	Marks allotted
II.	**Answer the following questions : $8 \times 1 = 8$** **(For direct answers from Q. Nos. 9 to 16 full marks should be given)**	
9.	Express 70 as a product of its prime factors. *Ans.* :	
	$2 \times 5 \times 7$	1
10.	If the lines representing the pair of linear equations are intersecting lines, then how many solutions do they have ? *Ans.* :	
	Only one solution (unique)	1
11.	Write the zeroes of the polynomial $p(x) = x^2 - 25$. *Ans.* :	
	+ 5 or – 5 (± 5) ½ + ½	1

Qn. Nos.	Value Points	Marks allotted
12.	In the figure *'O'* is the centre of the circle. *OA* is the radius and *AP* is the tangent. If $\angle OPA = 40°$, then find $\angle AOP$.  *Ans.* : $\angle AOP = 50°$	1
13.	In the given figure, if $\angle XYZ = 90°$, then find the value of $\sin\alpha$.  *Ans.* : $\sin\alpha = \frac{3}{5}$	1
14.	Write the formula to find the total surface area of a solid hemisphere of radius *'r'* units. *Ans.* : $A = 3\pi r^2$	1

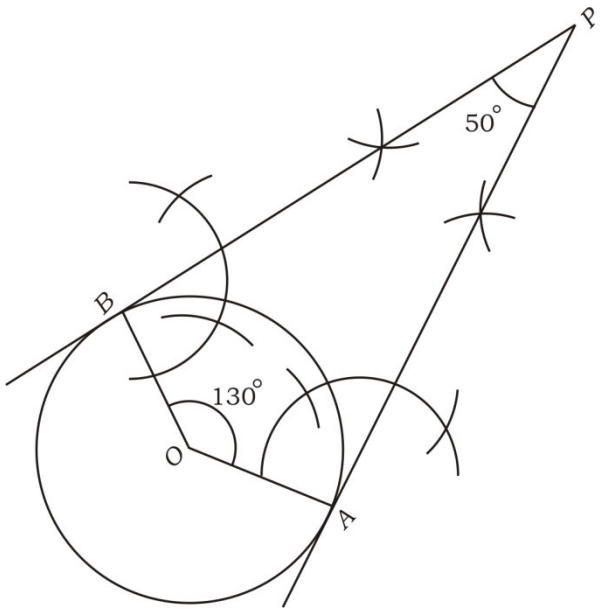
Qn. Nos.	Value Points	Marks allotted
15.	In the given figure, $EF \parallel BC$. If EF = 6 cm, BC = 12 cm and AE = 5 cm, then find AB. 	
	Ans. :	
	$\frac{AE}{AB} = \frac{EF}{BC}$ ½	
	$\frac{5}{AB} = \frac{6}{12}$	
	AB = 10 cm ½	
	NOTE : For direct answer give full marks.	1
16.	Write the degree of the polynomial $p(x) = 5x^2 - 6x^3 - 7x + 1$.	
	Ans. :	
	3	1
III.	**Answer the following questions :** **8 × 2 = 16**	
17.	Prove that $2 + \sqrt{3}$ is an irrational number.	
	OR	
	Without actually performing the long division, find whether the rational number $\frac{7}{200}$ has a terminating decimal expansion or a non-terminating repeating decimal expansion.	
	Ans. :	
	Let us assume to the contrary that $2+\sqrt{3}$ is rational. ½	
	$2+\sqrt{3} = \frac{p}{q}$ p and q are coprime, $q \neq 0$	

Qn. Nos.	Value Points	Marks allotted
	$\sqrt{3} = \frac{p}{q} - 2$ $\sqrt{3} = \frac{p - 2q}{q}$ ½ $\Rightarrow \sqrt{3}$ is rational But this contradicts the fact that $\sqrt{3}$ is irrational. Our assumption that $2 + \sqrt{3}$ is rational is incorrect. ½ $\therefore\ 2+\sqrt{3}$ is irraional. ½	2
	OR $\frac{7}{200}$ $= \frac{7}{2^3 \times 5^2}$ 2 | 200 2 | 100 2 | 50 5 | 25 5 1½ Since the prime factorisation of 200 (demoninaor) is of the form $2^n \times 5^m$, $\frac{7}{200}$ has a terminating decimal expansion. ½	2
18.	Solve the given pair of linear equations by Elimination method : $2x + y = 8$ $x - y = 1$ *Ans.* : $2x+y=8$ ..... (1) $x-y=1$ ..... (2) Adding $3x=9$ ½ $\Rightarrow x=\frac{9}{3}$ $\boxed{x = 3}$ ½ Substitute x = 3 in ..... (1) $2(3)+y=8$ $\Rightarrow 6 + y = 8$ ½ $\Rightarrow y = 8 - 6$ $\boxed{y = 2}$ ½	2

