CCE RF/RR/PF/PR **A**

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

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

ಮಾರ್ಚ್/ಏಪ್ರಿಲ್ 2026 ರ ಪರೀಕ್ಷೆ - 1

MARCH/APRIL 2026 EXAMINATION - 1

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

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

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / ಶಾಲಾ ಪುನರಾವರ್ತಿತ ಅಭ್ಯರ್ಥಿ / ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ / ಖಾಸಗಿ ಪುನರಾವರ್ತಿತ ಅಭ್ಯರ್ಥಿ)

(Regular Fresh / Regular Repeater / Private Fresh / Private Repeater)

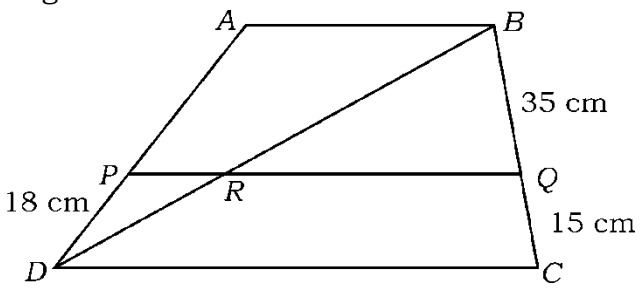
(ಆಂಗ್ಲ ಮಾಧ್ಯಮ / English Medium)

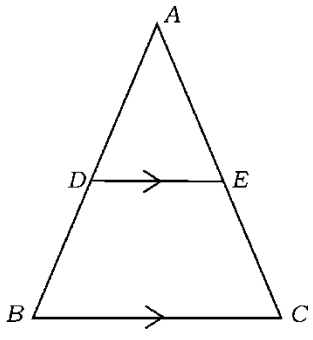
ದಿನಾಂಕ : 28. 03. 2026] **[ಗರಿಷ್ಠ ಅಂಕಗಳು : 80**

Date : 28. 03. 2026] **[Max. Marks : 80**

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **8 × 1 = 8**	
1.		The probability of an impossible event is (A) 1 (B) 0 (C) 1·5 (D) – 1 *Ans.* :	
	(B)	0	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
2.		If cosec $\theta = \frac{5}{3}$, then the value of sin θ is (A) $\frac{5}{3}$ (B) $\frac{5}{4}$ (C) $\frac{3}{4}$ (D) $\frac{3}{5}$ *Ans.* :	
	(D)	$\frac{3}{5}$	1
3.		The quadratic equation among the following is (A) $x^{-2} - 3x + 2 = 0$ (B) $2x + 3 = 0$ (C) $x^2 - 5x + 6 = 0$ (D) $2x^3 + 7x + 1 = 0$ *Ans.* :	
	(C)	$x^2 - 5x + 6 = 0$	1
4.		In the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, then the equations (A) have unique solution (B) do not have any solution (C) have three solutions (D) have infinitely many solutions *Ans.* :	
	(A)	have unique solution	1
5.		The volume of a sphere of radius *'r'* units is (A) $\frac{2}{3}\pi r^2$ cubic units (B) $\frac{1}{3}\pi r^3$ cubic units (C) $\frac{4}{3}\pi r^3$ cubic units (D) $\frac{4}{3}\pi r^2$ cubic units *Ans.* :	
	(C)	$\frac{4}{3}\pi r^3$ cubic units	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
6.		In an arithmetic progression if $a_n = 2n + 1$, then the common difference of the arithmetic progression is (A) 1 (B) 2 (C) 3 (D) 4 *Ans.* :	
	(B)	2	1
7.		The coordinates of the mid-point of the line segment joining the points (2, 3) and (4, 7) are (A) (3, 5) (B) (5, 3) (C) (1, 2) (D) (6, 10) *Ans.* :	
	(A)	(3, 5)	1
8.		In trapezium *ABCD, AB* || *DC* and *P, Q* are points on the sides *AD* and *BC* respectively. If *PQ* || *DC*, *PD* = 18 cm, *BQ* = 35 cm and *QC* = 15 cm, then length of *AD* is  (A) 5 cm (B) 50 cm (C) 57 cm (D) 60 cm *Ans.* :	
	(D)	60 cm	1

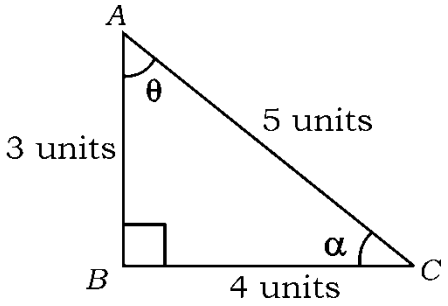
Qn. Nos.	Value Points	Marks allotted
II.	**Answer the following questions : 8 × 1 = 8** **(Direct answers from Q. Nos. 9 to 16 full marks should be given)**	
9.	State the 'fundamental theorem of arithmetic'. *Ans.* : 'Every composite number can be expressed (factorised) as a product of primes and this factorisation is unique, apart from the order in which the prime factors occur.	1
10.	If the first term of an arithmetic progression is *'a'* and the last term is *'a_n'*, then write the formula to find the sum of the first *'n'* terms of the arithmetic progression. *Ans.* : $S_n = \frac{n}{2}[a + a_n]$	1
11.	Write the degree of a cubic polynomial. *Ans.* : 3	1
12.	In the figure, *D* and *E* are the mid-points of sides *AB* and *AC* respectively. If *DE* = 4 cm, then write the measure of *BC*.  *Ans.* : $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$ $\frac{\frac{1}{2}AB}{AB} = \frac{\frac{1}{2}AC}{AC} = \frac{DE}{BC}$	½

Qn. Nos.	Value Points	Marks allotted
	$\frac{DE}{BC} = \frac{1}{2}$ $\frac{4}{BC} = \frac{1}{2}$ $\therefore$ $BC = 8$ cm ½	1
13.	Write the formula to find the total surface area of a cube of edge of length *'a'* units. *Ans.* : $6a^2$ square units	1
14.	If the lines represented by the equations $4x + py + 8 = 0$ and $4x + 4y + 2 = 0$ are parallel, then find the value of *'p'*. *Ans.* : $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ ½ $\frac{\cancel{4}}{\cancel{4}} = \frac{p}{4} \neq \frac{8}{2}$ $p = 4$ ½	1
15.	In the given cumulative frequency distribution table, write the median class. *Ans.* : 20 – 30	1
16.	Write the coordinates of the point where the graph of linear polynomial p (x) = x + 5 intersects the x-axis. *Ans.* : (– 5, 0)	1

