CCE RF
UNREVISED FULL SYLLABUS

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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, ಮಾರ್ಚ್ / ಏಪ್ರಿಲ್ — 2023

S. S. L. C. EXAMINATION, MARCH/APRIL, 2023

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 03. 04. 2023] ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Date : 03. 04. 2023] **CODE NO. : 81-E**

ವಿಷಯ : ಗಣಿತ

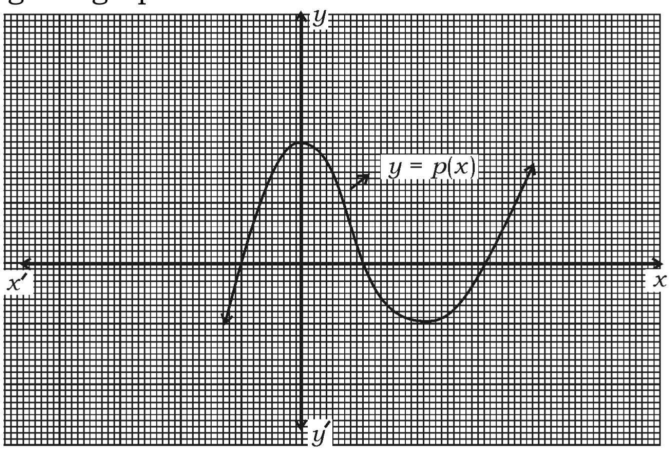
Subject : MATHEMATICS

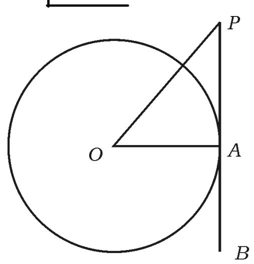
(ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Fresh)

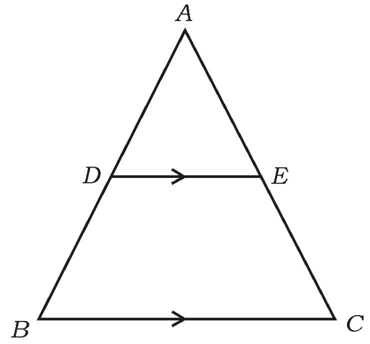
(ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ / English Medium)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : **80**

[Max. Marks : 80

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** $8 \times 1 = 8$	
1.		The number of zeroes of the polynomial $y = p(x)$ in the given graph is 	

Qn. Nos.	Ans. Key	Value Points	Marks allotted
		(A) 3 (B) 2 (C) 1 (D) 4 *Ans.* :	
	(A)	3	1
2.		For an event '*E*', if $P(E) = 0{\cdot}75$, then $P(\overline{E})$ is (A) 2·5 (B) 0·25 (C) 0·025 (D) 1·25 *Ans.* :	
	(B)	0·25	1
3.		The total surface area of a right circular cylinder having radius '*r*' and height '*h*' is (A) $\pi r(r+h)$ (B) $2\pi rh$ (C) $2\pi r(r-h)$ (D) $2\pi r(r+h)$ *Ans.* :	
	(D)	$2\pi r(r+h)$	1
4.		The number that represents the remainder when $19 = 6 \times 3 + 1$ is compared with Euclid's division lemma $a = bq + r$ is (A) 3 (B) 6 (C) 1 (D) 19 *Ans.* :	
	(C)	1	1
5.		In the given figure, *PB* is a tangent drawn at the point *A* to the circle with centre '*O*'. If $\angle AOP = 45°$, then the measure of $\angle OPA$ is  (A) 45° (B) 90° (C) 35° (D) 65° *Ans.* :	
	(A)	45°	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
6.		In the figure, if $DE \parallel BC$, then the correct relation among the following is	
			
		(A) $\frac{AD}{AB} = \frac{AE}{EC}$ (B) $\frac{AD}{DB} = \frac{EC}{AE}$	
		(C) $\frac{AD}{DB} = \frac{AE}{EC}$ (D) $\frac{DB}{AD} = \frac{AE}{EC}$	
		Ans. :	
	(C)	$\frac{AD}{DB} = \frac{AE}{EC}$	1
7.		The lines represented by the equations	
		$4x + 5y - 10 = 0$ and $8x + 10y + 20 = 0$ are	
		(A) intersecting lines	
		(B) perpendicular lines to each other	
		(C) coincident lines	
		(D) parallel lines	
		Ans. :	
	(D)	parallel lines	1
8.		The distance of the point (– 8, 3) from the x-axis is	
		(A) – 8 units (B) 3 units	
		(C) – 3 units (D) 8 units	
		Ans. :	
	(B)	3 units	1

Qn. Nos.	Value Points	Marks allotted

II. **Answer the following questions :** **8 × 1 = 8**

(Direct answers from Q. Nos. 9 to 16 full marks should be given)

9. Express the denominator of $\frac{7}{80}$ in the form of $2^n \times 5^m$.

Ans. :

$\frac{7}{80}$

$$\begin{array}{r|l} 2 & 80 \\ \hline 2 & 40 \\ \hline 2 & 20 \\ \hline 2 & 10 \\ \hline & 5 \end{array}$$

$80 = 2^4 \times 5^1$ ½

$\therefore \; 2^n \times 5^m = 2^4 \times 5^1$ ½ — **1**

10. If the pair of lines represented by the linear equations $x + 2y - 4 = 0$ and $ax + by - 12 = 0$ are coincident lines, then find the values of '*a*' and '*b*'.

Ans. :

$x + 2y - 4 = 0$ $\qquad$ $ax + by - 12 = 0$

coincident lines $\qquad$ $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ ½

$$\frac{1}{a} = \frac{2}{b} = \frac{-4}{-12}$$

$$\frac{1}{a} = \frac{1}{3} \qquad \frac{2}{b} = \frac{1}{3}$$

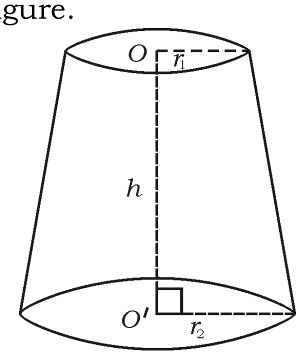
$\therefore$ $\boxed{a = 3}$ $\boxed{b = 6}$ ½ — **1**

11. $\Delta ABC \sim \Delta PQR$. Area of the ΔABC is 64 cm^2 and the area of the ΔPQR is 100 cm^2. If AB = 8 cm, then find the length of PQ.

