CCE PF
UNREVISED FULL SYLLABUS
NSR & NSPR

C

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

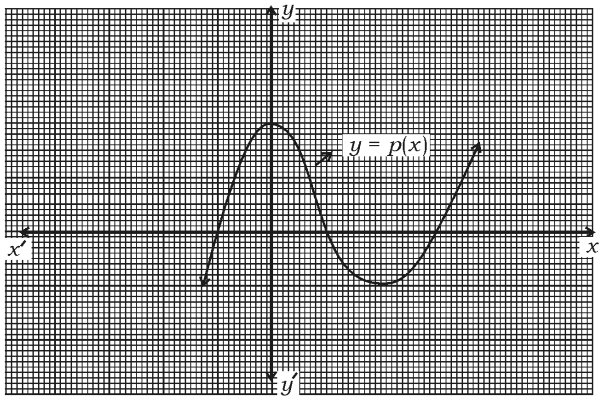
(ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / ಎನ್.ಎಸ್.ಆರ್. & ಎನ್.ಎಸ್.ಪಿ.ಆರ್.)

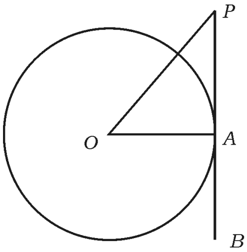
(Private Fresh / NSR & NSPR)

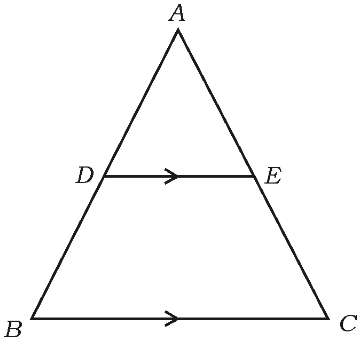
(ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ / English Medium)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : **100**

[Max. Marks : 100

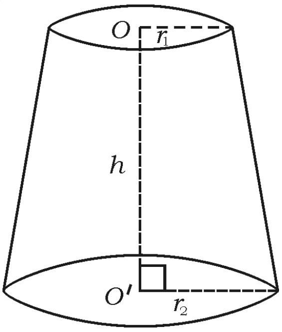
Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **8 × 1 = 8**	
1.		The number of zeroes of the polynomial $y = p(x)$ in the given graph is 	

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 $P(E) = 0·75$, 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 $\underline{|\,AOP} = 45°$, then the measure of $\underline{|\,OPA}$ 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

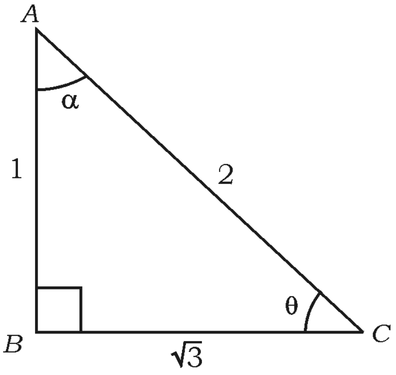
Qn. Nos.	Value Points	Marks allotted
II.	**Answer the following questions : $8 \times 1 = 8$** **(Direct answers from Q. Nos. 9 to 16 full marks should be given)**	
9.	Express the denominator of $\frac{7}{80}$ in the form of $2^n \times 5^m$. *Ans.* : $\frac{7}{80}$ $\begin{array}{r\|l} 2 & 80 \\ 2 & 40 \\ 2 & 20 \\ 2 & 10 \\ & 5 \end{array}$ $80 = 2^4 \times 5^1$ 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.* : $x + 2y - 4 = 0$ $ax + by - 12 = 0$ coincident lines $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ ½ $\frac{1}{a} = \frac{2}{b} = \frac{-4}{-12}$ $\frac{1}{a} = \frac{1}{3}$ $\frac{2}{b} = \frac{1}{3}$ $\therefore$ $\boxed{a = 3}$ $\boxed{b = 6}$ ½	1
11.	$\Delta\, ABC \sim \Delta\, PQR$. Area of the $\Delta\, ABC$ is 64 cm^2 and the area of the $\Delta\, PQR$ is 100 cm^2. If AB = 8 cm, then find the length of PQ. *Ans.* : $\left.\begin{array}{l} \frac{ar(ABC)}{ar(PQR)} = \frac{AB^2}{PQ^2} \\ \frac{\cancel{64}}{100} = \frac{\cancel{8}^2}{PQ^2} \end{array}\right\}$ ½	

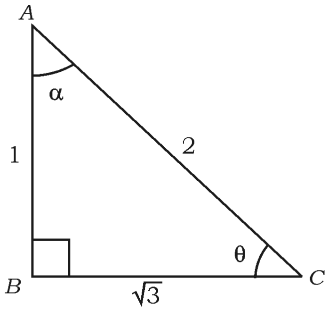
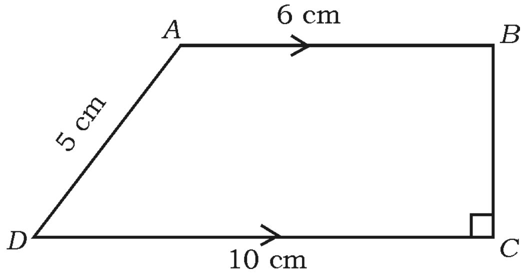
Qn. Nos.	Value Points	Marks allotted
	$PQ^2 = 100$	
	$PQ = \sqrt{100}$	
	$\boxed{PQ = 10 \text{ cm}}$ ½	1
12.	Express the equation $x(2 + x) = 3$ in the standard form of a quadratic equation.	
	Ans. :	
	$x(2+x) = 3$ ½	
	$2x + x^2 = 3$	
	Standard form : $x^2 + 2x - 3 = 0$ ½	1
13.	Find the discriminant 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