Qn. Nos.	Value Points	Marks allotted
19.	Find the sum of first 20 terms of the Arithmetic progression 5, 11, 17, ... using formula. *Ans.* : $a = 5$ $d = 11 - 5$ $d = 6$ $n = 20$ ½ $S_n = \frac{n}{2}[2a+(n-1)d]$ ½ $= \frac{20}{2}[2(5)+(20-1)6]$ $= 10\ [\ 10 + 19 \times 6\ ]$ ½ $= 10\ [\ 10 + 114\ ]$ $= 10 \times 124$ $S_{20} = 1240$ ½ **Note :** If any other correct alternative method is followed to get a correct answer, then give full marks.	2
20.	Find the roots of the equation $x^2 - 5x + 2 = 0$ using 'quadratic formula'. **OR** Find the roots of the equation $x^2 - 6x + 2 = 0$ by the method of completing the square. *Ans.* : $x^2 - 5x + 2 = 0$ $ax^2 + bx + c = 0$ $a = 1,\ b = -5,\ c = 2$ ½ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ½	

Qn. Nos.	Value Points	Marks allotted
	$= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(2)}}{2(1)}$	
	$= \frac{5 \pm \sqrt{25-8}}{2}$ ½	
	$= \frac{5 \pm \sqrt{17}}{2}$ ½	2
	OR	
	$x^2 - 6x + 2 = 0$	
	$x^2 - 6x = -2$	
	$\frac{6}{2} = 3$, Adding 9 both sides ½	
	$x^2 - 6x + 9 = -2 + 9$ ½	
	$(x-3)^2 = 7$ ½	
	$x - 3 = \pm\sqrt{7}$	
	$x = 3 \pm \sqrt{7}$ ½	2
21.	Find the co-ordinates of the point which divides the line segment joining the points (4, – 3) and (8, 5) in the ratio 3 : 1 internally.	
	Ans. :	
	(4, – 3) (8, 5) 3 : 1	
	x_1, y_1 x_2, y_2 $m_1 : m_2$	
	$P(x, y) = \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$ ½	
	$= \left(\frac{3(8) + 1(4)}{3+1}, \frac{3(5) + 1(-3)}{3+1} \right)$ ½	
	$= \left(\frac{24+4}{4}, \frac{15-3}{4} \right)$	
	$= \left(\frac{28}{4}, \frac{12}{4} \right)$ ½	
	$P(x, y) = (7, 3)$ ½	2

Qn. Nos.	Value Points	Marks allotted
22.	The area of a triangle with vertices A (0, 2), B (3, 0) and C (x, 3) is $\frac{11}{2}$ sq.units. Find the value of 'x'.	
	Ans. :	
	$A(0, 2)$ $B(3, 0)$ $C(x, 3)$	
	x_1, y_1 x_2, y_2 x_3, y_3	
	$A=\frac{1}{2}\left[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right]$ ½	
	$\frac{11}{2}=\frac{1}{2}\left[0(0-3)+3(3-2)+x(2-0)\right]$	
	$11 = [\,3\,(\,1\,) + x\,(\,2\,)\,]$ ½	
	$11 = 3 + 2x$	
	$2x = 11 - 3$ ½	
	$2x = 8$	
	$x = \frac{8}{2}$	
	$x = 4$ ½	2
23.	Identify the impossible event in the following and write the probability of an impossible event.	
	Event A : 'getting both head and tail' when a fair coin is tossed once.	
	Event B : 'getting head or tail' when a fair coin is tossed once.	
	Ans. :	
	Impossible event = Event *A*. 1	
	P (Impossible event) = 0 1	2
24.	Draw a circle of radius 4 cm and construct a pair of tangents to the circle such that the angle between them is 50°.	