Ans. :

$$\left.\begin{array}{l} \frac{ar(ABC)}{ar(PQR)} = \frac{AB^2}{PQ^2} \\ \frac{64}{100} = \frac{8^2}{PQ^2} \end{array}\right\}$$ ½

Qn. Nos.	Value Points		Marks allotted
	$PQ^2 = 100$ $PQ = \sqrt{100}$ $PQ = 10$ cm	½	1
12.	Express the equation $x (2 + x) = 3$ in the standard form of a quadratic equation.		
	Ans. :		
	$x(2+x) = 3$	½	
	$2x + x^2 = 3$		
	Standard form : $x^2 + 2x - 3 = 0$	½	1
13.	Find the discriminant of the quadratic equation $2x^2 - 4x + 3 = 0$.		
	Ans. :		
	$2x^2 - 4x + 3 = 0$		
	$\Delta = b^2 - 4ac$	½	
	$\Delta = (-4)^2 - 4 \times 2 \times 3$		
	$= 16 - 24$		
	$\Delta = -8$		
	$\therefore$ Discriminant $= -8$	½	1
14.	Find the coordinates of the mid-point of the line segment joining the points (6, 3) and (4, 7).		
	Ans. :		
	(6, 3) (4, 7) (x_1, y_1) (x_2, y_2)		
	Co-ordinates of Mid-point = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	½	
	$= \left(\frac{6+4}{2}, \frac{3+7}{2} \right)$		
	$= (5, 5)$	½	1

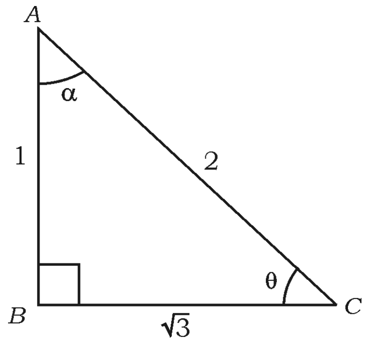
Qn. Nos.	Value Points	Marks allotted
15.	Write the degree of the polynomial $P(x) = 3x^3 - x^4 + 2x^2 + 5x + 2$.	
	Ans. :	
	Degree of the polynomial = 4	1
16.	Write the formula to find the volume of the frustum of a cone given in the figure.	
		
	Ans. :	
	Volume of the frustum of the cone } $(V) = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$	1
III.	**Answer the following questions : 8 × 2 = 16**	
17.	Show that 5 + $\sqrt{3}$ is an irrational number.	
	OR	
	Find the H.C.F. of 72 and 120 by using Euclid's division algorithm.	
	Ans. :	
	Let us assume $5+\sqrt{3}$ is rational that is, we can find coprime a and $b(b \neq 0)$ ½	
	Such that $5+\sqrt{3} = \frac{a}{b}$	
	$\therefore \frac{a}{b} - 5 = \sqrt{3}$	
	Rearranging this equation $\sqrt{3} = \frac{a}{b} - 5$	
	$\sqrt{3} = \frac{a-5b}{b}$ ½	

Qn. Nos.	Value Points		Marks allotted
	Since a and b are integers we get		
	$\frac{a}{b} - 5$ is rational and so $\sqrt{3}$ is rational		
	But this contradicts the fact that $\sqrt{3}$ is irrational .		
	This contradiction has arisen because of our incorrect assumption that $5 + \sqrt{3}$ is rational.	½	
	So, we conclude $5 + \sqrt{3}$ is irrational.	½	2
	OR		
	$a = bq + r, \quad 0 \le r < b$		
	(1) 120 = 72 × 1 + 48 $72 \overline{) 120} (1$; 72; 48	½	
	(2) 72 = 48 × 1 + 24 $48 \overline{) 72} (1$; 48; 24	½	
	(3) 48 = 24 × 2 + 0 $24 \overline{) 48} (2$; 48; 0	½	
	∴ H.C.F. = 24	½	2
18.	Solve the given pair of linear equations :		
	$3x + y = 12$		
	$x + y = 6$		
	Ans. :		
	$3x + y = 12$		
	$x + y = 6$		
	(−) (−) (−) subtracting		
	$2x = 6$	½	
	$x = \frac{6}{2}$		
	$\boxed{x = 3}$	½	
	$x + y = 6$		
	$3 + y = 6$	½	
	$y = 6 - 3$		
	$\boxed{y = 3}$	½	2

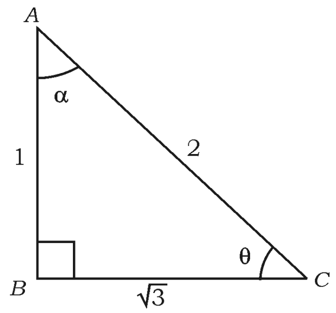
Qn. Nos.	Value Points	Marks allotted
19.	Find the 20^{th} term of the Arithmetic progression 4, 7, 10, ... by using formula.	
	Ans. :	
	4, 7, 10 .... a_{20} = ?	
	$a = 4,\ d = 7 - 4 = 3 \qquad n = 20$ ½	
	$a_n = a + (n-1)d$ ½	
	$a_{20} = 4 + (20-1)\times 3$ $= 4 + 19 \times 3$ $= 4 + 57$ ½	
	$\therefore \boxed{a_{20} = 61}$ ½	2
20.	Find the roots of the equation $2x^2 - 5x + 3 = 0$ by using 'quadratic formula'.	
	OR	
	Find the roots of the equation $5x^2 - 6x - 2 = 0$ by the method of completing the square.	
	Ans. :	
	$2x^2 - 5x + 3 = 0$	
	$a = 2 \quad b = -5 \quad c = 3$	
	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ ½	
	$x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4\times 2\times 3}}{2\times 2}$ ½	

Qn. Nos.	Value Points		Marks allotted
	$x = \frac{5 \pm \sqrt{25-24}}{4}$	½	
	$x = \frac{5 \pm \sqrt{1}}{4}$	½	2
	$x = \frac{5 \pm 1}{4}$		
	$x = \frac{5+1}{4}$, $x = \frac{5-1}{4}$		
	$x = \frac{6}{4}$, $x = \frac{4}{4}$		
	$\boxed{x = \frac{3}{2}}$ $\boxed{x = 1}$		
	OR		
	$5x^2 - 6x - 2 = 0$		
	Multiplying the equation throughout by '5' we get		
	$(5x^2 - 6x - 2 = 0) \times 5$		
	$25x^2 - 30x - 10 = 0$		
	$25x^2 - 30x + 3^2 - 3^2 - 10 = 0$	½	
	$(5x - 3)^2 - 19 = 0$		
	$5x - 3 = \sqrt{19}$	½	
	$5x = 3 \pm \sqrt{19}$		
	$x = \frac{3 \pm \sqrt{19}}{5}$	½	
	$\therefore \boxed{x = \frac{3+\sqrt{19}}{5}}$ $\boxed{x = \frac{3-\sqrt{19}}{5}}$	½	
	Note : Alternate method is used to solve give marks		2