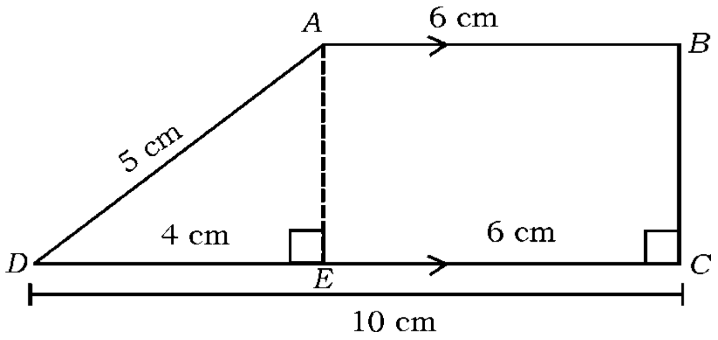
Qn. Nos.	Value Points	Marks allotted
15.	Write the degree of the polynomial $P(x) = 3x^3 - x^4 + 2x^2 + 5x + 2.$	
	Ans. :	
	Degree of the polynomial = 4	1
16.	Write the formula to find the volume of the frustum of a cone given in the figure.  	
	Ans. :	
	Volume of the frustum of the cone $\Big\}$ $(V) = \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$	1
III.	**Answer the following questions :** **18 × 2 = 36**	
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	

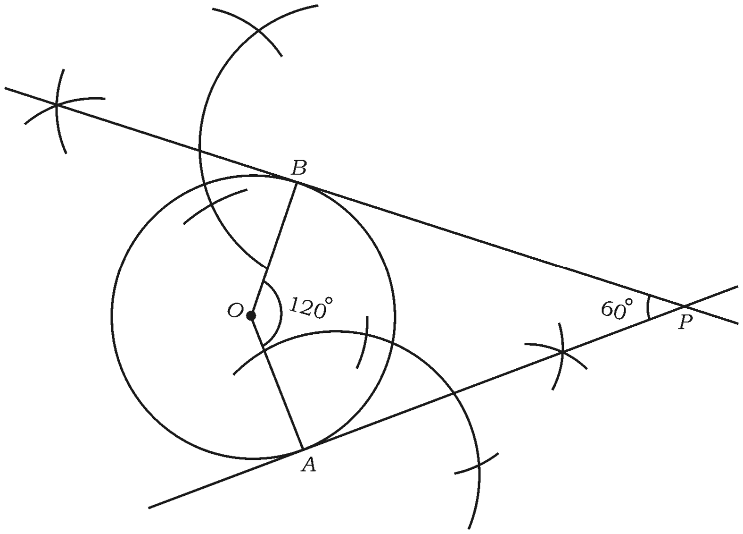
Qn. Nos.	Value Points	Marks allotted
	Since a and b are integers we get	
	$\frac{a}{b}-5$ is rational and so $\sqrt{3}$ is rational	
	But this contradicts the fact that $\sqrt{3}$ is irrational .	
	This contradiction has arisen because of our incorrect assumption that $5+\sqrt{3}$ is rational. ½	
	So, we conclude $5+\sqrt{3}$ is irrational. ½	2
	OR	
	$a=bq+r, \quad 0 \le r < b$	
	(1) $120 = 72 \times 1 + 48$ $72\,)\,120\,(1$ 72 48 ½	
	(2) $72 = 48 \times 1 + 24$ $48\,)\,72\,(1$ 48 24 ½	
	(3) $48 = 24 \times 2 + 0$ $24\,)\,48\,(2$ 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 .... $a_{20} = ?$	
	$a = 4,\ d = 7 - 4 = 3 \quad n = 20$ ½	
	$a_n = a + (n-1)d$ ½	
	$\left.\begin{aligned} a_{20} &= 4 + (20-1) \times 3 \\ &= 4 + 19 \times 3 \\ &= 4 + 57 \end{aligned}\right\}$ 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	
	$x = \dfrac{5 \pm \sqrt{25 - 24}}{4}$ ½	
	$x = \dfrac{5 \pm \sqrt{1}}{4}$ ½	2
	$x = \dfrac{5 \pm 1}{4}$	
	$x = \dfrac{5+1}{4}, \quad x = \dfrac{5-1}{4}$	
	$x = \dfrac{6}{4}, \quad x = \dfrac{4}{4}$	
	$\boxed{x = \dfrac{3}{2}} \qquad \boxed{x = 1}$	
	OR	

Qn. Nos.	**Value Points**	**Marks allotted**
	$5x^2-6x-2=0$	
	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	
	$5x=3\pm\sqrt{19}$	
	$x=\dfrac{3\pm\sqrt{19}}{5}$ ½	
	$\therefore \boxed{x=\dfrac{3+\sqrt{19}}{5}}$ $\boxed{x=\dfrac{3-\sqrt{19}}{5}}$ ½	
	Note : Alternate method is used to solve give marks	2
21.	In the given figure, if $\underline{\lfloor ABC}$ = 90°, then find the values of sin θ and cos α. 	
	Ans. :	

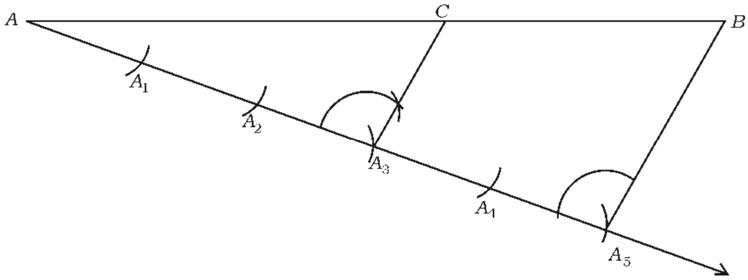
Qn. Nos.	**Value Points**		**Marks allotted**
			
	$\sin\theta = \frac{AB}{AC} = \frac{1}{2}$	1	
	$\cos\alpha = \frac{AB}{AC} = \frac{1}{2}$	1	2
22.	A box contains cards which are numbered from 9 to 19. If one card is drawn at random from the box, find the probability that it bears a prime number.		
	Ans. :		
	$S = \{9, 10, 11, ... 19\}$		
	$\therefore \quad n(5) = 11$	½	
	$A = \{ \text{Prime numbers} \}$		
	$A = \{ 11, 13, 17, 19 \}$	½	
	$\therefore n(A) = 4$		
	$P(A) = \frac{4}{11}$	1	2
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.		
			