Qn. Nos.	Value Points	Marks allotted
	Ans. : 	
	Angle between radii = 180° – 50° = 130° ½	
	Drawing a circle of radius 4 cm ½	
	Drawing arcs ½	
	Drawing tangents to the circle ½	2
IV.	**Answer the following questions :** **9 × 3 = 27**	
25.	Divide $p(x) = x^3 - 3x^2 + 5x - 3$ by $g(x) = x^2 - 2x + 1$ and find the quotient [$q(x)$] and remainder [$r(x)$].	
	OR	
	Find a quadratic polynomial whose sum of the zeroes is 7 and product of the zeroes is 12. Also find the zeroes of the polynomial.	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	$x^2-2x+1 \overline{)\ x^3-3x^2+5x-3}$ $\quad x-1$	
	x^3-2x^2+x ½	
	$(-)\quad(+)\quad(-)$	
	$-x^2+4x-3$ ½	
	$-x^2+2x-1$ ½	
	$(+)\quad(-)\quad(+)$	
	$2x-2$ ½	
	$q(x)=x-1$ ½	
	$r(x)=2x-2$ ½	3
	OR	
	Let α and β be the zeroes of the required polynomial.	
	By data α + β = 7, αβ = 12 ½	
	Required polynomial is $x^2-(\alpha+\beta)x+\alpha\beta$ ½	
	$\boxed{p(x)=x^2-7x+12}$ ½	
	$x^2-7x+12=x^2-4x-3x+12$ $\quad +12x^2$	
	$=x(x-4)-3(x-4)$ $\quad \wedge$	
	$=(x-4)(x-3)$ $\quad -4x-3x$ ½	
	$\Rightarrow (x-4)=0$ or $(x-3)=0$ ½	
	$x=4$ or $x=3$ ½	
	4 or 3 are the zeroes of the required polynomial.	3
26.	The sum of the squares of two positive integers is 400. If twice of one integer is 8 more than the other integer, then find the integers.	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	Let the two positive integers be x and y.	
	$x^2 + y^2 = 400$ ..... (1) ½	
	By data, $2x = y + 8$	
	$y = 2x - 8$ ..... (2) ½	
	Substitute (2) in (1)	
	$x^2 + (2x-8)^2 = 400$ ½	
	$x^2 + (2x)^2 + (8)^2 - 2(2x)(8) = 400$	
	$x^2 + 4x^2 + 64 - 32x = 400$	
	$5x^2 - 32x - 336 = 0$	
	$5x^2 - 60x + 28x - 336 = 0$ $-1680x^2$ ½	
	$5x(x-12) + 28(x-12) = 0$	
	$(x - 12)(5x + 28) = 0$ $-60x + 28x$	
	$x - 12 = 0$ or $5x + 28 = 0$	
	$x = 12$ or $x = -\frac{28}{5}$ ½	
	Since x is a positive integer, $x = 12$	
	Another integer, $y = 2x - 8$	
	$= 2(12) - 8$	
	$= 24 - 8$	
	$y = 16$ ½	
	Required integers are 12 and 16.	3
27.	Prove that $\frac{\sec\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1 + \sin\theta}{\cos\theta}$	
	OR	
	Evaluate : $\left(\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin 30^\circ + \sin 90^\circ} \right)$	
	Ans. :	
	LHS = $\frac{\sec\theta + \tan\theta - 1}{\tan\theta - \sec\theta + 1}$	
	substitute $1 = \sec^2\theta - \tan^2\theta$ ½	

Qn. Nos.	Value Points		Marks allotted
	$= \frac{\sec\theta + \tan\theta - (\sec^2\theta - \tan^2\theta)}{\tan\theta - \sec\theta + 1}$		
	$= \frac{(\sec\theta + \tan\theta) - [(\sec\theta + \tan\theta)(\sec\theta - \tan\theta)]}{\tan\theta - \sec\theta + 1}$	½	
	$= \frac{(\sec\theta + \tan\theta)[1 - (\sec\theta - \tan\theta)]}{\tan\theta - \sec\theta + 1}$	½	
	$= \frac{(\sec\theta + \tan\theta)(1 - \sec\theta + \tan\theta)}{(\tan\theta - \sec\theta + 1)}$		
	$= \sec\theta + \tan\theta$	½	
	$= \frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}$	½	
	$= \frac{1 + \sin\theta}{\cos\theta}$ = RHS	½	3
	Note : If alternate method is used to prove, then give full marks.		
	OR		
	$\frac{5\cos^2 60° + 4\sec^2 30° - \tan^2 45°}{\sin 30° + \sin 90°}$		
	$= \frac{5\left(\frac{1}{2}\right)^2 + 4\left(\frac{2}{\sqrt{3}}\right)^2 - (1)^2}{\frac{1}{2} + 1}$	1	
	$= \frac{5\left(\frac{1}{4}\right) + 4\left(\frac{4}{3}\right) - 1}{\frac{1+2}{2}}$	½	
	$= \frac{\frac{5}{4} + \frac{16}{3} - 1}{\frac{3}{2}}$		
	$= \frac{\frac{15 + 64 - 12}{12}}{\frac{3}{2}}$	½	
	$= \frac{\frac{67}{12}}{\frac{3}{2}}$	½	

Qn. Nos.	Value Points	Marks allotted
	$= \frac{67}{12} \times \frac{2}{3}$	3
	$= \frac{67}{18}$ ½	
28.	Find the mean for the following data by 'Direct method' :	

Class-interval	*Frequency*
10 – 20	4
20 – 30	6
30 – 40	5
40 – 50	4
50 – 60	1

OR

Find the median for the following data :

Class-interval	*Frequency*
50 – 60	5
60 – 70	8
70 – 80	10
80 – 90	4
90 – 100	3

Ans. :