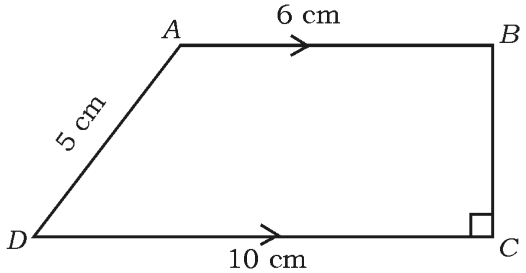
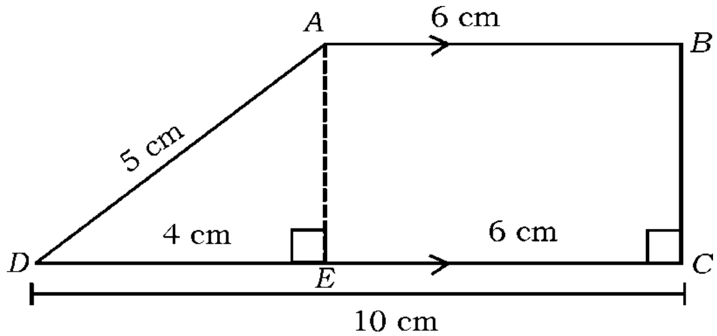
Qn. Nos.	Value Points	Marks allotted
21.	In the given figure, if $\angle ABC = 90°$, then find the values of $\sin\theta$ and $\cos\alpha$.	

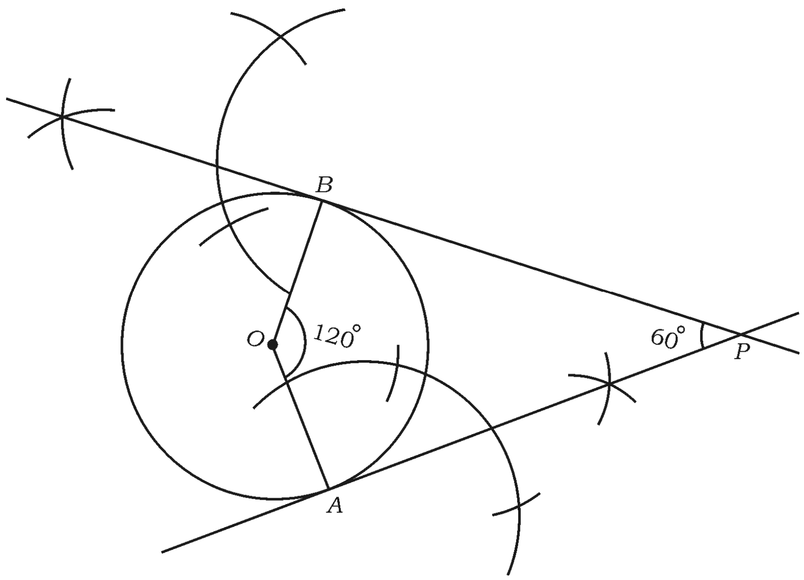


Ans. :



	$\sin\theta = \frac{AB}{AC} = \frac{1}{2}$ 1	
	$\cos\alpha = \frac{AB}{AC} = \frac{1}{2}$ 1	2
22.	A box contains cards which are numbered from 9 to 19. If one card is drawn at random from the box, find the probability that it bears a prime number.	
	Ans. :	
	$n(S) = \{9, 10, 11, \ldots\ldots\ldots\ldots 19\}$	
	$\therefore \quad n(S) = 11$ ½	
	$A = \{\text{Prime numbers}\}$	
	$A = \{11, 13, 17, 19\}$ ½	
	$\therefore n(A) = 4$	
	$P(A) = \frac{4}{11}$ 1	2

Qn. Nos.	Value Points		Marks allotted
23.	In the given figure, *ABCD* is a trapezium in which *AB* || *DC*, and $BC \perp DC$. If *AB* = 6 cm, *CD* = 10 cm and *AD* = 5 cm, then find the distance between the parallel lines.		
			
	Ans. :		
			
	Draw $AE \perp DC$	½	
	$\therefore$ *ABCE* is a rectangle		
	$\therefore EC = AB = 6$ cm		
	$DC = DE + EC$		
	$10 = DE + EC$		
	$10 = DE + 6$		
	$DE = 10 - 6 = 4$ cm	½	
	In Δ *ADE* $\quad AD^2 = AE^2 + DE^2$	½	
	$5^2 = AE^2 + 4^2$		

Qn. Nos.	Value Points	Marks allotted
	$25 = AE^2 + 16$	
	$AE^2 = 25 - 16$	
	$AE^2 = 9$	
	$AE = \sqrt{9}$	
	AE = 3 cm ∴ Distance between the parallel lines = 3 cm. } ½	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 60°.	
	Ans. :	
	Angle between the Radii = 180° – 60° = 120° ½	
		
	Drawing a circle of radius 4 cm ½	
	Drawing 2 arcs ½	
	Drawing a pair of tangents to circle ½	2

Qn. Nos.	Value Points	Marks allotted
IV.	**Answer the following questions :** **$9 \times 3 = 27$**	
25.	Divide $p(x) = 3x^3 + x^2 + 2x + 5$ by $g(x) = x^2 + 2x + 1$ and find the quotient $[q(x)]$ and remainder $[r(x)]$.	
	OR	
	Find the zeroes of the quadratic polynomial $p(x) = x^2 + 7x + 10$, and verify the relationship between zeroes and the coefficients.	
	Ans. :	
	$p(x) = 3x^3 + x^2 + 2x + 5$	
	$g(x) = x^2 + 2x + 1$	
	$q(x) = ?$	
	$r(x) = ?$	
	Quotient: $3x - 5$	
	$x^2 + 2x + 1 \overline{)\ 3x^3 + x^2 + 2x + 5\ (}$ 1	
	$3x^3 + 6x^2 + 3x$	
	$(-)\quad(-)\quad(-)$	
	$-5x^2 - x + 5$ 1	
	$-5x^2 - 10x - 5$	
	$(+)\quad(+)\quad(+)$	
	$9x + 10$	
	$\therefore$ Quotient $\boxed{q(x) = 3x - 5}$ ½	
	Remainder $\boxed{r(x) = 9x + 10}$ ½	3
	OR	
	$p(x) = x^2 + 7x + 10$	
	$0 = x^2 + 5x + 2x + 10$ ½	
	$0 = x(x + 5) + 2(x + 5)$	
	$0 = (x + 2)(x + 5)$ ½	
	$x + 2 = 0 \qquad x + 5 = 0$	
	$x = -2 \qquad x = -5$ ½	