Marks	*Number of students*	*Cumulative frequency*
0 – 10	3	3
10 – 20	4	7
20 – 30	7	14
30 – 40	6	20
	$n = 20$	

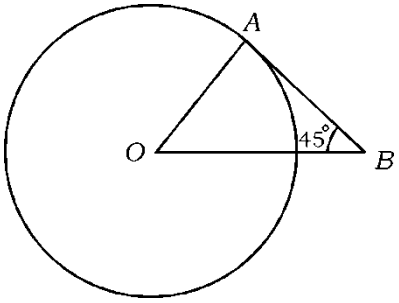
Qn. Nos.	Value Points	Marks allotted
III.	**Answer the following questions :** **8 × 2 = 16**	
17.	Prove that $5 + \sqrt{3}$ is an irrational number.	
	Ans. :	
	Let us assume to the contrary that $5+\sqrt{3}$ is rational	
	$5+\sqrt{3}=\frac{a}{b}$ 'a' and 'b' are coprimes $b \neq 0$ ½	
	$\sqrt{3}=\frac{a}{b}-5$ $\sqrt{3}=\frac{a-5b}{b}$ ½	
	This shows that $\sqrt{3}$ is rational.	
	But this contradits the fact that $\sqrt{3}$ is irrational.	
	This contradiction has arisen because of our wrong asumption. ½	
	$\therefore$ $5+\sqrt{3}$ is an irrational number. ½	2
18.	Solve the given pair of linear equations by elimination method :	
	$2x + y = 8$	
	$3x - y = 7$	
	Ans. :	
	$2x + y = 8$ ..... (1)	
	$3x - y = 7$ ..... (2)	
	$5x = 15$	
	$x = \frac{15^{3}}{5}$	
	$x = 3$ 1	
	Substitute $x = 3$ in equation (1)	
	$2 (3) + y = 8$	
	$6 + y = 8$	
	$y = 8 - 6$	
	$\boxed{y = 2}$ 1	
	Note : Marks should be given if the value of 'x' is substituted in equation (2)	2

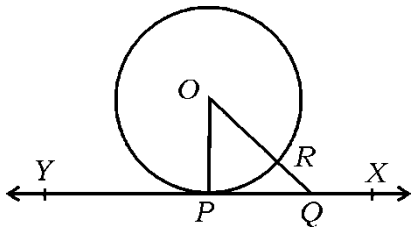
Qn. Nos.	Value Points	Marks allotted
19.	Find the sum of the first 20 terms of the arithmetic progression 5, 8, 11, ... using formula.	
	OR	
	Find the number of terms of the arithmetic progression 100, 96, 92, ... 12 using formula.	
	Ans. :	
	$a = 5$	
	$d = 8 - 5 = 3$	
	$n = 20$	
	$S_n = \frac{n}{2}\{2a + (n-1)\,d\}$ ½	
	$S_{20} = \frac{\cancel{20}^{10}}{\cancel{2}_{1}}\{2 \times 5 + (20-1)\,3\}$ ½	
	$= 10\{10 + 19 \times 3\}$	
	$= 10\{10 + 57\}$	
	$= 10\{67\}$ ½	
	$= 670$	
	$\boxed{S_{20} = 670}$ ½	2
	OR	
	$a = 100$	
	$d = 96 - 100 = -4$	
	$a_n = 12$	
	$n = ?$	
	$a_n = a + (n-1)d$ ½	
	$12 = 100 + (n-1)(-4)$ ½	
	$12 - 100 = (n-1)(-4)$	
	$-88 = (n-1)(-4)$	
	$\frac{-\cancel{88}^{22}}{-\cancel{4}_{1}} = n - 1$	
	$n - 1 = 22$ ½	
	$n = 22 + 1 = 23$	
	Number of terms in progression = 23 ½	2

Qn. Nos.	Value Points	Marks allotted
20.	In the figure, $\angle ABC = 90°$. Write the values of the following : i) $\sin \alpha$ ii) $\tan \theta$  *Ans.* : i) $\sin \alpha = \frac{\text{Opposite side}}{\text{Hypotenuse}}$ ½ $\sin \alpha = \frac{3}{5}$ ½ ii) $\tan\theta = \frac{\text{Opposite side}}{\text{Adjacent side}}$ ½ $\tan \theta = \frac{4}{3}$ ½ **Note :** Full marks should be given if the ratios of sin α and tan θ are written directly.	2
21.	Find the roots of the quadratic equation $x^2 + 4x - 60 = 0$ by factorisation method. **OR** Find the discriminant of the quadratic equation $2x^2 + 3x - 7 = 0$ and write the nature of the roots. *Ans.* : $x^2 + 4x - 60 = 0$ $x^2 + 10x - 6x - 60 = 0$ ½ $x(x+10) - 6(x+10) = 0$ ½ $(x+10)(x-6) = 0$ ½ $x + 10 = 0$ or $x - 6 = 0$ $\boxed{x = -10 \text{ or } x = 6}$ ½ **OR**	2

Qn. Nos.	Value Points	Marks allotted
	$2x^2 + 3x - 7 = 0$ $ax^2 + bx + c = 0$ $a = 2, \quad b = 3, \quad c = -7$ Discriminant = $b^2 - 4ac$ ½ $= (3)^2 - 4 \times 2 \times -7$ ½ $= 9 + 56$ $= 65 > 0$ ½ Nature of Roots : Two distinct real roots. ½	2
22.	Find the HCF of 135 and 75 by prime factorisation method and then find the LCM of HCF (135, 75) and 20. *Ans.* : 3|135, 3|45, 3|15, 5|5, 1 ; 3|75, 5|25, 5|5, 1 ; 2|20, 2|10, 5|5, 1 $135 = 3 \times 3 \times 3 \times 5$ $75 = 3 \times 5 \times 5$ $20 = 2 \times 2 \times 5$ 1 HCF (135, 75) $= 3 \times 5 = 15$ ½ LCM [HCF (135, 75), 20] = LCM [15, 20] $= 5 \times 2 \times 2 \times 3$ = 60 ½	2
23.	*A* (*x*, 5) and *B* (2, *y*) are the coordinates of the end points of the diameter *AB* of a circle with centre *P* (4, 3). Find the values of *'x'* and *'y'*. Also find the length of the diameter of the circle.	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	$A(x, 5)$ $B(2, y)$ $P(4, 3)$	
	(x_1, y_1) (x_2, y_2) (x, y)	
	Coordinates of mid-point	
	$= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	
	$(4, 3) = \left(\frac{x+2}{2}, \frac{5+y}{2} \right)$ ½	
	$4 = \frac{x+2}{2}$, $3 = \frac{5+y}{2}$	
	$8 = x + 2$, $6 = 5 + y$	
	$8 - 2 = x$ $6 - 5 = y$	
	$\boxed{x = 6}$, $\boxed{y = 1}$ ½	
	$A(6, 5)$ $B(2, 1)$	
	(x_1, y_1) (x_2, y_2)	
	length of diameter of the circle	
	$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	
	$= \sqrt{(2-6)^2 + (1-5)^2}$ ½	
	$= \sqrt{(-4)^2 + (-4)^2}$	
	$= \sqrt{16+16} = \sqrt{32}$ units ½	
	Or	
	$= 4\sqrt{2}$ units	2