Class interval	frequency (f_i)	Mid point x_i	$x_i f_i$
10-20	4	15	60
20-30	6	25	150
30-40	5	35	175
40-50	4	45	180
50-60	1	55	55
	$\Sigma f_i = 20$		$\Sigma f_i x_i = 620$

2

Qn. Nos.	Value Points		Marks allotted
	Mean = $\overline{X}=\frac{\sum f_i x_i}{\sum f_i}$	½	
	$= \frac{620}{20}$		
	Mean = 31	½	3

OR

Class interval	frequency (f_i)	Cumulative frequency (C_f)
50-60	5	5
60-70	8	13
70-80	10	23
80-90	4	27
90-100	3	30
	$n=30$	

1

$\frac{n}{2}=\frac{30}{2}=15$, L = 70, C_f = 13, f = 10, h = 10 ½

Median = $l+\left[\frac{\frac{n}{2}-C_f}{f}\right]\times h$ ½

$= 70+\left[\frac{15-13}{10}\right]\times 10$

$= 70+\frac{2}{10}\times 10$ ½

= 70 + 2

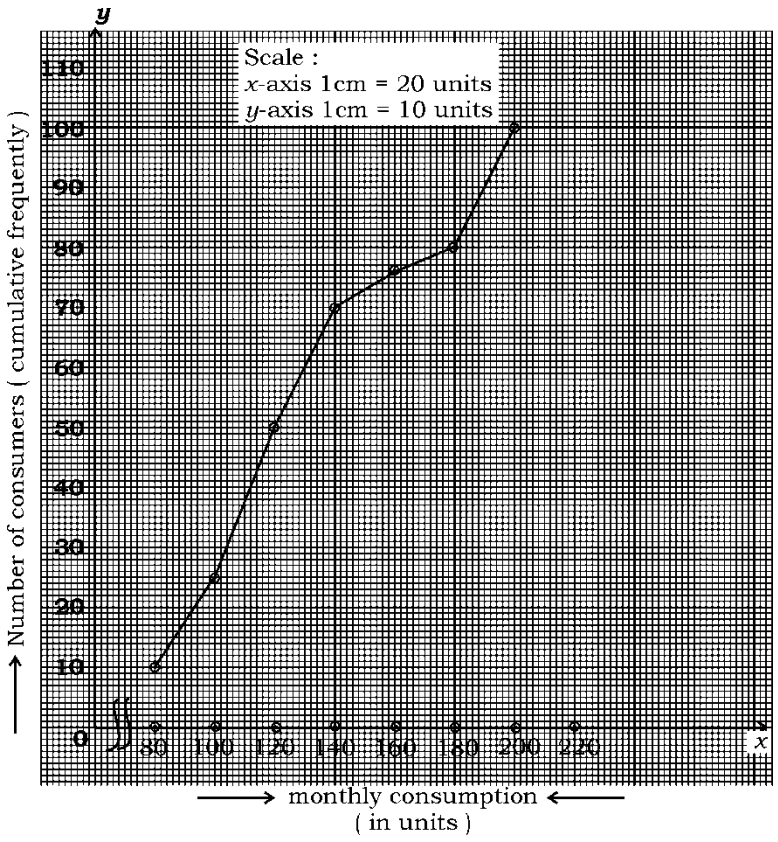
Median = 72 ½ 3

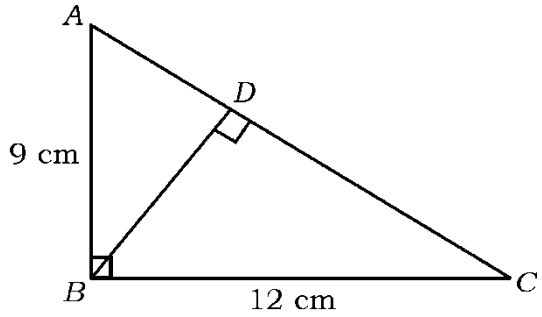
Qn. Nos.	Value Points	Marks allotted

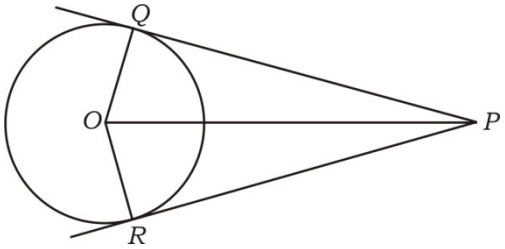
29. The following data gives the monthly consumption of electricity of 100 consumers of a locality. Draw a "less than type ogive" for the given data :