Qn. Nos.	Value Points	Marks allotted
	Ans. :  Draw $AE \perp DC$ $\therefore$ $ABCE$ is a rectangle $\therefore EC = AB = 6$ cm $DC = DE + EC$ $10 = DE + EC$ $10 = DE + 6$ $DE = 10 - 6 = 4$ cm ½ In $\Delta\, ADE$ $AD^2 = AE^2 + DE^2$ ½ $5^2 = AE^2 + 4^2$ $25 = AE^2 + 16$ $AE^2 = 25 - 16$ $AE^2 = 9$ $AE = \sqrt{9}$ $AE = 3$ cm ½ $\therefore$ 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.* :	

Qn. Nos.	**Value Points**		**Marks allotted**
	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
25.	Find the LCM of 6 and 20 by prime factorisation method. *Ans.* :		
	Prime factors of 6 = 2 × 3 $\begin{array}{r\|l} 2 & 6 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$	½	
	Prime factors of 20 = 2 × 2 × 5 $\begin{array}{r\|l} 2 & 20 \\ \hline 2 & 10 \\ \hline & 5 \end{array}$	½	
	∴ L. C. M. of 6 and 20 = 2 × 2 × 3 × 5 = 60	1	2
26.	The sum of the first three terms in an arithmetic progression is 180 and the common difference is 5. Find these three terms of the progression. *Ans.* :		
	Let the three terms of A.P. are		
	$a - d, \quad a, \quad a + d$	½	
	Sum of three terms = 180		
	$a - \cancel{d} + a + a + \cancel{d} = 180$	½	

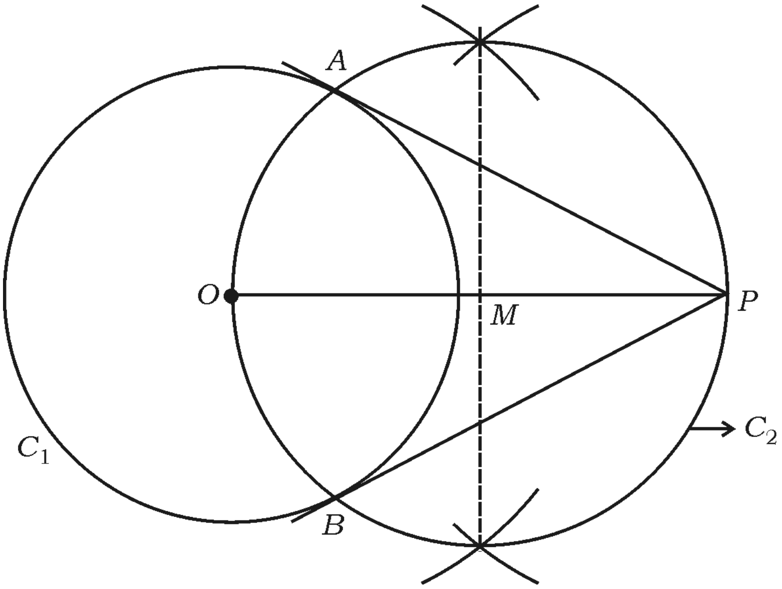
Qn. Nos.	Value Points		Marks allotted
	$3a = 180$		
	$a = \frac{180}{3}$		
	$\boxed{a = 60}$	½	
	$c . d$ $\boxed{(d) = 5}$		
	∴ The three terms of A.P. are		
	$a - d,$ a $a + d$		
	$60 - 5,$ $60,$ $60 + 5$		
	$55,$ $60,$ 65	½	2
27.	Show that $\cot\theta \times \cos\theta + \sin\theta = \operatorname{cosec}\theta$.		
	Ans. :		
	$\cot\theta \times \cos\theta + \sin\theta = \operatorname{cosec}\theta$		
	L.H.S. $= \cot\theta \times \cos\theta + \sin\theta$		
	$= \frac{\cos\theta}{\sin\theta} \times \cos\theta + \sin\theta$	½	
	$= \frac{\cos^2\theta}{\sin\theta} + \frac{\sin\theta}{1}$		
	$= \frac{\cos^2\theta + \sin^2\theta}{\sin\theta}$	½	
	$= \frac{1}{\sin\theta}$	½	
	$= \operatorname{cosec}\theta$ (R. H. S.)	½	2
28.	Find the distance between the points $A(4, 3)$ and $B(10, 11)$ by using 'distance formula'.		
	Ans. :		
	$A(4, 3)$ $B(10, 11)$		
	(x_1, y_1) (x_2, y_2)		
	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	½	
	$d = \sqrt{(10 - 4)^2 + (11 - 3)^2}$	½	
	$d = \sqrt{6^2 + 8^2}$		

Qn. Nos.	Value Points	Marks allotted
	$d = \sqrt{36+64}$ ½	
	$d = \sqrt{100}$	
	d = 10 units ½	2
29.	The median value of a set of scores is 38 and their mean value is 26. Find the mode of the scores.	
	Ans. :	
	Median = 38	
	Mean = 26	
	Mode = ?	
	3 × Median = Mode + 2 × Mean ½	
	3 × 38 = Mode + 2 × 26	
	Mode = 3 Median – 2 Mean	
	Mode = 3 × 38 – 2 × 26 ½	
	Mode = 114 – 52 ½	
	Mode = 62 ½	2
30.	Draw a line segment of length 10 cm and divide it in the ratio 3 : 2 by geometric construction.	
	Ans. :	

