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ಕರ್ನಾಟಕ ಪ್ರೌಢ ಶಿಕ್ಷಣ ಪರೀಕ್ಷಾ ಮಂಡಳಿ, ಮಲ್ಲೇಶ್ವರಂ, ಬೆಂಗಳೂರು – 560 003

KARNATAKA SECONDARY EDUCATION EXAMINATION BOARD, MALLESHWARAM, BANGALORE – 560 003

ಎಸ್.ಎಸ್.ಎಲ್.ಸಿ. ಪರೀಕ್ಷೆ, ಮಾರ್ಚ್ / ಏಪ್ರಿಲ್ — 2022

S. S. L. C. EXAMINATION, MARCH/APRIL, 2022

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

ದಿನಾಂಕ : 04. 04. 2022] **ಸಂಕೇತ ಸಂಖ್ಯೆ : 81-E**

Date : 04. 04. 2022] **CODE NO. : 81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

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

(Private Fresh & Private Repeater / NSR & NSPR)

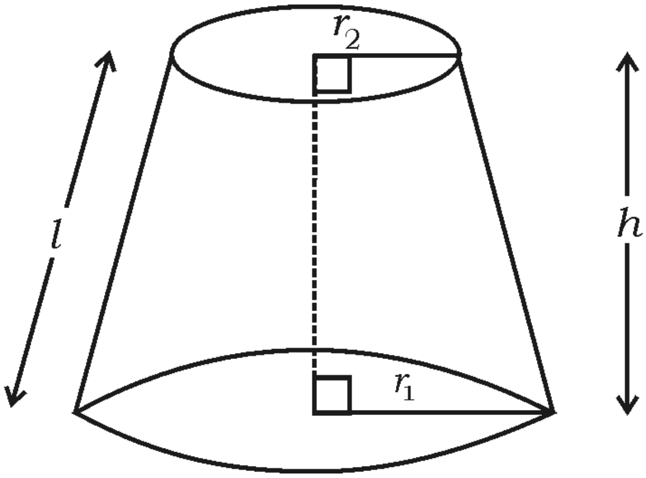
(ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ / English Medium)

[ಗರಿಷ್ಠ ಅಂಕಗಳು : **100**

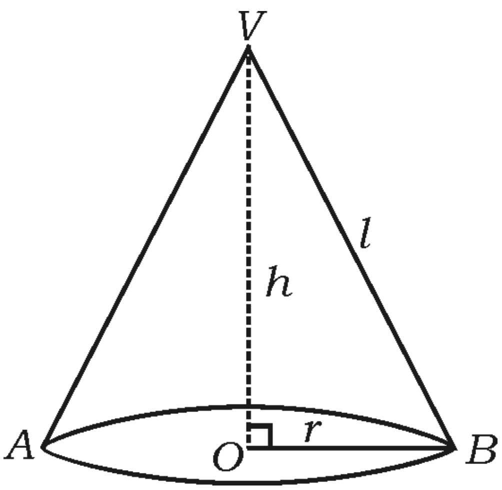
[Max. Marks : 100

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		Multiple choice : $8 \times 1 = 8$	
1.		The graphical representation of pair of lines $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$ is (A) intersecting lines (B) parallel lines (C) coincident lines (D) perpendicular lines. *Ans.* :	
	(B)	parallel lines	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
2.		The common difference of the Arithmetic progression	
		8, 5, 2, – 1, ... is	
		(A) – 3 (B) – 2	
		(C) 3 (D) 8.	
		Ans. :	
	(A)	– 3	1
3.		The standard form of $2x^2 = x - 7$ is	
		(A) $2x^2 - x = -7$ (B) $2x^2 + x - 7 = 0$	
		(C) $2x^2 - x + 7 = 0$ (D) $2x^2 + x + 7 = 0$.	
		Ans. :	
	(C)	$2x^2 - x + 7 = 0$	1
4.		The value of $\cos(90° - 30°)$ is	
		(A) – 1 (B) $\frac{1}{2}$	
		(C) 0 (D) 1.	
		Ans. :	
	(B)	$\frac{1}{2}$	1
5.		The distance of the plant $P(x, y)$ from the origin is	
		(A) $\sqrt{x^2 + y^2}$ (B) $x^2 + y^2$	
		(C) $x^2 - y^2$ (D) $\sqrt{x^2 - y^2}$.	
		Ans. :	
	(A)	$\sqrt{x^2 + y^2}$	1