Qn. Nos.	Value Points	Marks allotted
24.	*AB* is a tangent to the circle with centre *'O'* and *'A'* is the point of contact. If $\angle OBA = 45°$, then prove that ΔAOB is an isosceles triangle. If $OB = 5\sqrt{2}$ cm, then find the radius of the circle.  *Ans.* : $\angle OBA = 45°$, $OB = 5\sqrt{2}$ cm $\angle OAB = 90°$ ($OA \perp AB$) In ΔAOB, $\angle AOB + \angle OBA + \angle OAB = 180°$ $\angle AOB = 180° - 45° - 90°$ ½ $\angle AOB = 45°$ $\therefore$ $\angle AOB = \angle OBA = 45°$ $\Rightarrow$ $OA = AB$ ..... (1) $\therefore$ ΔAOB is an isosceles triangle ½ $OB^2 = OA^2 + BA^2$ (Pythagoras theorem) $(5\sqrt{2})^2 = OA^2 + OA^2$ (from (1)) ½ $25 \times 2 = 2\ OA^2$ $OA^2 = 25 = 5^2$ $OA = 5$ cm $\therefore$ Radius of circle = 5 cm ½ Alternate method to find the radius : In ΔAOB, $\sin 45° = \frac{OA}{OB}$ ½ $\frac{1}{\sqrt{2}} = \frac{OA}{5\sqrt{2}}$ $OA = \frac{5\sqrt{2}}{\sqrt{2}} = 5$ $\therefore$ Radius of circle = 5 cm ½	2

Qn. Nos.	Value Points	Marks allotted
IV.	**Answer the following questions : 9 × 3 = 27**	
25.	Find the zeroes of the quadratic polynomial $p(x) = x^2 - 2x - 8$ and verify the relationship between the zeroes and the coefficients.	
	Ans. :	
	$p(x) = x^2 - 2x - 8$	
	$= x^2 - 4x + 2x - 8$	
	$= x(x-4) + 2(x-4)$	
	$= (x-4)(x+2)$ ½	
	$(x-4)(x+2) = 0$	
	$x - 4 = 0$ or $x + 2 = 0$	
	$x = 4$ or $x = -2$ ½	
	4 and – 2 are the zeroes of given polynomial.	
	Sum of zeroes = $4 + (-2) = 2 = \frac{-(-2)}{1}$	
	$= \frac{-\text{coefficient of } x}{\text{coefficient of } x^2}$ 1	
	Product of zeroes = $4 \times (-2) = -8 = \frac{-8}{1}$	3
	$= \frac{\text{constant term}}{\text{coefficient of } x^2}$ 1	
26.	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 the tangent at ' *P* '. *OP* is the radius. ½	
	To prove : $OP \perp XY$. ½	
	Construction : Take a point '*Q*' on *XY* other than '*P* ' and join *OQ*. Let it intersect the circle at ' *R* '. ½	

Qn. Nos.	Value Points	Marks allotted
	Proof : From the figure, $OQ > OR$. But $OR = OP$ (radii of the same circle) ½ $OQ > OP$. This happens for every point on the line XY except the point P. $\therefore$ OP is the shortest distance from O to XY. $\therefore$ $OP \perp XY$ ½ **Note :** If the theorem is proved as given in textbook give full marks.	3
27.	$\Delta ABC \sim \Delta PQR$. In ΔABC, $\angle A = 55°$, $\angle C = 35°$ and the sides of ΔABC are in the ratio 3 : 4 : 5. If the perimeter of ΔPQR is 60 cm, then find the measure of sides and angles of ΔPQR. *Ans.* : Let $3k$, $4k$ and $5k$ be the measures of sides of ΔPQR. ($\because \Delta ABC \sim \Delta PQR$) Perimeter of ΔPQR = 60 cm ½ $\therefore 3k + 4k + 5k = 60$ $12k = 60$ $k = \frac{\cancel{60}^{5}}{\cancel{12}_{1}}$ $k = 5$ ½ $3k = 3 \times 5 = 15$ $4k = 4 \times 5 = 20$ $5k = 5 \times 5 = 25$ $\therefore$ Measures of sides of ΔPQR are 15 cm, 20 cm and 25 cm ½ In ΔABC, $\angle B = 180° - \angle A - \angle C$ $= 180° - 55° - 35°$ ½ $\angle B = 90°$ ½ $\Delta ABC \sim \Delta PQR$	

Qn. Nos.	Value Points		Marks allotted
	$\therefore \angle P = \angle A = 55°$		
	$\angle Q = \angle B = 90°$		
	$\angle R = \angle C = 35°$		
	$\therefore$ Measures of ΔPQR are 55°, 90° and 35°	½	3
28.	Find the mean for the following data :		

Class-interval	***Frequency***
0 – 10	4
10 – 20	9
20 – 30	15
30 – 40	14
40 – 50	8

OR

Find the mode for the following data :

Class-interval	***Frequency***
5 – 15	3
15 – 25	4
25 – 35	8
35 – 45	7
45 – 55	3

Ans. :

Class interval	Frequency f_i	Mid-point x_i	$f_i x_i$
0 – 10	4	5	20
10 – 20	9	15	135
20 – 30	15	25	375
30 – 40	14	35	490
40 – 50	8	45	360
	$\sum f_i = 50$		$\sum f_i x_i = 1380$