Qn. Nos.	Value Points		Marks allotted
	Therefore zeroes of $p(x) = x^2 + 7x + 10$ are – 2 and – 5.	½	
	Sum of zeroes = – 2 + (– 5) = – 7 = $\frac{-7}{1} = \frac{-\text{coefficient of } x}{\text{coefficient of } x^2}$	½	
	Products of zeroes = $(-2)\times(-5) = 10 = \frac{10}{1} = \frac{\text{const. } term}{\text{coefficient of } x^2}$	½	3
26.	Prove that $\sqrt{\frac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A$		
	OR		
	Prove that $\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = 2 \operatorname{cosec} A.$		
	Ans. :		
	$\sqrt{\frac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A$		
	L.H.S. = $\sqrt{\frac{(1+\cos A)(1+\cos A)}{(1-\cos A)(1+\cos A)}}$	½	
	$= \sqrt{\frac{(1+\cos A)^2}{1^2 - \cos^2 A}}$	½	
	$= \sqrt{\frac{(1+\cos A)^2}{1 - \cos^2 A}}$		
	$= \sqrt{\frac{(1+\cos A)^2}{\sin^2 A}}$	½	
	$= \frac{1+\cos A}{\sin A}$	½	
	$= \frac{1}{\sin A} + \frac{\cos A}{\sin A}$	½	
	$\sqrt{\frac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A =$ R.H.S.	½	3
	OR		

Qn. Nos.	Value Points		Marks allotted
	$\dfrac{\sin A}{1+\cos A}+\dfrac{1+\cos A}{\sin A}=2\operatorname{cosec} A$		
	L.H.S. $=\dfrac{\sin A}{1+\cos A}+\dfrac{1+\cos A}{\sin A}$		
	$=\dfrac{\sin^2 A+(1+\cos A)^2}{(1+\cos A)\sin A}$	½	
	$=\dfrac{\sin^2 A+1^2+\cos^2 A+2.(1)\cos A}{(1+\cos A)\sin A}$	½	
	$=\dfrac{\sin^2 A+\cos^2 A+1+2\cos A}{(1+\cos A)\sin A}$	½	
	$=\dfrac{1+1+2\cos A}{(1+\cos A)\sin A}$		
	$=\dfrac{2+2\cos A}{(1+\cos A)\sin A}$		
	$=\dfrac{2(1+\cos A)}{(1+\cos A)\sin A}$	½	
	$=\dfrac{2}{\sin A}$		
	$=2\cdot\dfrac{1}{\sin A}$	½	
	$=2\operatorname{cosec} A$ R.H.S		
	$\therefore\ \dfrac{\sin A}{1+\cos A}+\dfrac{1+\cos A}{\sin A}=2\operatorname{cosec} A$	½	3
27.	Find the mean for the following data :		

Class-interval	*Frequency*
1 – 5	4
6 – 10	3
11 – 15	2
16 – 20	1
21 – 25	5

OR

Qn. Nos.	Value Points	Marks allotted

Find the mode for the following data :

Class-interval	*Frequency*
1 – 3	6
3 – 5	9
5 – 7	15
7 – 9	9
9 – 11	1

Ans. :

C.I.	frequency f_i	Mid point x_i	$x_i f_i$
1-5	4	3	12
6-10	3	8	24
11-15	2	13	26
16-20	1	18	18
21-25	5	23	115
	$\sum f_i$ 15		$\sum f_i x_i = 195$

2

$\therefore$ mean $\bar{x} = \dfrac{\Sigma f_i x_i}{\sum f_i} = \dfrac{195}{15}$ ½

Mean ($\bar{x}$) =13 ½ 3

OR

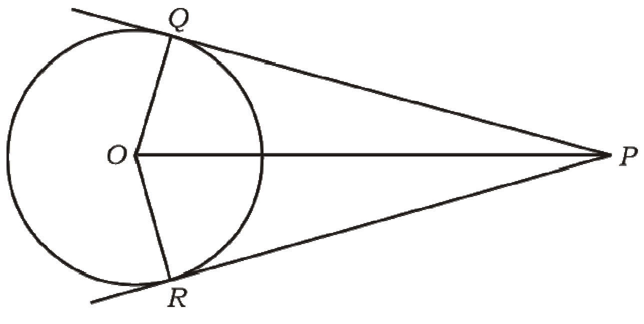
From the frequency distribution table, we find that

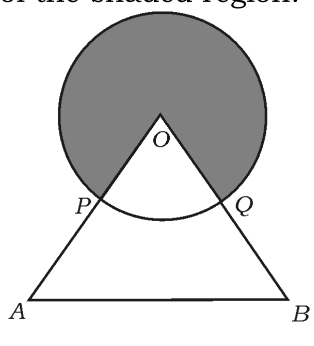
$f_0 = 9$, $f_1 = 15$, $f_2 = 9$, $h = 2$, $l = 5$, ½

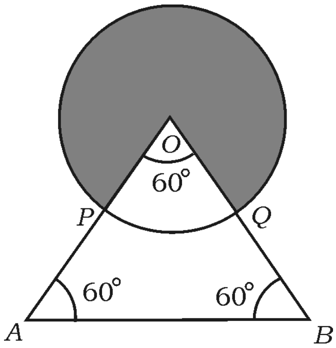
$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$$ ½

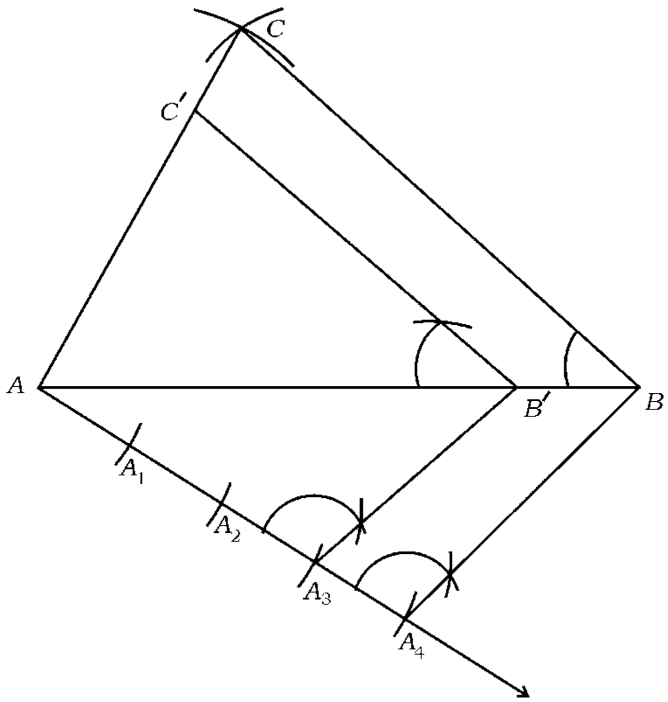
$$= 5 + \left(\frac{15 - 9}{2 \times 15 - 9 - 9} \right) \times 2$$ ½