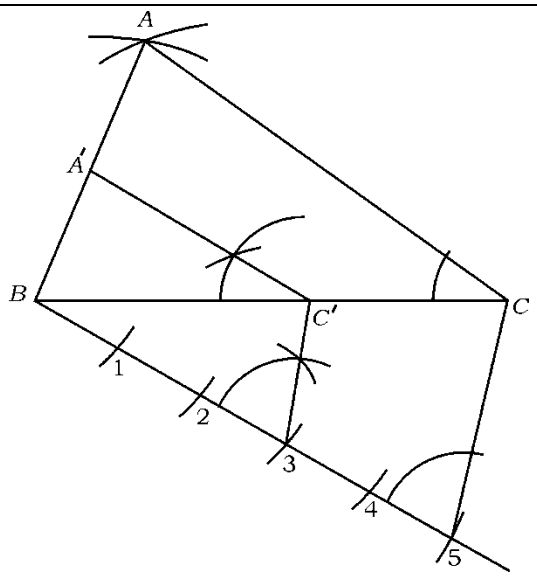
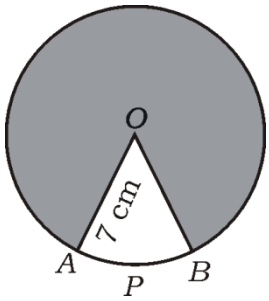
Monthly consumption (in units)	*Number of consumers (cumulative frequency)*
Less than 80	10
Less than 100	25
Less than 120	50
Less than 140	70
Less than 160	75
Less than 180	80
Less than 200	100

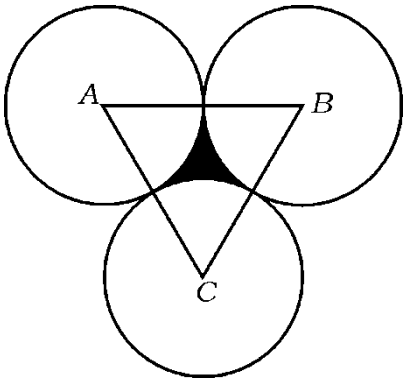
Ans. :



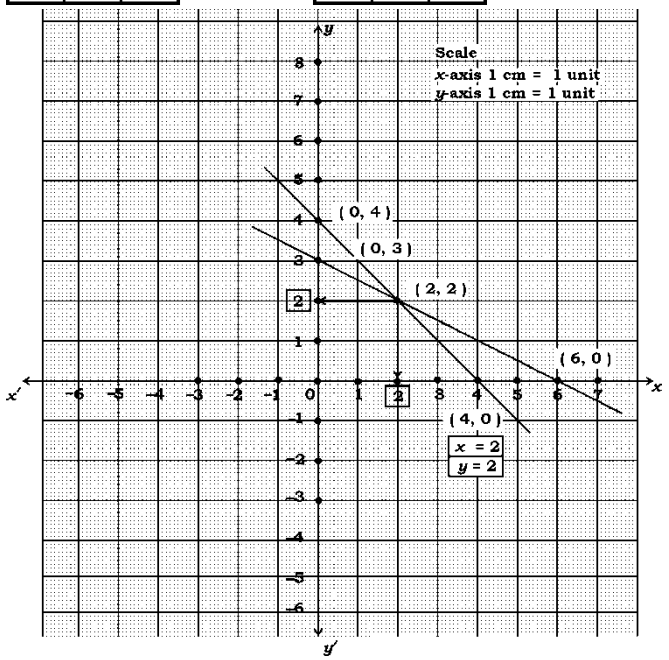
Qn. Nos.	Value Points		Marks allotted
	Drawing axes and scale	1	
	Plotting points	1	
	Drawing Ogive curve	1	3
30.	In the given figure, $\angle ABC = 90°$ and $BD \perp AC$. Prove that $\Delta ABD \sim \Delta BCD$. If $AB = 9$ cm and $BC = 12$ cm, then find AD.		
			
	Ans. :		
	In the figure let $\angle BAD = x°$ then		
	$\angle ABD = 90° - x$, $\angle ACB = 90° - x$		
	In ΔABD and ΔBCD,		
	$\angle ADB = \angle BDC = 90°$	½	
	$\angle ABD = \angle ACB = 90° - x$	½	
	$\therefore \Delta ABD \sim \Delta BCD$ [*AA* similarity criterion]		
	InΔABC, $AC^2 = AB^2 + BC^2$	½	
	$= 9^2 + 12^2$		
	$= 81 + 144$		
	$= 225$		
	$AC = \sqrt{225}$		
	$AC = 15$ cm	½	
	Now $AB^2 = AC.AD$	½	
	$9^2 = 15 . AD$		
	$81 = 15 . AD$		
	$AD = \frac{81}{15}$ cm		
	$AD = 5{\cdot}4$ cm	½	3