For the table 2

Mean $\overline{X} = \dfrac{\sum f_i x_i}{\sum f_i} = \dfrac{1380}{50}$ ½ 3

Mean = $\overline{X}$ = 27·6 ½

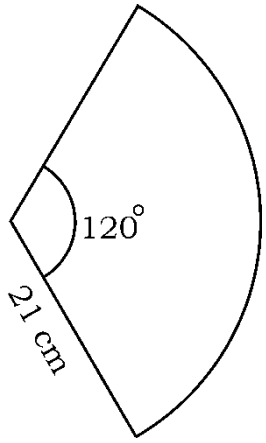
OR

Qn. Nos.	Value Points		Marks allotted
	$l = 25$ $f_0 = 4$ $f_1 = 8$ $f_2 = 7$ $h = 35 - 25 = 10$	1	
	Mode = $l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right] h$	½	
	$= 25 + \left[\frac{8-4}{2(8)-4-7} \right] 10$	½	
	$= 25 + \left[\frac{4}{16-11} \right] 10$		
	$= 25 + \left[\frac{4}{\cancel{5}\,1} \right] \cancel{10}^{2}$	½	
	$= 25 + 4 \times 2$ $= 25 + 8$ $= 33$		
	$\therefore$ Mode = 33	½	3
29.	Prove that, $(\text{cosec } A - \sin A)\ (\sec A - \cos A) = \frac{1}{\tan A + \cot A}$		
	OR		
	Prove that, $\frac{\sec 60^\circ}{\cot 45^\circ} - \frac{2 \sin 90^\circ}{\cos 0^\circ} + \frac{\tan 45^\circ}{\text{cosec } 30^\circ} =$ $\sin^2 45^\circ\ (\text{cosec}^2 45^\circ - \sec^2 0^\circ)$		
	Ans. : L.H.S. $= (\text{cosec } A - \sin A)\ (\sec A - \cos A)$		
	$= \left(\frac{1}{\sin A} - \sin A \right) \left(\frac{1}{\cos A} - \cos A \right)$	½	
	$= \left(\frac{1 - \sin^2 A}{\sin A} \right) \left(\frac{1 - \cos^2 A}{\cos A} \right)$		
	$= \left(\frac{\cos^2 A}{\sin A} \right) . \left(\frac{\sin^2 A}{\cos A} \right)$ $(\because \sin^2 A + \cos^2 A = 1)$	½	
	$= \cos A \,.\, \sin A$ ..... (1)	½	

Qn. Nos.	Value Points	Marks allotted
	R.H.S. $= \frac{1}{\tan A + \cot A}$	
	$= \frac{1}{\frac{\sin A}{\cos A} + \frac{\cos A}{\sin A}}$ ½	
	$= \frac{1}{\frac{\sin^2 A + \cos^2 A}{\cos A . \sin A}}$ ½	
	$= \frac{1}{\frac{1}{\cos A . \sin A}}$ $(\because \sin^2 A + \cos^2 A = 1)$	
	$= \cos A \cdot \sin A$..... (2) ½	3
	from (1) and (2), we have L.H.S = R.H.S.	
	Note : If the alternate method is used to get correct answer, then give full marks.	
	OR	
	L.H.S.	
	$= \frac{\sec 60°}{\cot 45°} - \frac{2\sin 90°}{\cos 0°} + \frac{\tan 45°}{\text{cosec}\, 30°}$	
	$= \frac{2}{1} - \frac{2 \times 1}{1} + \frac{1}{2}$ 1	
	$= 2 - 2 + \frac{1}{2}$	
	$= \frac{1}{2}$ ..... (1) ½	
	R.H.S.	
	$= \sin^2 45° (\text{cosec}^2 45° - \sec^2 0°)$	
	$= \left(\frac{1}{\sqrt{2}}\right)^2 \left((\sqrt{2})^2 - 1^2 \right)$ 1	
	$= \frac{1}{2}(2-1)$	
	$= \frac{1}{2}$ ..... (2) ½	
	from (1) and (2)	
	L.H.S = R.H.S.	
30.	A hand fan is made up of cloth fixed in between the metallic wires. It is in the shape of a sector of a circle of radius 21 cm and of an angle 120° as shown in the figure. Calculate the area of the cloth used and also find the	

Qn. Nos.	Value Points	Marks allotted

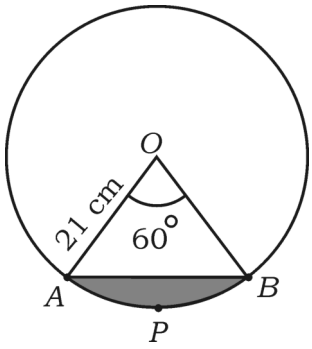
total length of the metallic wire required to make such a fan.



OR

In the given figure, *'O'* is the centre of the circle of radius 21 cm. If $\angle AOB = 60°$, then find the area of the segment *APB*.

[Take $\sqrt{3} = 1{\cdot}73$]



Ans. :

Area of cloth required to make hand fan

= Area of sector

$= \frac{\theta}{360} \times \pi r^2$ ½

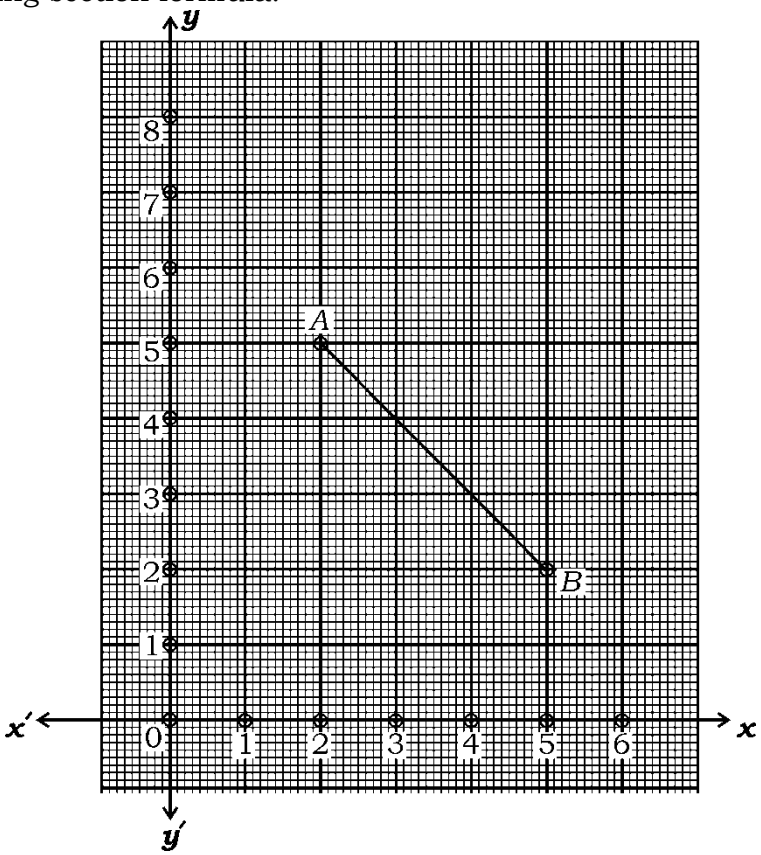
$= \frac{120^{\circ}}{360^{\circ}} \times \frac{22}{7} \times 21 \times 21$ ½