Qn. Nos.	Value Points		Marks allotted
	$= 5 + \left(\frac{6}{30-18}\right) \times 2$	½	
	$= 5 + \left(\frac{\cancel{6}^1}{\cancel{12}_{\cancel{2}}}\right) \times \cancel{2}$	½	
	$= 5 + 1$		
	Mode = 6	½	3
28.	Find the ratio in which the line segment joining the points $A(-6, 10)$ and $B(3, -8)$ is divided by the point $(-4, 6)$.		
	OR		
	Find the area of a triangle whose vertices are $A(1, -1)$, $B(-4, 6)$ and $C(-3, -5)$		
	Ans. :		
	$A(-6, 10)$ (x_1, y_1) $B(3, -8)$ (x_2, y_2) $P = (-4, 6)$ (x, y)	½	
	$m_1 : m_2 = ?$		
	$\frac{m_1}{m_2} = \frac{x - x_1}{x_2 - x}$ or $\frac{y - y_1}{y_2 - y}$	½	
	$\frac{m_1}{m_2} = \frac{-4-(-6)}{3-(-4)}$ or $\frac{6-10}{-8-6}$	½	
	$\frac{m_1}{m_2} = \frac{-4+6}{3+4}$ or $\frac{-4}{-14}$	½	
	$\frac{m_1}{m_2} = \frac{2}{7}$ or $\frac{2}{7}$	½	
	$\therefore\ m_1 : m_2 = 2 : 7$	½	3
	Note : Alternate formula is used to find $m_1 : m_2$. Give full marks.		
	OR		

Qn. Nos.	Value Points		Marks allotted
	$A\,(1, -1)$ $B\,(-4, 6)$ $c\,(-3, -5)$		
	(x_1, y_1) (x_2, y_2) (x_3, y_3)	½	
	Area of triangle		
	$(A) = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$	1	
	$= \frac{1}{2}[1(6-(-5)) + (-4)(-5-(-1)] + (-3)(-1-6)]$	½	
	$= \frac{1}{2}[1(6+5) + (-4)(-5+1) + (-3)(-7)]$		
	$= \frac{1}{2}[1 \times 11 + (-4) \times (-4) + (-3) \times (-7)]$		
	$= \frac{1}{2}[11 + 16 + 21]$	½	
	$= \frac{1}{2} \times 48$		
	$A = 24$ sq.cm	½	3
29.	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 tangents drawn from external point P.	½	
	To prove : $PQ = PR$	½	

Qn. Nos.	Value Points		Marks allotted
	Construction ; Join OP, OQ and OR	½	
	Proof : In the firgure		
	$\angle OQP = \angle ORP = 90°$ $\left[OQ \perp PQ \right.$ $OR \perp PR$	½	
	OQ = OR (radii of same circle)		
	OP = OP (common side)		
	$\Delta OQP \cong \Delta\ ORP$ [RHS]		
	$\therefore$ $PQ = PR$ (C.P.CT)	½	3
	Note : If the theorem is proved as given in the test-book, give full marks.		
30.	In the given figure, *'O'* is the centre of a circle and *OAB* is an equilateral triangle. *P* and *Q* are the mid-points of *OA* and *OB* respectively. If the area of Δ *OAB* is $36\sqrt{3}$ cm^2, then find the area of the shaded region. 		

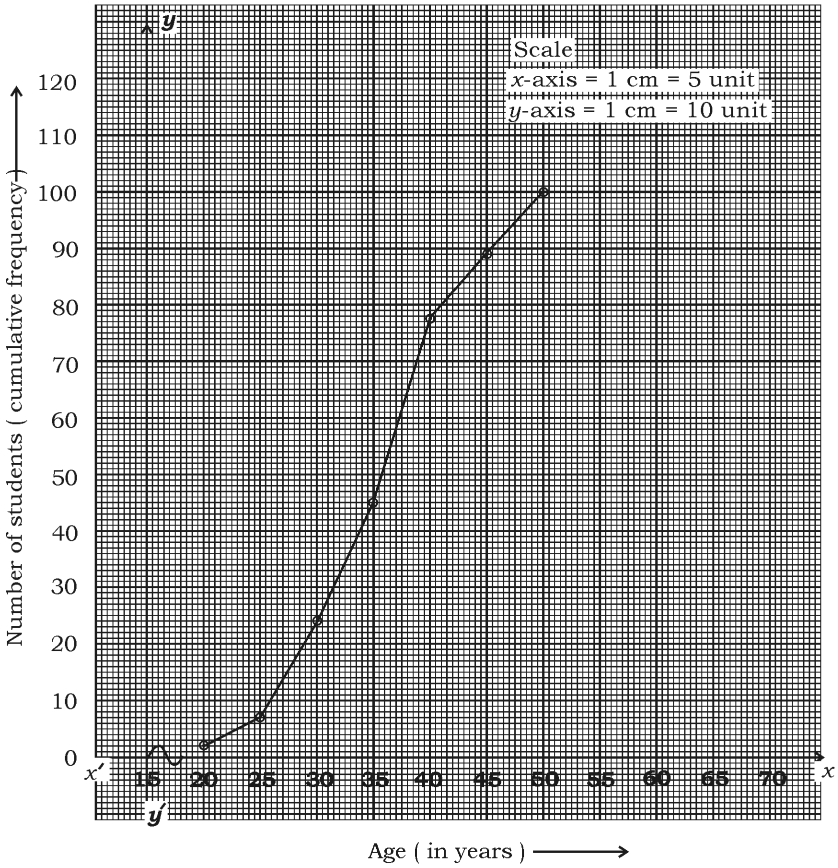
Qn. Nos.	Value Points		Marks allotted
	Ans. :		
			
	Area of equilateral triangle $OAB = \frac{\sqrt{3}a^2}{4}$	½	
	$36\sqrt{3} = \frac{\sqrt{3}a^2}{4}$		
	$a^2 = 36 \times 4$		
	$a^2 = 144$		
	$a = \sqrt{144} = 12\text{ cm}$	½	
	$\therefore$ Radius of the circle $= \frac{a}{2} = \frac{12}{2} = 6\text{ cm}$	½	
	Area of shaded region = Area of circle – Area of sector *OPQ*		
	$= \pi r^2 - \frac{\theta}{360°} \times \pi r^2$	½	
	$= \pi r^2\left(1 - \frac{60°}{360°}\right)$		
	$= \pi r^2\left(1 - \frac{1}{6}\right)$		
	$= \frac{22}{7} \times 6^2\left(\frac{6-1}{6}\right)$	½	
	$= \frac{22}{7} \times 6 \times \not{6} \times \frac{5}{\not{6}}$		
	$= \frac{660}{7}$		
	Area of shaded region $\boxed{A = 94{\cdot}2\text{ cm}^2}$	½	3
	Note : area of shaded region $= \frac{300}{360} \times \pi r^2$ can also be used.		