Qn. Nos.	Ans. Key	Value Points	Marks allotted
6.		In a circle, the angle between the tangent and the radius at the point of contact is (A) 30° (B) 60° (C) 90° (D) 180°. *Ans.* :	
	(C)	90°	1
7.		In the given figure, the volume of the frustum of a cone is  (A) $\pi (r_1 + r_2) l$ (B) $\pi (r_1 - r_2) l$ (C) $\frac{1}{3}\pi h (r_1^2 - r_2^2 - r_1 r_2)$ (D) $\frac{1}{3}\pi h (r_1^2 + r_2^2 + r_1 r_2)$ *Ans.* :	
	(D)	$\frac{1}{3}\pi h (r_1^2 + r_2^2 + r_1 r_2)$	1
8.		Surface area of a sphere of radius '*r*' unit is (A) πr^2 sq.units (B) $2\pi r^2$ sq.units (C) $3\pi r^2$ sq.units (D) $4\pi r^2$ sq.units. *Ans.* :	
	(D)	$4\pi r^2$ sq.units	1

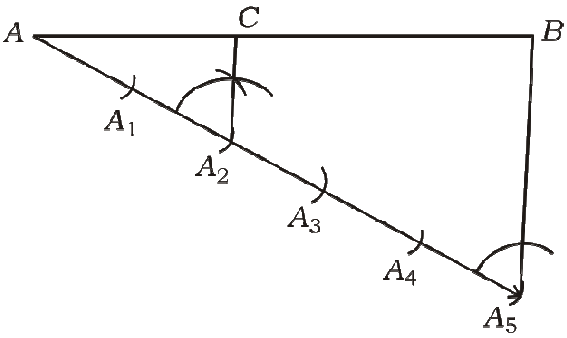
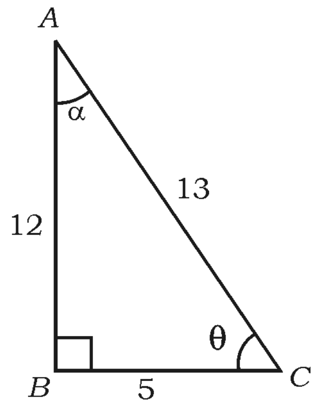
Qn. Nos.	Value Points	Marks allotted
II.	Answer the following questions : $8 \times 1 = 8$	
	(Direct answers from Q. Nos. 9 to 16 full marks should be given)	
9.	If the pair of linear equations in two variables are inconsistent, then how many solutions do they have ?	
	Ans. :	
	No solution	1
10.	In an Arithmetic progression if '*a*' is the first term and '*d*' is the common difference, then write its n^{th} term.	
	Ans. :	
	$a_n = a + (n-1)\mathrm{d}$	1
11.	Write the standard form of quadratic equation.	
	Ans. :	
	$ax^2 + bx + c = 0$	1
12.	Write the value of $\dfrac{\sin 18^\circ}{\cos 72^\circ}$.	
	Ans. :	
	1	1
13.	Write the distance of the point (4, 3) from *x*-axis.	
	Ans. :	
	3	1
14.	Find the median of the scores 6, 4, 2, 10 and 7.	
	Ans. :	
	6	1

Qn. Nos.	Value Points	Marks allotted
15.	Write the statement of "Basic Proportionality" theorem (Thales theorem). *Ans.* : If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. **Note** : If correct alternate statement is written give full marks.	1
16.	In the given figure, write the formula used to find the curved surface area of the cone.  *Ans.* : Curved surface area of cone = πrl sq units	1
III.	Answer the following questions : $18 \times 2 = 36$	
17.	Solve the given pair of linear equations by Elimination method : $2x + y = 8$ $x - y = 1$ *Ans.* : $2x + y = 8$ .... (1) Adding $x - y = 1$ .... (2) ½ $3x = 9$	