$= 22 \times 21$

$= 462 \text{ cm}^2$

Qn. Nos.	Value Points	Marks allotted
	$\therefore$ Area of cloth required to make hand fan = 462 cm^2 ½	
	Total length of the wire = length of arc + 2 radius.	
	$= \frac{\theta}{360} \times 2\pi r + 2 \times r$ ½	
	$= \frac{\cancel{120}^{\circ 1}}{\cancel{360}^{\circ}_{\cancel{3}_1}} \times 2 \times \frac{22}{\cancel{7}_1} \times \cancel{21}^{\cancel{3}^1} + 2 \times 21$ ½	
	$= 44 + 42$	
	$= 86$ cm	
	$\therefore$ Total length of the wire = 86 cm ½	3
	OR	
	Area of segment *APB*	
	= Area of sector – Area of an equilateral triangle ½	
	$= \frac{\theta}{360^{\circ}} \pi r^2 - \frac{\sqrt{3}}{4} a^2$ ½ + ½	
	$= \frac{\cancel{60}^{\circ 1}}{\cancel{360}^{\circ}_6} \times \frac{22}{\cancel{7}_1} \times \cancel{21}^3 \times 21 - \frac{1 \cdot 73}{4} \times 21 \times 21$ ½	
	$= \frac{1}{\cancel{6}\cancel{3}_1} \times \cancel{22}^{11} \times \cancel{3}^1 \times 21 - \frac{762 \cdot 93}{4}$	
	$= 231 - 190 \cdot 7325$ ½	
	$= 40 \cdot 2675$ cm^2	
	$\therefore$ Area of segment *APB* = $40 \cdot 2675$ cm^2 ½	3
31.	The perimeter of square *ABCD* is 12 m less than the perimeter of the square *PQRS*. The sum of the areas of these two squares is 117 m^2. Find the ratio of the area of the square *ABCD* to the area of the square *PQRS*.	

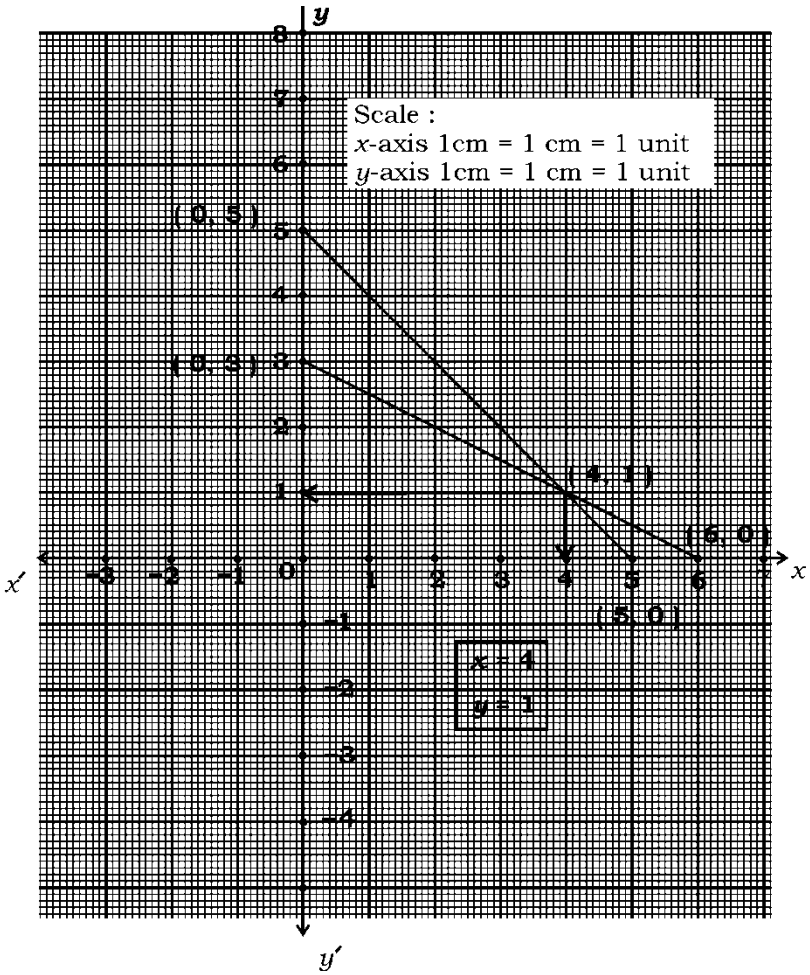
Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	Let the side of the square *ABCD* be ' x ' m and the side of the square *PQRS* be 'y' m.	
	$4x = 4y - 12$	
	$x = y - 3$ ..... (1) ½	
	$x^2 + y^2 = 117$ ½	
	$(y-3)^2 + y^2 = 117$ ..... (from (1))	
	$y^2 + 9 - 6y + y^2 - 117 = 0$	
	$2y^2 - 6y - 108 = 0$	
	$y^2 - 3y - 54 = 0$ ½	
	$y^2 - 9y + 6y - 54 = 0$	
	$y(y-9) + 6(y-9) = 0$	
	$(y-9)\ (y+6) = 0$	
	$y - 9 = 0$ or $y + 6 = 0$	
	$y = 9$ or $y = -6$ ½	
	side length cannot be a negative number	
	$y = 9$	
	$x = y - 3 = 9 - 3 = 6$	
	$x = 6$	
	Side of square *ABCD* = x = 6 cm Side of square *PQRS* = y = 9 cm ½	
	Area of square *ABCD* : Area of square *PQRS*	
	$= 6^2 : 9^2$	
	$= 36 : 81$	
	$= 4 : 9$ ½	3