Qn. Nos.	Value Points	Marks allotted
31.	Construct a triangle with sides 5 cm, 6 cm and 8 cm and 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 1 Obtaining of required triangle ½	3
32.	The distance between two cities *'A'* and *'B'* is 132 km. Flyovers are built to avoid the traffic in the intermediate towns between these cities. Because of this, the average speed of a car travelling in this route through flyovers increases by 11 km/h and hence, the car takes 1 hour less time to travel the same distance than earlier. Find the current average speed of the car. *Ans.* : Let the average speed of the car = x km/hr Distance between two cities = 132 km Time taken = $\left(\frac{D}{S}\right) = \frac{132}{x}$ Hours ½	

Qn. Nos.	Value Points	Marks allotted
	If the speed increases by 11 km/hr Then the speed of the Car = (x + 11) km/hr Time taken = $\frac{132}{x+11}$ Hours ½ According to the data $\frac{132}{x}-\frac{132}{x+11}=1$ ½ $\frac{132(x+11)-132x}{x(x+11)}=1$ $132x+1452-132x=1x(x+11)$ $1452 = x^2+11x$ ½ $x^2+11x-1452=0$ $x^2+44x-33x-1452=0$ $x(x+44)-33(x+44)=0$ $(x-33)(x+44)=0$ $x-33=0$ $x+44=0$ $x=33$ $x=-44$ ½ ∴ Average speed of the car (x) = 33 km/hr ∴ Current Average speed is (x + 11) km/hr = 33 + 11 = 44 km/hr ½	3
33.	A life insurance agent found the following data for distribution of ages of 100 policy holders. Draw a "Less than type ogive" for the given data :	

Age (in years)	*Number of policy holders (cumulative frequency)*
Below 20	2
Below 25	6
Below 30	24
Below 35	45
Below 40	78
Below 45	89
Below 50	100

Qn. Nos.	Value Points	Marks allotted
	Ans. :	



Qn. Nos.	Value Points		Marks allotted
	Drawing axes and writing scale	(½ + ½) = 1	
	Marking points	1	
	Drawing ogive	1	3
V.	**Answer the following questions :**	**4 × 4 = 16**	
34.	The sum of 2nd and 4th terms of an arithmetic progression is 54 and the sum of its first 11 terms is 693. Find the arithmetic progression. Which term of this progression is 132 more than its 54th term ?		
	OR		
	The first and the last terms of an arithmetic progression are 3 and 253 respectively. If the 20th term of the progression is 98, then find the arithmetic progression. Also find the sum of the last 10 terms of this progression.		

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	$a_2 + a_4 = 54$	
	$a + d + a + 3d = 54$	
	$2a + 4d = 54 \div 2$	
	$a + 2d = 27$ .... (i)	½
	$S_{11} = 693$	
	$693 = \frac{11}{2} [\ 2a + (11-1)\ d\ ]$	
	$693 = \frac{11}{2} [2a + 10\text{d}\ ]$	
	$693 = \frac{11}{\cancel{2}} \times \cancel{2} [\ a + 5d\ ]$	
	$a + 5d = \frac{693}{11}$	
	$a + 5d = 63$ .... (ii)	½
	(ii) – (i)	
	$\cancel{a} + 5d = 63$	
	$\cancel{a} + 2d = 27$	
	(–) (–) (–)	
	$3d = 36$	
	$d = \frac{36}{3}$	
	$\boxed{d = 12}$	½
	$a + 2d = 27$	
	$a + 2 \times (\ 12\ ) = 27$	
	$a + 24 = 27$	
	$a = 27 - 24$	
	$\boxed{a = 3}$	½
	∴ required A.P. a, $a + d$, $a + 2d$	
	3, 3 + 12, 3 + 2 × 12	
	3, 15, 27	½
	$a_n = a_{54} + 132$	½
	$\cancel{a} + (n-1)d = \cancel{a} + 53d + 132$	
	$(n-1) \times 12 = 53 \times 12 + 132$	

Qn. Nos.	Value Points		Marks allotted
	$(n-1)\,12 = 12\,[\,53 + 11\,]$	½	
	$n - 1 = 64$		
	$n = 64 + 1$		
	$\boxed{n = 65}$	½	4
	OR		
	$a = 3$ $\quad a_n = l = 253$		
	$a_{20} = 98$		
	$a + 19d = 98$	½	
	$3 + 19d = 98$		
	$19\,d = 98 - 3$		
	$19\,d = 95$		
	$d = \frac{95}{19}$		
	$\boxed{d = 5}$	½	
	Required A.P. a, a + d, a + 2d		
	3, 3 + 5, 3 + 2 × 5		
	3, 8, 13	½	
	A.P. which starts from last term is		
	$a_n,\quad a_n - d\quad a_n - 2d$		
	253, 253 – 5 253 – 2 × 5		
	253, 248, 243	½	
	$a = 253,\quad d = -5,\quad n = 10$	½	
	$S_n = \frac{n}{2}[2a + (n-1)\,d\,]$	½	
	$S_{10} = \frac{\cancel{10}^{5}}{\cancel{2}}[2\times 253 + (10-1)\times(-5)\,]$	½	
	$= 5\,[\,506 + (-45\,)\,]$		
	$= 5\,[\,506 - 45\,]$		
	$= 5 \times 461$		
	$\boxed{S_{10} = 2305}$	½	4
	Note : Any other correct alternate method is followed give full marks.		