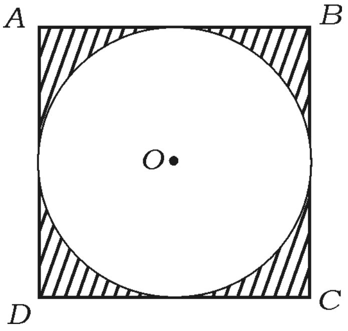


Qn. Nos.	Value Points	Marks allotted
	$AC : CB = 3 : 2$	
	Drawing line segment (10 cm) ½	
	Constructing acute angle at A ½	
	Marking 5 arcs ½	
	Constructing $A_3C \parallel A_5B$ ½	2
	Note : Any other suitable method is followed, full marks should be given.	

Qn. Nos.	Value Points	Marks allotted
31.	Construct two tangents to a circle of radius 3·5 cm from a point 9 cm away from its centre.	
	Ans. :	

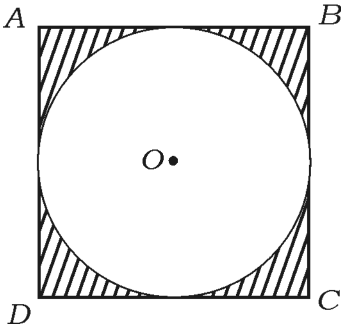


	Drawing a circle of radius 3·5 cm	½	
	Drawing *OP* = 8 cm and constructing perpendicular bisector	½	
	Drawing C_2 circle	½	
	Joining *PA* and *PB*	½	2
32.	In the given figure, *ABCD* is a square of side 14 cm, whose sides are touching the circle. Find the area of the shaded region.		



Qn. Nos. **Value Points** **Marks allotted**

Ans. :



Area of the square = side × side

= 14 × 14

= 196 sq.cm ½

Diameter of the circle = 14 cm

Radius of the circle = $\frac{14}{2}$ = 7 cm

$\therefore$ Area of the circle = πr^2

$= \frac{22}{7}\times 7^2$

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

= 154 cm^2 ½

Area of the shaded region =

Area of the square *ABCD* – Area of the circle ½

= 196 – 154

= 42 cm^2 ½ 2

33. Find the surface area of a sphere whose radius is 7 cm.

Ans. :

$r = 7$ cm

S. A. of sphere = $4\pi r^2$ ½

$A = 4\times\frac{22}{7}\times 7^2$ ½

$= 4\times\frac{22}{\cancel{7}}\times 7\times\cancel{7}$ ½

= 616 cm^2 ½ 2

Qn. Nos. | **Value Points** | **Marks allotted**

34. Write the linear equation $3x - 4y = 5$ in the form of $ax + by + c = 0$ and write the values of *a, b* and *c*.

Ans. :

$3x - 4y = 5$

$3x - 4y - 5 = 0$ ½

$ax + by + c = 0$

$\boxed{a = 3}$ $\boxed{b = -4}$ $\boxed{c = -5}$ 1½ 2

IV. **Answer the following questions :** **9 × 3 = 27**

35. 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. :

$p(x) = 3x^3 + x^2 + 2x + 5$

$g(x) = x^2 + 2x + 1$

$q(x) = ?$

$r(x) = ?$

$$
\begin{array}{rl}
 & \quad 3x - 5 \\
x^2 + 2x + 1 \Big) & \cancel{3x^3} + x^2 \quad + 2x + 5 \ (\\
 & \cancel{3x^3} + 6x^2 \ + 3x \\
 & (-) \quad (-) \quad (-) \\
\hline
 & \quad -\cancel{5x^2} - x + 5 \\
 & \quad -\cancel{5x^2} - 10x - 5 \\
 & \quad (+) \ (+) \ (+) \\
\hline
 & \qquad 9x + 10
\end{array}
$$

1 (for $3x^3 + 6x^2 + 3x$)

1 (for $-5x^2 - 10x - 5$)

∴ Quotient $\boxed{q(x) = 3x - 5}$ ½

Remainder $\boxed{r(x) = 9x + 10}$ ½ 3

OR

Qn. Nos.	Value Points	Marks allotted
	$p(x) = x^2 + 7x + 10$	
	$0 = x^2 + 5x + 2x + 10$ ½	
	$0 = x(x+5) + 2(x+5)$	
	$0 = (x+2)(x+5)$ ½	
	$x + 2 = 0$ $x + 5 = 0$	
	$x = -2$ $x = -5$ ½	
	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
36.	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	

Qn. Nos.	Value Points		Marks allotted
	$= \dfrac{1+\cos A}{\sin A}$	½	
	$= \dfrac{1}{\sin A} + \dfrac{\cos A}{\sin A}$	½	
	$\sqrt{\dfrac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A =$ R.H.S.	½	3
	OR		
	$\dfrac{\sin A}{1+\cos A} + \dfrac{1+\cos A}{\sin A} = 2 \operatorname{cosec} A$		
	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	
	$= \dfrac{1 + 1 + 2\cos A}{(1+\cos A)\sin A}$		
	$= \dfrac{2 + 2\cos A}{(1+\cos A)\sin A}$		
	$= \dfrac{2\cancel{(1+\cos A)}}{\cancel{(1+\cos A)}\sin A}$	½	
	$= \dfrac{2}{\sin A}$		
	$= 2 . \dfrac{1}{\sin A}$	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