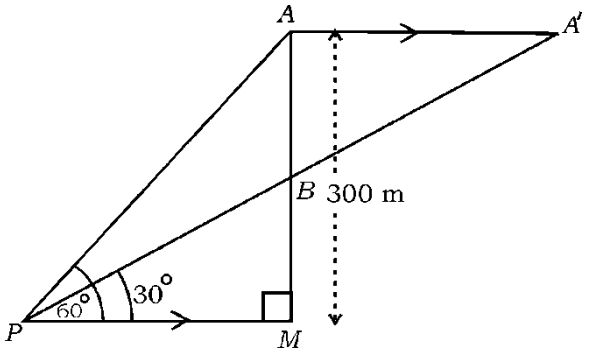
Qn. Nos.	Value Points	Marks allotted
31.	Prove that "The lengths of tangents drawn from an external point to a circle are equal". *Ans.* :  ½ Data : O is the centre of the circle. PQ and PR are the tangents drawn from external point P. ½ To prove : $PQ = PR$ ½ Construction : Join OP, OQ and OR. ½ Proof : In the figure, in ΔOQP and ΔORP, $\angle OQP = \angle ORP = 90°$ [$OQ \perp PQ$, $OR \perp PR$] ½ $OQ = OR$ [radii of the same circle] $OP = OP$ [Common side] $\Delta OQP \cong \Delta ORP$ [RHS congruence rule] ½ $\therefore PQ = PR$ [CPCT] Note : If the theorem is proved as given in the text book, then give full marks.	3
32.	Construct a triangle with sides 6·5 cm, 7·5 cm and 8 cm and then construct another triangle whose sides are $\frac{3}{5}$ of the corresponding sides of the first triangle.	

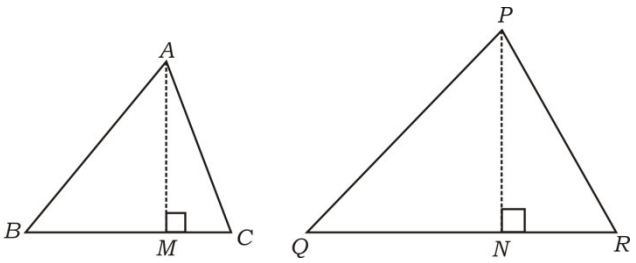
Qn. Nos.	Value Points	Marks allotted
	Ans. : 	
	Constructing given triangle 1	
	Constructing acute angle and drawing arcs ½	
	Drawing parallel lines 1	
	Getting required triagle ½	3
33.	In the given figure *'O'* is the centre of the circle of radius 7 cm. If the length of the arc *APB* is $\frac{22}{3}$ cm, then find the area of the shaded region. [Take $\pi = \frac{22}{7}$] 	
	OR	
	ABC is an equilateral triangle whose vertices are the centres of three touching circles as shown in the figure. If the area of Δ *ABC* is $100\sqrt{3}$ cm^2 and the radius of each circle is half the side of the triangle, then find the area of	

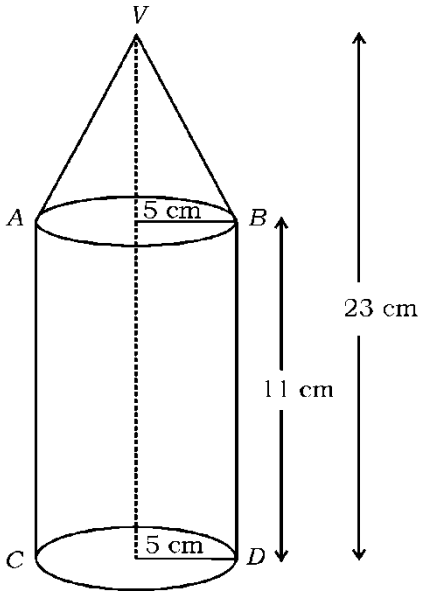
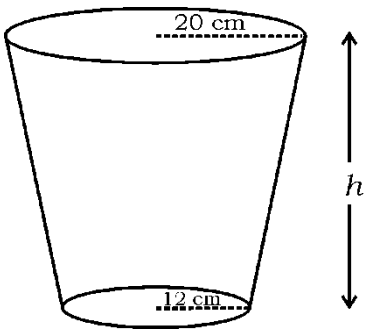
Qn. Nos.	Value Points	Marks allotted
	the shaded region. [Use $\pi = 3{\cdot}14$ and $\sqrt{3} = 1{\cdot}73$]  *Ans.* : Length of the arc of a sector angle θ $= \frac{\theta}{360^\circ} \times 2\pi r$ ½ $\frac{22}{3} = \frac{\theta}{360^\circ} \times 2 \times \frac{22}{7} \times 7$ $\therefore \theta = 60^\circ$ ½ Area of circle = $A_1 = \pi r^2$ $= \frac{22}{7} \times 7^2$ $= \frac{22}{7} \times 7 \times 7$ $A_1 = 154 \text{ cm}^2$ ½ Area of the sector of angle $\theta = \frac{\theta}{360^\circ} \times \pi r^2$ $A_2 = \frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 7 \times 7$ $A_2 = \frac{77}{3} \text{ cm}^2$ or $\boxed{25{\cdot}66 \text{ cm}^2}$ ½ Required area $= A_1 - A_2$ $= 154 - \frac{77}{3}$ ½ $= \frac{462 - 77}{3} = \frac{385}{3} = 128{\cdot}33 \text{ cm}^2$ ½ <u>Alternative method</u> :	3