Qn. Nos.	Value Points	Marks allotted
35.	Find the solution of the given pair of linear equations by graphical method :	

$$2x + y = 8$$

$$x - y = 1$$

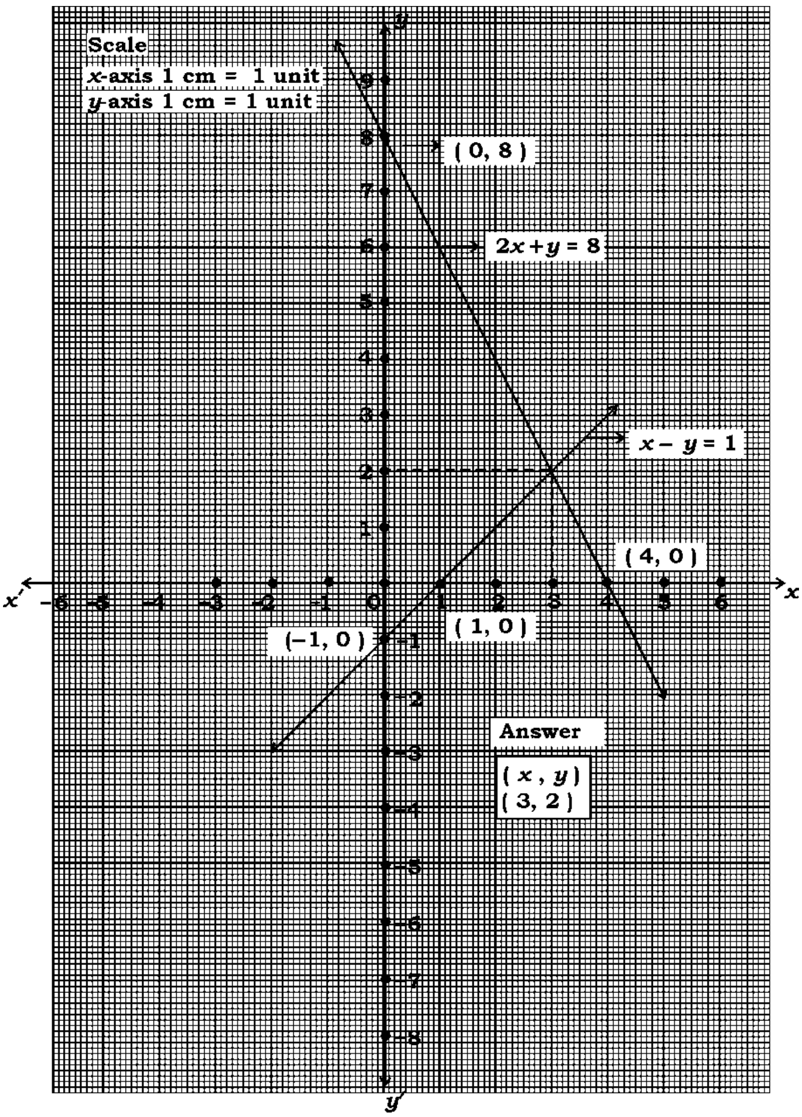
Ans. :