Qn. Nos. | **Value Points** | **Marks allotted**

37. 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

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

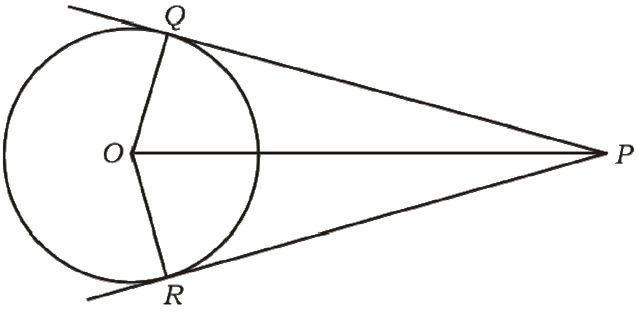
$\therefore$ mean $\bar{x} = \dfrac{\Sigma f_i x_i}{\sum f_i} = \dfrac{195}{15}$ ½

$\boxed{\text{Mean } (\bar{x}) = 13}$ ½ 3

OR

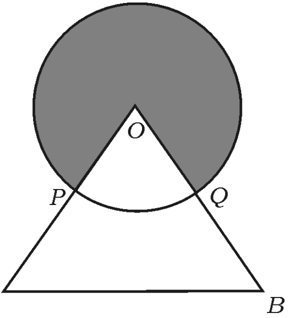
Qn. Nos.	Value Points	Marks allotted
	From the frequency distribution table, we find that	
	$f_0 = 9, \quad f_1 = 15, \quad f_2 = 9, \quad h = 2, \quad l = 5,$ ½	
	Mode $= l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$ ½	
	$= 5 + \left(\frac{15 - 9}{2 \times 15 - 9 - 9} \right) \times 2$ ½	
	$= 5 + \left(\frac{6}{30 - 18} \right) \times 2$ ½	
	$= 5 + \left(\frac{\cancel{6}^{1}}{\cancel{12}_{\cancel{2}}} \right) \times \cancel{2}$ ½	
	$= 5 + 1$	
	$\boxed{\text{Mode } = 6}$ ½	3
38.	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. :	
	$A(-6, 10)$ $B(3, -8)$ $P = (-4, 6)$	
	(x_1, y_1) (x_2, y_2) (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	

Qn. Nos.	Value Points		Marks allotted
	$\frac{m_1}{m_2}=\frac{-4-(-6)}{3-(-4)}$ 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		
	$A\,(1, -1)$ $B\,(-4, 6)$ $c\,(-3, -5)$ (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	
	$=\frac{1}{2}\times 48$		
	$\boxed{A = 24 \text{ sq.cm}}$	½	3

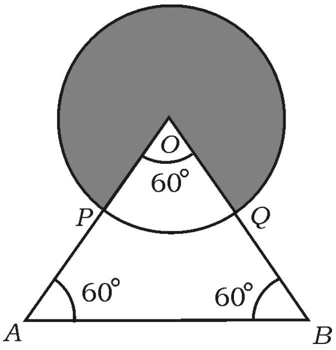
Qn. Nos.	Value Points	Marks allotted
39.	Prove that "The lengths of tangents drawn from an external point to a circle are equal".	
	Ans. :  ½	
	Data : 'O' is the centre of the circle PQ and PR are tangents drawn from external point P. ½	
	To prove : $PQ = PR$ ½	
	Construction ; Join OP, OQ and OR ½	
	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.	

Qn. Nos.	Value Points	Marks allotted

40. 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.



Ans. :



Area of equilateral triangle *OAB* = $\frac{\sqrt{3}a^2}{4}$ ½

$$36\cancel{\sqrt{3}} = \frac{\cancel{\sqrt{3}}a^2}{4}$$

$$a^2 = 36 \times 4$$

$$a^2 = 144$$

$a = \sqrt{144} = 12\,\text{cm}$ ½

∴ 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

$$= \pi r^2 \left(1 - \frac{60°}{360°} \right)$$

$$= \pi r^2 \left(1 - \frac{1}{6} \right)$$

Qn. Nos. **Value Points** **Marks allotted**

$$= \frac{22}{7} \times 6^2 \left(\frac{6-1}{6} \right)$$ ½

$$= \frac{22}{7} \times 6 \times \cancel{6} \times \frac{5}{\cancel{6}}$$

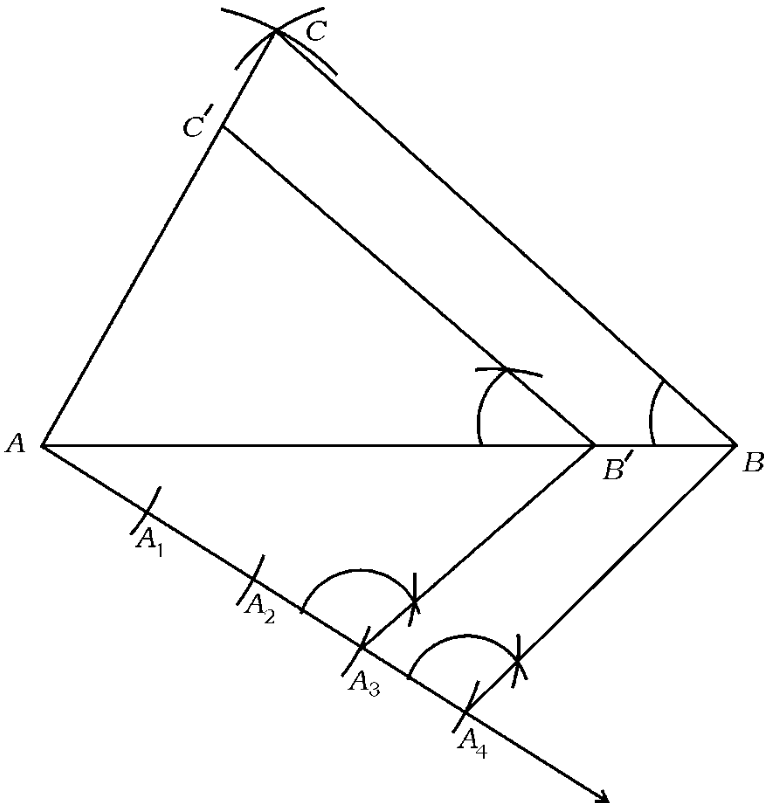
$$= \frac{660}{7}$$

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.