Qn. Nos.	Value Points	Marks allotted
32.	In the figure, find the coordinates of the point which divides the line segment AB internally in the ratio 1 : 2 using section formula.  **OR** Verify whether the points A (1, 5), B (2, 4) and C (9, – 3) are collinear with the help of 'distance formula'. *Ans.* : Coordinates of point A = (2, 5) ½ Coordinates of point B = (5, 2) ½ (x_1, y_1) (x_2, y_2) $m_1 : m_2$ = (2, 5) = (5, 2) = 1 : 2 $P(x, y) = \left[\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2} \right]$ ½	

Qn. Nos.	Value Points		Marks allotted
	$= \left[\frac{1(5)+2(2)}{1+2}, \frac{1(2)+2(5)}{1+2}\right]$	½	
	$= \left[\frac{5+4}{3}, \frac{2+10}{3}\right]$		
	$= \left[\frac{\cancel{9}^{3}}{\cancel{3}}, \frac{\cancel{12}^{4}}{\cancel{3}}\right]$	½	
	$= [3, 4]$	½	3
	OR		
	$A(1, 5)$ $B(2, 4)$ (x_1, y_1) (x_2, y_2)		
	Distance between points A & B		
	$= AB = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	½	
	$AB = \sqrt{(2-1)^2+(4-5)^2}$		
	$= \sqrt{1+1}$		
	$= \sqrt{2}$ units	½	
	$B(2, 4)$ $C(9, -3)$ (x_1, y_1) (x_2, y_2)		
	Distance between points B & C		
	$BC = \sqrt{(9-2)^2+(-3-4)^2}$		
	$= \sqrt{7^2+(-7)^2}$		
	$= \sqrt{49+49}$		
	$= 7\sqrt{2}$ units	½	
	$A(1, 5)$ $C(9, -3)$ (x_1, y_1) (x_2, y_2)		
	Distance between points A & C		
	$AC = \sqrt{(9-1)^2+(-3-5)^2}$		
	$= \sqrt{8^2+(-8)^2}$		
	$= \sqrt{64+64}$		
	$= 8\sqrt{2}$ units	½	

Qn. Nos.	Value Points	Marks allotted
	$AB + BC$ $= \sqrt{2} + 7\sqrt{2}$ $= 8\sqrt{2}$ ½ $= AC$ $\therefore AB + BC = AC$ ½ $\therefore A(1, 5)$, $B(2, 4)$ and $C(9, -3)$ are collinear points	3
33.	Two fair dice whose faces are numbered from 1 to 6 are rolled once. Find the probability a) that the sum of the numbers on the top faces is 6 b) of getting a square number on one of the faces only. Ans. S = { (1, 1) (1, 2) (1, 3) (1, 4) (1, 5) (1, 6) (2, 1) (2, 2) (2, 3) (2, 4) (2, 5) (2, 6) (3, 1) (3, 2) (3, 3) (3, 4) (3, 5) (3, 6) (4, 1) (4, 2) (4, 3) (4, 4) (4, 5) (4, 6) (5, 1) (5, 2) (5, 3) (5, 4) (5, 5) (5, 6) (6, 1) (6, 2) (6, 3) (6, 4) (6, 5) (6, 6) $n(S) = 36$ ½ a) $A = \{(1, 5) (5, 1) (2, 4) (4, 2) (3, 3)\}$ $n(A) = 5$ ½ $P(A) = \frac{n(A)}{n(S)}$ ½ $\boxed{P(A) = \frac{5}{36}}$ ½ b) $B = \{(1, 2) (1, 3) (1, 5) (1, 6) (2, 1)$ $(2, 4) (3, 1) (3, 4) (4, 2) (4, 3)$ $(4, 5) (4, 6) (5, 1) (5, 4) (6, 1)$ $(6, 4)\}$ $n(B) = 16$ ½ $P(B) = \frac{n(B)}{n(S)}$ $\boxed{P(B) = \frac{16}{36}}$ or $P(B) = \frac{4}{9}$ 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 : $x + 2y = 6$ $x + y = 5$ *Ans.* :	



$x + 2y = 6$ For table construction 1 + 1

x	0	6
y	3	0

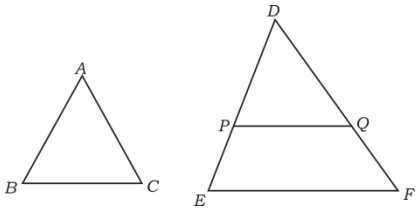
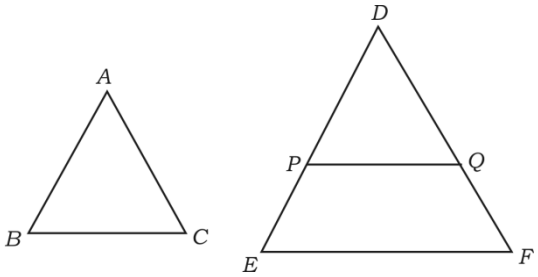
Drawing two lines by marking points 1

$x + y = 5$

x	0	5
y	5	0

Writing the values of x and y 1 4

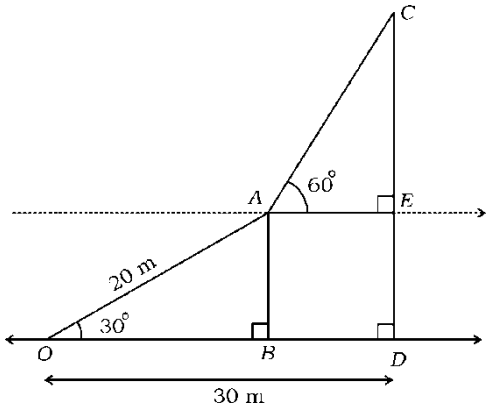
Qn. Nos.	Value Points	Marks allotted
35.	The 7^{th} term of an arithmetic progression is four times its 2^{nd} term and the 12^{th} term is 2 more than thrice its 4^{th} term. Find the progression. *Ans.* : $a_7 = 4a_2$ $a_{12} = 3a_4 + 2$ ½ $a_n = a + (n-1)d$ $a + 6d = 4\,(a + d)$ $a + 6d = 4a + 4d$ $6d - 4d = 4a - a$ $2d = 3a$ ..... (1) 1 $a + 11d = 3\,(a + 3d) + 2$ $a + 11d = 3a + 9d + 2$ 1 $-2a + 2d = 2$ $-2a + 3a = 2$ (from (1)) $\boxed{a = 2}$ ½ $2d = 3a$ $2d = 3 \times 2$ $\boxed{d = 3}$ ½ $\therefore$ Arithmetic progression is 2, 5, 8 ..... ½	4
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". **OR** Prove that, "If one angle of a triangle is equal to one angle of the other triangle and the sides including these angles are proportional, then the two triangles are similar".	