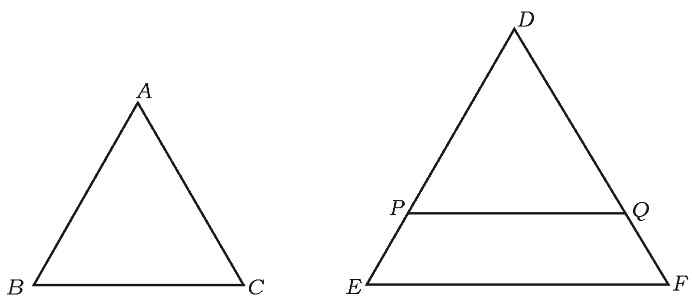
$2x + y = 8$

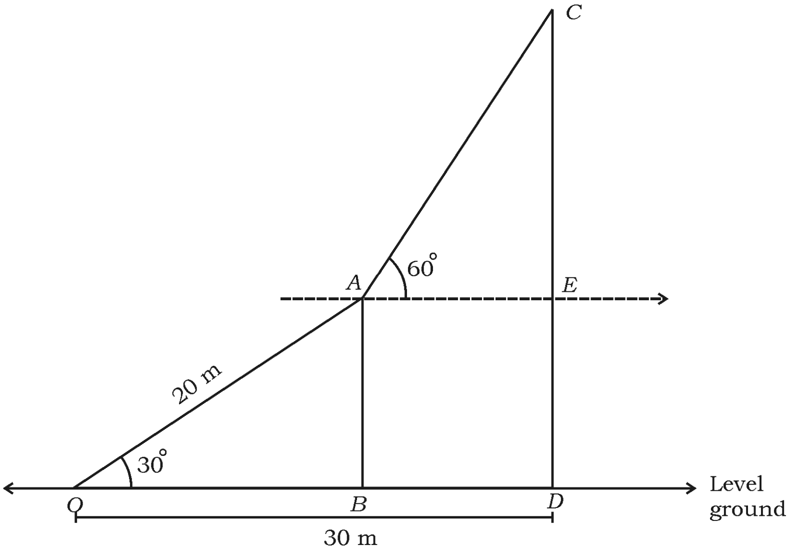
x	0	4
y	8	0

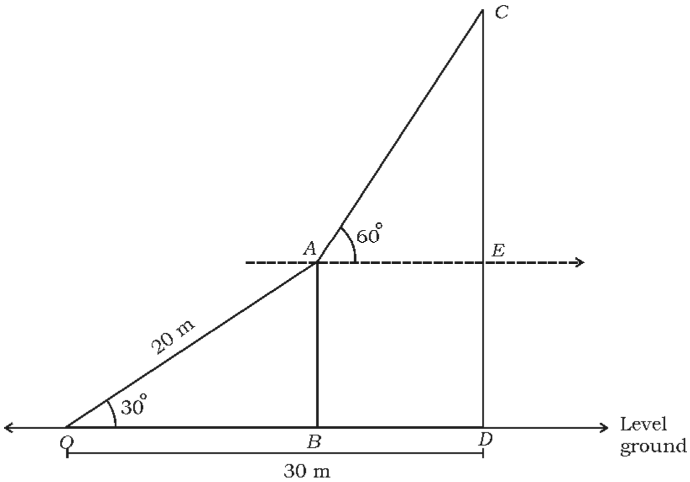
$x - y = 1$

x	0	1
y	− 1	0

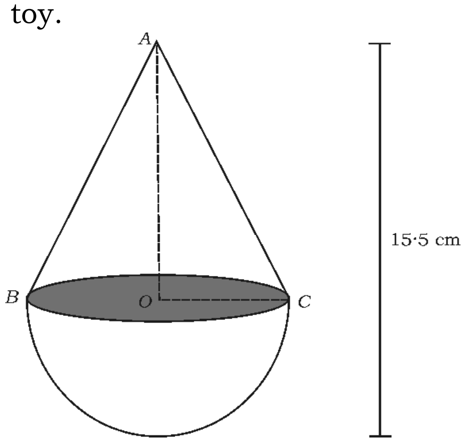


Qn. Nos.	Value Points	Marks allotted
	For table construction 1 + 1	
	Drawing two lines by marking points 1	
	Marking point of intersection and writing values of x and y 1	4
	Note : Any other points can be considered to get straight lines	
36.	Prove that "If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar".	
	Ans. :	
	 ½	
	Data : In ΔABC and ΔDEF ½	
	$\angle A = \angle D$	
	$\angle B = \angle E$	
	$\angle C = \angle F$	
	To prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ½	
	Construction : Cut $DP = AB$ and $DQ = AC$ and join PQ ½	
	Proof : In ΔABC and ΔDPQ	
	$AB = DP$ (const.)	
	$AC = DQ$ (const.)	
	$\angle A = \angle D$ (Data) (S.A.S postulate)	
	$\therefore \Delta ABC \cong \Delta DPQ$ ½	

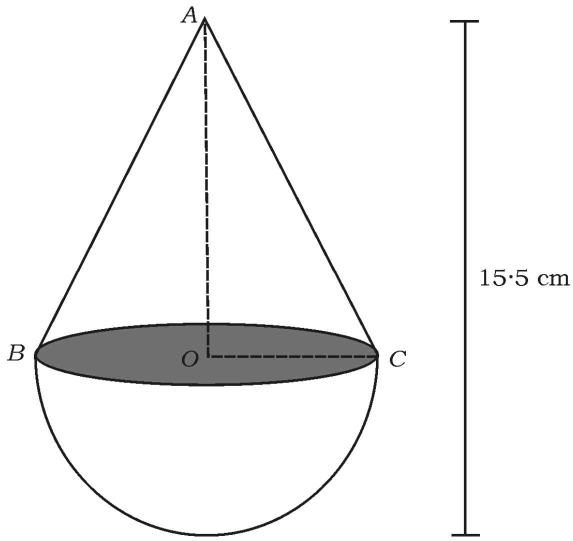
Qn. Nos.	Value Points	Marks allotted
	$\therefore\ BC = PQ$ $\angle B = \angle P$ But $\angle B = \angle E$ (Data) $\therefore\ \angle P = \angle E$ ½ But these are corresponding angles $\therefore\ PQ \mid\mid EF$ ½ $\frac{DP}{DE} - \frac{DQ}{DF} = \frac{PQ}{EF}$ (C. B. P. T.) $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$, $\Delta\ ABC \sim \Delta\ DEF$ ½ Hence proved Note : Proving this theorem as mentioned in the textbook, marks should be given	4
37.	In the given figure, a rope is tightly stretched and tied from the top of a vertical pole to a peg on the same level ground such that the length of the rope is 20 m and the angle made by it with the ground is 30°. A circus artist climbs the rope, reaches the top of the pole and from there he observes that the angle of elevation of the top of another pole on the same ground is found to be 60°. If the distance of the foot of the longer pole from the peg is 30 m, then find the height of this pole. (Take $\sqrt{3}$ = 1·73) 	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
		
	In ΔOAB	
	$\sin 30° = \frac{AB}{AO}$ ½	
	$\frac{1}{2} = \frac{AB}{20}$	
	$AB = 10$ m ½	
	$\tan 30° = \frac{AB}{OB}$ ½	
	$\frac{1}{\sqrt{3}} = \frac{10}{OB}$	
	$OB = 10\sqrt{3}$ ½	
	$BD = OD - OB$	
	$30 - 10\sqrt{3} = AE$ ½	
	In ΔAEC	
	$\tan 60° = \frac{CE}{AE}$ ½	
	$\sqrt{3} = \frac{CE}{30 - 10\sqrt{3}}$	
	$CE = 30\sqrt{3} - 30$	
	$CD = CE + ED$ ½	
	$30\sqrt{3} - 30 + 10$	
	$= 30\sqrt{3} - 20$	
	$= 30 \times 1{\cdot}73 - 20$	
	$= 51{\cdot}90 - 20$	
	$CD = 31{\cdot}90$ m ½	4

Qn. Nos.	Value Points	Marks allotted
VI.	**Answer the following question : $1 \times 5 = 5$**	
38.	A wooden solid toy is made by mounting a cone on the circular base of a hemisphere as shown in the figure. If the area of base of the cone is $38 \cdot 5\ cm^2$ and the total height of the toy is 15·5 cm, then find the total surface area and volume of the toy.	



Ans. :



Area of the base of the cone = $38 \cdot 5\ cm^2$

$$\pi r^2 = 38 \cdot 5\ cm^2$$

$$\frac{22}{7} \times r^2 = 38 \cdot 5$$

$$r^2 = \frac{38 \cdot 5 \times 7}{22}$$

$$\boxed{r = 3 \cdot 5\ cm}$$ ½

Qn. Nos.	Value Points	Marks allotted
	Height of the cone (h) = height of the toy – Height of hemisphere	
	$= 15\cdot5 - 3\cdot5$	
	$h = 12$ cm	½
	Slant height of the cone $\Rightarrow$ $l^2 = h^2 + r^2$	½
	$= 12^2 + (3\cdot5)^2$	
	$= 144 + 12\cdot25$	
	$= 156\cdot25$	
	$l = \sqrt{156\cdot25}$	
	$l = 12\cdot5$ cm	½
	T. S. A of the toy = C.S.A. of cone + C.S.A of hemisphere	
	$= \pi rl + 2\pi r^2$	½
	$= \pi r [\, l + 2r \,]$	
	$= \frac{22}{7_1} \times 3\cdot5^{\,0\cdot5}\ (125 + 2 \times 3\cdot5)$	
	$= 11(\,12\cdot5 + 7\,)$	½
	$= 11 \times 19\cdot5$	
	T.S.A of the toy = $214\cdot5$ cm^2	½
	Volume of the toy = Volume of cone + volume of hemisphere	
	$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$	½
	$= \frac{1}{3}\pi r^2 (h + 2r)$	
	$= \frac{1}{3} \times \frac{22}{7} \times 3\cdot5^{\,0\cdot5} \times 3\cdot5(12 + 2 \times 3\cdot5\,)$	
	$= \frac{38\cdot5}{3}(12 + 7)$	½

Qn. Nos.	Value Points		Marks allotted
	$= \frac{38 \cdot 5 \times 19}{3}$		
	$= \frac{731 \cdot 5}{3}$		
	$= 243{\cdot}8$		
	Volume of the toy = $243{\cdot}8$ cm^3	½	5