41. 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

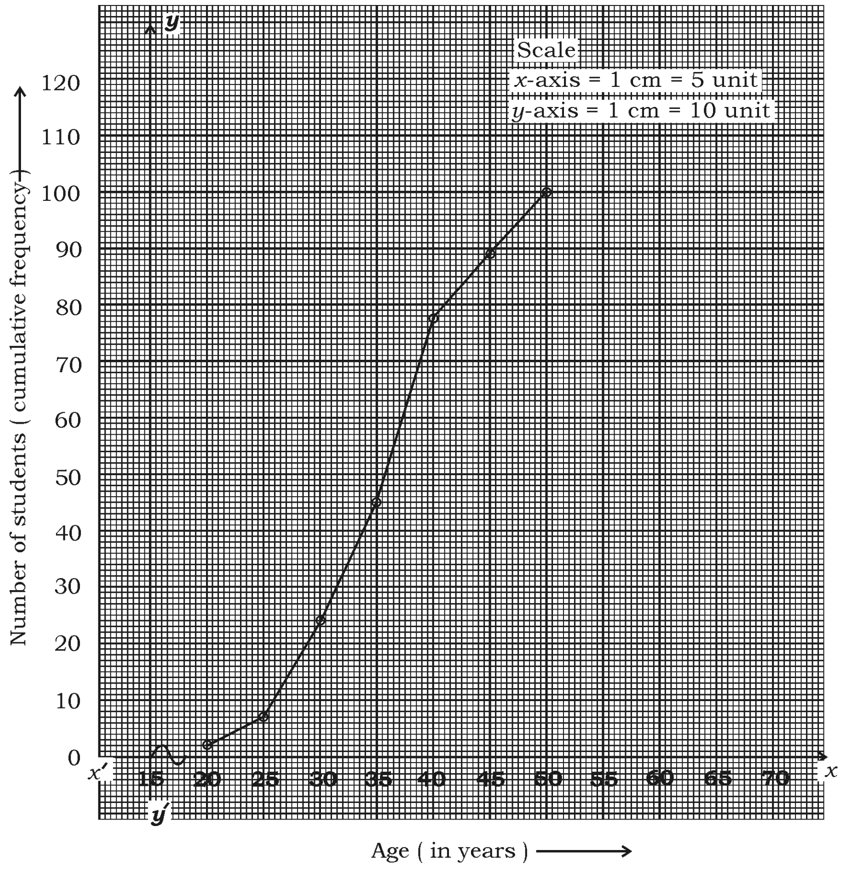
Qn. Nos.	**Value Points**	**Marks allotted**
42.	The distance between two cities *'A'* and *'B'* is 132 km. Flyovers are built to avoid the traffic in the intermediate towns between these cities. Because of this, the average speed of a car travelling in this route through flyovers increases by 11 km/h 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	
	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	
	$\frac{132(x+11)-132x}{x(x+11)}=1$	
	$1\cancel{32}x+1452-1\cancel{32}x=1x(x+11)$	
	$1452 = x^2+11x$ 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

Qn. Nos.	Value Points	Marks allotted

43. 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

Ans. :



Drawing axes and writing scale	(½ + ½) =	1	
Marking points		1	
Drawing ogive		1	3

Qn. Nos.	**Value Points**	**Marks allotted**
V.	**Answer the following questions : $4 \times 4 = 16$**	
44.	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.	
	Ans. :	
	$a_2 + a_4 = 54$	
	$a + d + a + 3d = 54$	
	$2a + 4d = 54 \div 2$	
	$a + 2d = 27$ .... (i)	½
	$S_{11} = 693$	
	$693 = \frac{11}{2}[\,2a + (11-1)\,d\,]$	
	$693 = \frac{11}{2}[2a + 10\mathrm{d}\,]$	
	$693 = \frac{11}{\cancel{2}} \times \cancel{2}[\,a + 5d\,]$	
	$a + 5d = \frac{693}{11}$	
	$a + 5d = 63$ .... (ii)	½
	(ii) – (i)	
	$\cancel{a} + 5d = 63$	
	$\cancel{a} + 2d = 27$	
	(–) (–) (–)	
	$3d = 36$	

Qn. Nos.	Value Points		Marks allotted
	$d = \frac{36}{3}$		
	$\boxed{d = 12}$	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	
	$\cancel{a} + (n-1)d = \cancel{a} + 53d + 132$		
	$(n-1) \times 12 = 53 \times 12 + 132$		
	$(n-1)\, 12 = 12\,[53 + 11]$	½	
	$n - 1 = 64$		
	$n = 64 + 1$		
	$\boxed{n = 65}$	½	4
	OR		
	$a = 3$ $a_n = l = 253$		
	$a_{20} = 98$		
	$a + 19d = 98$	½	
	$3 + 19d = 98$		
	$19d = 98 - 3$		
	$19d = 95$		
	$d = \frac{95}{19}$		
	$\boxed{d = 5}$	½	
	Required A.P. a, a + d, a + 2d		
	3, 3 + 5, 3 + 2 × 5		
	3, 8, 13	½	

Qn. Nos.	Value Points		Marks allotted
	A.P. which starts from last term is		
	a_n, $a_n - d$ $a_n - 2d$		
	253, 253 – 5 253 – 2 × 5		
	253, 248, 243	½	
	$a = 253$, $d = -5$, $n = 10$	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.		
45.	Find the solution of the given pair of linear equations by graphical method :		
	$2x + y = 8$		
	$x - y = 1$		
	Ans. :		