Qn. Nos.	Value Points		Marks allotted
	Length of an arc of a sector angle $\theta = \frac{\theta}{360°} \times 2\pi r$	½	
	$\frac{22}{3} = \frac{\theta}{360°} \times 2 \times \frac{22}{7} \times 7$		
	$\therefore \theta = 60°$	½	
	Required sector angle = $360° - 60° = 300°$	½	
	Area of the sector of angle $\theta = \frac{\theta}{360°} \times \pi r^2$	½	
	$= \frac{300°}{360°} \times \frac{22}{7} \times 7 \times 7$		
	$= \frac{385}{3}$ cm^2	½	
	or $\boxed{128{\cdot}33 \text{ cm}^2}$	½	3
	OR		
	$A = \frac{\sqrt{3}}{4} a^2$	½	
	$100\sqrt{3} = \frac{\sqrt{3}}{4} a^2$		
	$a^2 = 400$		
	$a = \sqrt{400}$		
	a = 20 cm	½	
	Radius of each circle = $\frac{20}{2}$ = 10 cm		
	$\angle A = \angle B = \angle C = 60°$	½	
	Area of 3 sectors = $3 \times \frac{\theta}{360°} \times \pi r^2$	½	
	$= 3 \times \frac{60°}{360°} \times 3{\cdot}14 \times 10^2$		
	$= \frac{314}{2}$		
	= 157 cm^2	½	
	Area of the shaded region = $100\sqrt{3} - 157$		
	= 100 (1·73) – 157		
	= 173 – 157		
	= 16 cm^2	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 : $x + 2y = 6$ $x + y = 4$ *Ans.* : $x + 2y = 6$ <table><tr><td>x</td><td>0</td><td>6</td></tr><tr><td>y</td><td>3</td><td>0</td></tr></table> $x + y = 4$ <table><tr><td>x</td><td>0</td><td>4</td></tr><tr><td>y</td><td>4</td><td>0</td></tr></table> 	
	Constructing tables 1 + 1	
	Plotting points and drawing lines 1	
	Writing the values of x and y 1	4
	Any other alternate points can be used to draw straight lines.	
35.	Two kites *'A'* and *'B'* are flying one below the other above the horizontal ground as shown in the figure. Kite *'A'* is flying 300 m above the ground. The angles of elevation of kites *'A'* and *'B'* as observed from a point *'P'* on the ground are 60° and 30° respectively. Find the distance	

Qn. Nos.	Value Points	Marks allotted
	between the two kites (AB). After some time when the thread of kite *'A'* is released, it moves horizontal to the ground and reaches the point *'A''* in the sky. If P, B, A' are in the same line, then find the distance between the kites ($A'B$).	
		
	Ans. :	
	In ΔPMA, $\tan 60° = \frac{AM}{PM}$ ½	
	$\sqrt{3} = \frac{300}{PM}$	
	$PM = \frac{300}{\sqrt{3}}$ ½	
	In ΔPMB, $\tan 30° = \frac{BM}{PM}$ ½	
	$\frac{1}{\sqrt{3}} = \frac{BM}{\frac{300}{\sqrt{3}}}$	
	$\sqrt{3} \cdot \sqrt{3} \cdot BM = 300$	
	$3\ BM = 300$	
	$BM = \frac{300}{3} = 100\text{ m}$ ½	
	$AB = AM - BM = 300 - 100 = 200$ m ½	
	In $\Delta ABA'$, $\angle AA'B = \angle BPM = 30°$ ($AA' \parallel PM$) ½	
	$\sin 30° = \frac{AB}{A'B}$ ½	
	$\frac{1}{2} = \frac{200}{A'B}$	
	$A'B = 200 \times 2$	
	$A'B = 400$ m ½	4