Qn. Nos.	Value Points	Marks allotted
	Ans. :  ½	
	Data : In ΔABC and ΔDEF, $\angle A = \angle D$ $\angle B = \angle E$ $\angle C = \angle F$ ½	
	To prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$, $\Delta ABC \sim \Delta DEF$ ½	
	Construction : Mark points P and Q on the sides DE and DF such that $AB = DP$ and $AC = DQ$. Join P and Q. ½	
	Proof : In ΔABC & ΔDPQ $AB = DP$, $AC = DQ$ } construction $\angle BAC = \angle PDQ$ (Data)	
	$\therefore$ $\Delta ABC \cong \Delta DPQ$ [SAS] ½	
	$\therefore$ $\angle ABC = \angle DPQ$ (corresponding angles of congruent triangles) But $\angle ABC = \angle DEF$	
	$\therefore$ $\angle DPQ = \angle DEF$ ½	
	Corresponding angles are equal, lines are parallel $\therefore$ $PQ \parallel EF$	
	$\therefore$ $\frac{DP}{DE} = \frac{PQ}{EF} = \frac{DQ}{DF}$ ½	
	But $AB = DP$, $BC = PQ$ and $AC = DQ$	
	$\therefore$ $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$, $\Delta ABC \sim \Delta DEF$ ½	
	Note : If the theorem is proved as given in the textbook, give full marks.	4
	OR	
	 ½	
	Data : In ΔABC and ΔDEF,	

Qn. Nos.	Value Points	Marks allotted
	$\angle A = \angle D$ ½ and $\frac{AB}{DE} = \frac{AC}{DF}$ To prove : $\Delta ABC \sim \Delta DEF$ ½ Construction : Take P and Q points on DE and DF respectively so that $AB = DP$ and $AC = DQ$. Join PQ. ½ Proof : In ΔABC & ΔDPQ $AB = DP$ } construction $AC = DQ$ $\angle A = \angle D$ (Data) $\therefore \quad \Delta ABC \cong \Delta DPQ$ [SAS] ½ $\therefore \quad \angle B = \angle P$ ..... (1) $\angle C = \angle Q$ (corresponding angles of congruent triangles) $\frac{AB}{DE} = \frac{AC}{DF}$ (Data) $\frac{DP}{DE} = \frac{DQ}{DF}$ ($AB = DP$ & $AC = DQ$) ½ $\therefore \quad PQ \mid\mid EF$ (converse of Thales Theorem) $\therefore \angle E = \angle P$ } ..... (2) ½ $\angle F = \angle Q$ } From (1) and (2) $\angle B = \angle E$, $\angle C = \angle F$ and $\angle A = \angle D$ $\therefore \quad \Delta ABC \sim \Delta DEF$ ½	4
	Note : If the theorem is proved as given in the textbook, give full marks.	
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. The angle made by the rope 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 to be 60°. If the	

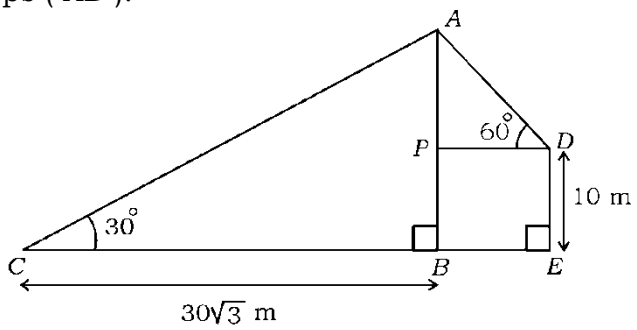
Qn. Nos.	Value Points	Marks allotted

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)



OR

A tower *AB* and a building *DE* are standing vertically on a level ground. The angles of elevation of the top of the tower from a point on the same ground and from the top of the building are found to be 30° and 60° respectively as shown in the figure. If the distance of the point from the foot of the tower is $30\sqrt{3}$ m and height of the building is 10 m, then find the distance (*BE*) between the foot of the tower and the building and also the distance between their tops (*AD*).



Ans. :

In ΔABO, $\sin\theta = \frac{AB}{AO}$

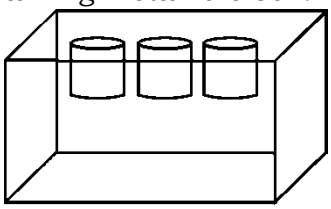
$\sin 30° = \frac{AB}{20}$ ½

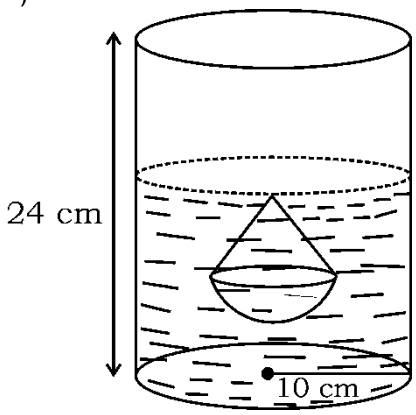
$\frac{1}{2} = \frac{AB}{20}$

AB = 10 m ½

$DE = AB$ = 10 m

Qn. Nos.	Value Points	Marks allotted
	$\cos 30° = \frac{OB}{AO}$	
	$\frac{\sqrt{3}}{2} = \frac{OB}{20}$ ½	
	$OB = 20 \times \frac{\sqrt{3}}{2}$	
	$OB = 10\sqrt{3} = 10 \times 1{\cdot}73$	
	OB = 17·3 m ½	
	$BD = OD - OB$ = 30 – 17·3 = 12·7 m	
	$AE = BD$ = 12·7 m ½	
	In ΔACE,	
	$\tan 60° = \frac{CE}{AE}$ ½	
	$\sqrt{3} = \frac{CE}{12{\cdot}7}$	
	$CE = \sqrt{3} \times 12{\cdot}7$	
	= 1·73 × 12·7	
	CE = 21·97 m ½	
	Height of the pole,	
	$CD = CE + DE$	
	= 21·97 + 10	
	Height of the pole = 31·97 m ½	4
	Note : If alternate method is used to get the correct answer then give full marks.	
	OR	
	In ΔABC, $\tan 30° = \frac{AB}{BC}$ ½	
	$\frac{1}{\sqrt{3}} = \frac{AB}{30\sqrt{3}}$	
	$AB = \frac{30\sqrt{3}}{\sqrt{3}}$	
	AB = 30 m ½	
	$AP = AB - PB$ = 30 – 10 = 20 m	