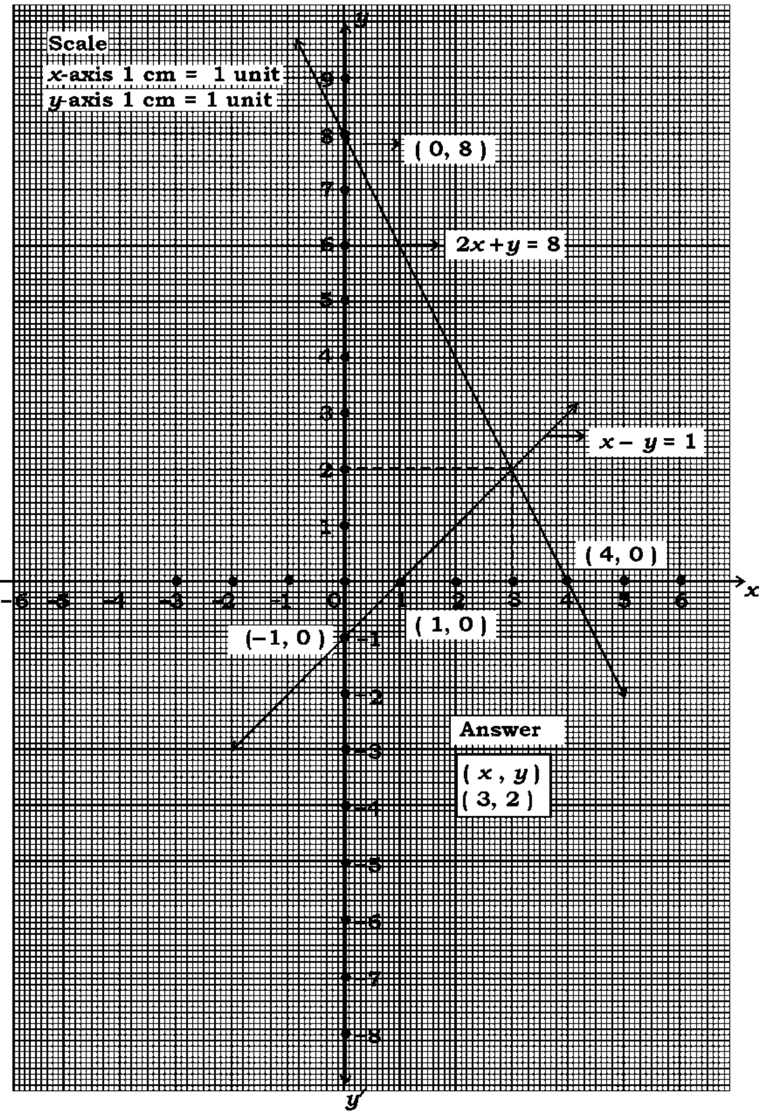
$2x + y = 8$

x	0	4
y	8	0

$x - y = 1$

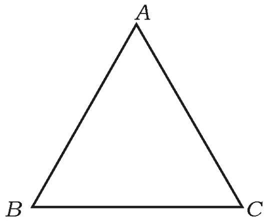
x	0	1
y	−1	0

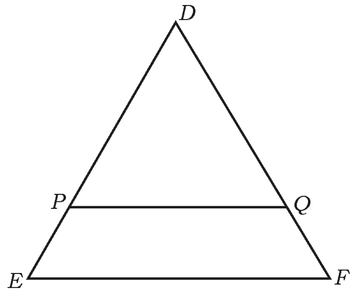
Qn. Nos.	Value Points	Marks allotted



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	
46.	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.* :	

Qn. Nos.	Value Points	Marks allotted





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

$\therefore BC = PQ$

$\angle B = \angle P$

But $\angle B = \angle E$ (Data)

$\therefore \angle P = \angle E$ ½

But these are corresponding angles

$\therefore PQ \mid\mid EF$ ½

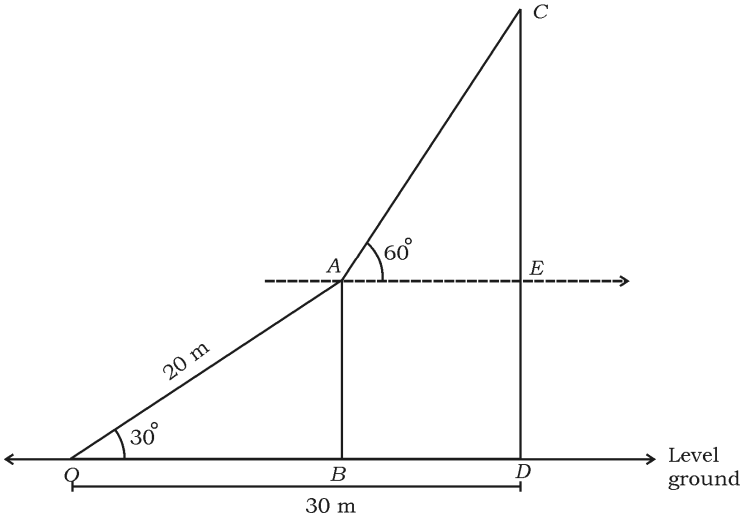
$\frac{DP}{DE} - \frac{DQ}{DF} = \frac{PQ}{EF}$ (C. B. P. T.)