Qn. Nos.	Value Points	Marks allotted
36.	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 : $\Delta ABC \sim \Delta PQR$	
	$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ½	
	To prove : $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC^2}{QR^2}$ ½	
	Construction : Draw $AM \perp BC$ and $PN \perp QR$ ½	
	Proof : $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{\frac{1}{2} \times BC \times AM}{\frac{1}{2} \times QR \times PN}$	
	$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC}{QR} \times \frac{AM}{PN}$ ..... (1) ½	
	In ΔABM and ΔPQN	
	$\angle B = \angle Q$ (By data, $\Delta ABC \sim \Delta PQR$)	
	$\angle M = \angle N = 90°$ (construction)	
	$\frac{AB}{PQ} = \frac{AM}{PN}$ ½	
	But $\frac{AB}{PQ} = \frac{BC}{QR}$	
	$\therefore \frac{AM}{PN} = \frac{BC}{QR}$ ..... (2) ½	
	Substitute (2) in (1)	
	$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC}{QR} \times \frac{BC}{QR}$	
	$\therefore \frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC^2}{QR^2}$ ½	4

Qn. Nos.	Value Points	Marks allotted
37.	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 container is in the form of a frustum of a cone as shown in the figure. The radii of its circular bases are 20 cm and 12 cm. If the volume of the frustum of a cone is 12320 cm^3, then find its curved surface area. [Take $\pi = \frac{22}{7}$] 	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	Height of cone = $h_{cone} = (23 - 11) = 12$ cm	
	radius of cone = r = 5 cm	
	slant height of cone = $l = \sqrt{r^2 + h^2}$ ½	
	$= \sqrt{5^2 + 12^2}$	
	$= \sqrt{25 + 144}$	
	$= \sqrt{169}$	
	l = 13 cm ½	
	CSA of given solid = CSA of cone + CSA of cylinder	
	$= \pi rl + 2\pi rh$ ½	
	$= \pi r\ (l + 2h)$	
	$= \frac{22}{7} \times 5\ (13 + 2 \times 11)$ ½	
	$= \frac{22}{7} \times 5 \times 35$	
	$= 550\ \text{cm}^2$ ½	
	Volume of given solid = Volume of cone + Volume of cylinder = $\frac{1}{3}\pi r^2 h_{cone} + \pi r^2 h_{cy}$ ½	
	$= \pi r^2 \left[\frac{1}{3} \times h_{cone} + h_{cy} \right]$	
	$= \frac{22}{7} \times 5^2 \left[\frac{1}{3} \times 12 + 11 \right]$ ½	
	$= \frac{550}{7} \times 15$	
	$= \frac{8250}{7}\ \text{cm}^3$	
	OR 1178·57 cm^3 ½	
	Note : Any other alternative method is used to get the correct answer, then give full marks.	4
	OR	

Qn. Nos.	Value Points	Marks allotted
	$V = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$ ½	
	$12320 = \frac{1}{3} \times \frac{22}{7} \times h(20^2 + 12^2 + 20 \times 12)$	
	$12320 = \frac{22}{21} \times h\,(784)$ ½	
	$h = \frac{12320 \times 21}{784 \times 22}$ ½	
	$h = 15$ cm ½	
	$l = \sqrt{h^2 + (r_1 - r_2)^2}$ ½	
	$= \sqrt{15^2 + (20-12)^2}$	
	$= \sqrt{225 + 64}$	
	$l = \sqrt{289}$	
	$l = 17$ cm ½	
	CSA = $\pi(r_1 + r_2)\,l$ ½	
	$= \frac{22}{7}(20+12) \times 17$	
	$= \frac{22}{7} \times 32 \times 17$	
	$= \frac{11968}{7}$ cm^2 or 1709·71 cm^2 ½	4
VI.	**Answer the following question : 1 × 5 = 5**	
38.	An Arithmetic progression contains 30 terms. The 17th term of the progression is 4 more than thrice its fifth term. If the 10th term is 31, then find the last three terms of the progression and also find the arithmetic progression.	
	Ans. :	
	$a_{17} = 3a_5 + 4$ ½	
	$a + 16d = 3(a + 4d) + 4$ ½	
	$a + 16d = 3a + 12d + 4$	
	or $3a + 12d + 4 = a + 16d$	

Qn. Nos.	Value Points	Marks allotted
	$3a - a = 16d - 12d - 4$ ½	
	$2a = 4d - 4$	
	$\div 2 \Rightarrow a = 2d - 2$ ..... (i) ½	
	By data, $a_{10} = 31$	
	$a + 9d = 31$	
	$2d - 2 + 9d = 31$ [from (i)] ½	
	$11d - 2 = 31$	
	$11d = 31 + 2$ ½	
	$11d = 33$	
	$d = \frac{33}{11}$ ½	
	$d = 3$, $a = 2 \times 3 - 2 = 4$ ½	
	30th term = $a + 29d = 4 + 29 \times 3 = 4 + 87 = 91$	
	29th term = 91 – 3 = 88 ½	
	28th term = 88 – 3 = 85 ½	
	The progression is 4, 4 + 3, 7 + 3, ...	
	4, 7, 10	
	Note : Any other alternative method is followed to get correct answer, then give full marks.	5