Qn. Nos.	Value Points	Marks allotted
	In ΔAPD, $\tan 60° = \frac{AP}{PD}$ ½ $\sqrt{3} = \frac{20}{PD}$ ½ $PD = \frac{20}{\sqrt{3}}$ m $\therefore$ The distance between the foot of the twoer and building = $BE = PD$ $= \frac{20}{\sqrt{3}}$ m ½ In ΔAPD, $\sin 60° = \frac{AP}{AD}$ ½ $\frac{\sqrt{3}}{2} = \frac{20}{AD}$ ½ $AD = 20 \times \frac{2}{\sqrt{3}}$ $AD = \frac{40}{\sqrt{3}}$ The distance between the tops of the tower and building $= AD = \frac{40}{\sqrt{3}}$ m ½	4
VI.	**Answer the following question :** **1 × 5 = 5**	
38.	From a solid cuboidal metallic block of dimensions 15 cm × 10 cm × 8 cm, three cylindrical depressions each having diameter 4·2 cm and height 6 cm are drilled out as shown in the figure. Find the total surface area and volume of the remaining metallic block. 	
	OR	
	In a cylinder of height 24 cm and radius 10 cm, water is filled up to the height of 14·4 cm. A solid is made by placing a cone of slant height 10 cm and curved surface area 60 π cm^2 on the hemisphere having the same radius as that of the cone. If this solid is completely immersed in	

Qn. Nos.	Value Points	Marks allotted
	the cylinder as shown in the figure, then find the rise in the water level in the cylinder. Also find the amount of water still to be filled in the cylinder so that the water level rises up to the brim of the cylinder. (Take $\pi = 3{\cdot}14$)  *Ans.* : Solid metallic cuboid : l = 15 cm, b = 10 cm, h = 8 cm Cylinder : d = 4·2 cm $r = \frac{4 \cdot 2}{2} = 2 \cdot 1$ cm ½ Total surface area of the remaining metallic block = T.S.A of the metallic cuboidal block – 3 upper circular area of the cylinder + 3 C.S.A. of cylinder + 3 Base circular area of the cylinder. ½ = $2(lb + bh + hl) - 3\pi r^2 + 3(2\pi rh) + 3\pi r^2$ ½ = 2 (15 × 10 + 10 × 8 + 8 × 15) + 3 × 2 × $\frac{22}{7}$ × 2·1 × 6 = 2 (150 + 80 + 120) + 6 × 22 × 1·8 ½ = 2 (350) + 237·6 = 700 + 237·6 = 937·6 cm^2 Total surface area of the remaining metallic block = 937·6 cm^2 ½	

Qn. Nos.	Value Points	Marks allotted
	Remaining volume of metallic block = Volume metallic block – 3 Volume of cylinder ½ = $lbh - 3\times\pi r^2 h$ ½ = $15 \times 10 \times 8 - 3 \times \frac{22}{7_1} \times (2{\cdot}1)^2 \times 6$ ½ = $1200 - 3 \times \frac{22}{\cancel{7}} \times \cancel{2{\cdot}1}^{0{\cdot}3} \times 2{\cdot}1 \times 6$ = 1200 – 249·48 ½ = 950·52 cm^2 ½ Remaining volume of the metallic block = 950·52 cm^2 Note : If alternate method is used to get correct answer, then give full marks. **OR** Cone : l = 10 cm C.S.A. = 60π cm^2 Cylinder : h = 24 cm, r = 10 cm height of water = 14·4 cm C.S.A. of cone = 60π cm^2 $\cancel{\pi} r\, l = 60\cancel{\pi}$ $r \times 10 = 60$ $r = \frac{\cancel{60}^{6}}{\cancel{10}}$ r = 6 cm ½ Radius of cone = radius of hemisphere = 6 cm height of cone = $h = \sqrt{l^2 - r^2}$ $= \sqrt{10^2 - 6^2}$ $= \sqrt{100 - 36}$ $= \sqrt{64}$ = 8 cm ½ Let 'h_1' be the height of water raised when solid is immersed. Volume of solid = Volume of cylinder with height h_1 Volume of cone + Volume of hemisphere = Volume of cylinder with height h_1 ½	5

Qn. Nos.	Value Points	Marks allotted
	$\frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3 = \pi r^2 h_1$ ½	
	$\frac{1}{3} \times \pi \times 6^2 \times 8 + \frac{2}{3} \times \pi \times 6^3 = \pi \times 10^2 \times h_1$	
	$\frac{288\pi}{3} + \frac{432\pi}{3} = \pi \times 100 h_1$	
	$\frac{240 \cancel{720\pi}}{\cancel{3}_1} = \cancel{\pi} \times 100 h_1$	
	$h_1 = \frac{240}{100}$	
	$h_1 = 2 \cdot 4$ cm 1	
	Height of water raised when solid is immersed = $h_1 = 2 \cdot 4$ cm	
	Remaining height in cylinder = 24 – 14·4 – 2·4 = 7·2 cm ½	
	Amount of water still to be filled = Volume of cylinder with height 7·2 cm ½	
	= $\pi r^2 h$	
	= $3{\cdot}14 \times 10^2 \times 7{\cdot}2$	
	= $314 \times 7{\cdot}2$	
	= $2260{\cdot}8\ \text{cm}^3$ 1	
	Amount of water still to be filled in the cylinder so that the water level raises upto the brim of the cylinder = $2260{\cdot}8\ \text{cm}^3$	5