$\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$, $\Delta ABC \sim \Delta DEF$ ½

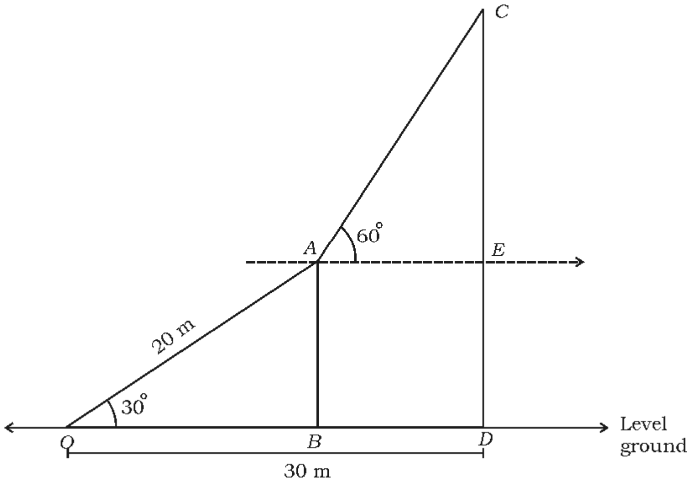
Hence proved

Note : Proving this theorem as mentioned in the textbook, marks should be given 4

Qn. Nos.	Value Points	Marks allotted
47.	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)	



Ans. :

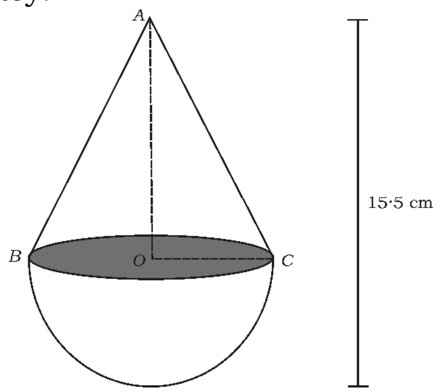


In ΔOAB

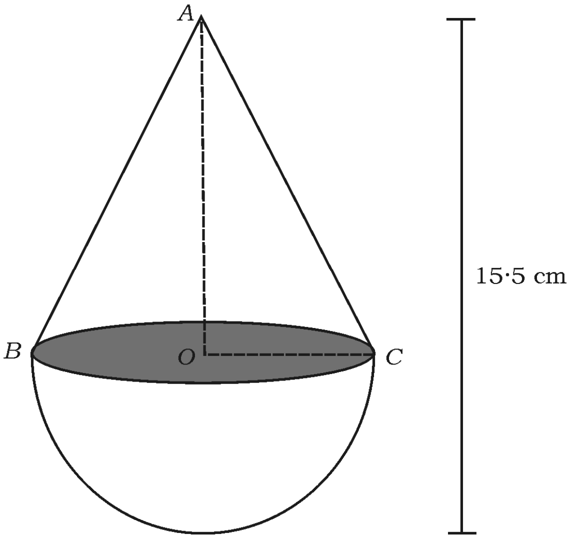
$$\sin 30° = \frac{AB}{AO}$$ ½

$$\frac{1}{2} = \frac{AB}{20}$$

Qn. Nos.	Value Points	Marks allotted
	$\boxed{AB = 10 \text{ m}}$ ½	
	$\tan 30° = \frac{AB}{OB}$ ½	
	$\frac{1}{\sqrt{3}} = \frac{10}{OB}$	
	$\boxed{OB = 10\sqrt{3}}$ ½	
	$BD = OD - OB$	
	$\boxed{30 - 10\sqrt{3} = AE}$ ½	
	In ΔAEC	
	$\tan 60° = \frac{CE}{AE}$ ½	
	$\sqrt{3} = \frac{CE}{30 - 10\sqrt{3}}$	
	$CE = 30\sqrt{3} - 30$	
	$\boxed{CD = CE + ED}$ ½	
	$30\sqrt{3} - 30 + 10$	
	$= 30\sqrt{3} - 20$	
	$= 30 \times 1{\cdot}73 - 20$	
	$= 51{\cdot}90 - 20$	
	$\boxed{CD = 31{\cdot}90 \text{ m}}$ ½	4
VI.	**Answer the following question : $1 \times 5 = 5$**	
48.	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 38·5 cm^2 and the total height of the toy is 15·5 cm, then find the total surface area and volume of the toy.	



Qn. Nos.	Value Points	Marks allotted
	Ans. :	



Area of the base of the cone = 38·5 cm^2

$$\pi r^2 = 38 \cdot 5 \text{ cm}^2$$

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

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

$$\boxed{r = 3{\cdot}5 \text{ cm}}$$ ½

Height of the cone (h) = height of the toy – Height of hemisphere

= 15·5 – 3·5

$$\boxed{h = 12 \text{ cm}}$$ ½

Slant height of the cone ⇒ = $l^2 = h^2 + r^2$ ½

= $12^2 + (3 \cdot 5)^2$

= 144 + 12·25

= 156·25

$l = \sqrt{156 \cdot 25}$

$$\boxed{l = 12{\cdot}5 \text{ cm}}$$ ½

T. S. A of the toy = C.S.A. of cone + C.S.A of hemisphere

= $\pi rl + 2\pi r^2$ ½

Qn. Nos.	**Value Points**	**Marks allotted**
	$= \pi r\,[\,l + 2r\,]$	
	$= \frac{22}{\cancel{7}_{1}} \times \cancel{3\cdot5}^{0\cdot5}\ (125+2\times3\cdot5)$	
	$= 11(\,12\cdot5 + 7\,)$ ½	
	$= 11 \times 19\cdot5$	
	T.S.A of the toy = $214\cdot5\ \text{cm}^2$ 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	
	$= \frac{1}{3}\pi r\left(h+2r\right)$	
	$= \frac{1}{3}\times\frac{22}{\cancel{7}}\times\cancel{3\cdot5}^{0\cdot5} \times 3\cdot5(12+2\times 3\cdot5\,)$	
	$= \frac{38\cdot5}{3}(12+7)$ ½	
	$= \frac{38\cdot5\times 19}{3}$	
	$= \frac{731\cdot5}{3}$	
	$= 243\cdot8$	
	$\boxed{\text{Volume of the toy } = 243\cdot8\ \text{cm}^3}$ ½	5