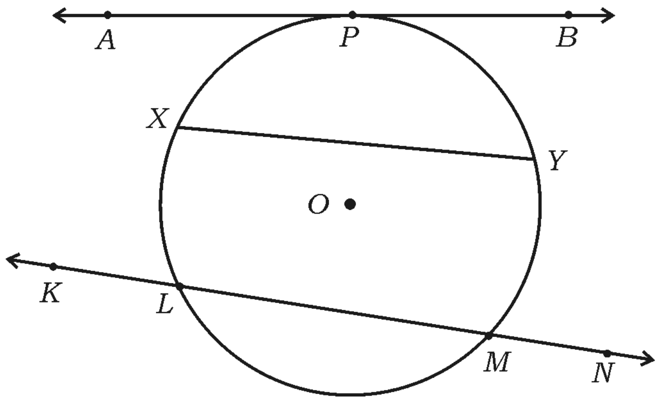
Qn. Nos.	Value Points		Marks allotted
	$x = \frac{9}{3}$		
	$x = 3$	½	
	Substitute $x = 3$ in (1)		
	$2(3) + y = 8$	½	
	$6 + y = 8$		
	$y = 8 - 6$		
	$y = 2$	½	2
18.	Find the 30th term of the arithmetic progression 5, 8, 11, ... by using formula.		
	Ans. :		
	5, 8, 11		
	Here $a = 5$, $d = 8 - 5 = 3$, $n = 30$	½	
	nth term of arithmetic progression		
	$a_n = a + (n-1)\text{d}$	½	
	$a_{30} = 5 + (30-1)3$	½	
	$= 5 + 29 \times 3$		
	$= 5 + 87$		
	$a_{30} = 92$	½	2
19.	Find the sum of first 20 terms of the Arithmetic progression 10, 15, 20, ... by using formula.		
	OR		
	Find the sum of first 20 positive integers using formula.		
	Ans. :		
	$a = 10$, $d = 15 - 10 = 5$, $n = 20$, $S_{20} = ?$		
	$S_n = \frac{n}{2}[2a + (n-1)\text{d}]$	½	

Qn. Nos.	Value Points		Marks allotted
	$S_{20} = \frac{20}{2}[2(10) + (20-1)5]$	½	
	$= 10 [20 + 19 \times 5]$		
	$= 10 [20 + 95]$		
	$= 10 \times 115$	½	
	$S_{20} = 1150$	½	
	Note : Any other suitable method is followed to get the correct answer, full marks should be given.		2
	OR		
	$S_n = \frac{n(n+1)}{2}$	½	
	$n = 20$		
	$S_{20} = \frac{20(20+1)}{2}$	½	
	$= \frac{20 \times 21}{2}$		
	$= 10 \times 21$	½	
	$S_{20} = 210$	½	2
20.	Find the roots of $x^2 + 5x + 2 = 0$ by using quadratic formula.		
	Ans. :		
	$x^2 + 5x + 2 = 0$		
	$ax^2 + bx + c = 0$		
	$a = 1,\ b = 5,\ c = 2$		
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	½	
	$= \frac{-5 \pm \sqrt{5^2 - 4(1)(2)}}{2(1)}$	½	
	$= \frac{-5 \pm \sqrt{25-8}}{2}$	½	
	$= \frac{-5 \pm \sqrt{17}}{2}$	½	2

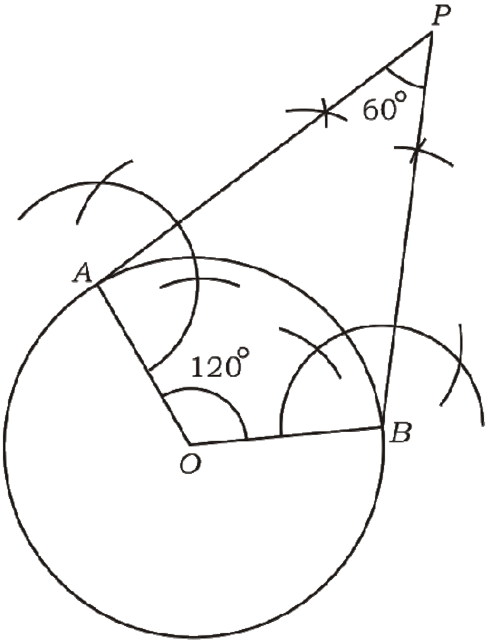
Qn. Nos.	Value Points		Marks allotted
21.	Find the value of the discriminant and hence write the nature of roots of the quadratic equation $x^2 + 4x + 4 = 0$.		
	Ans. :		
	$x^2 + 4x + 4 = 0$		
	$ax^2 + bx + c + 0$		
	$a = 1, \; b = 4, \; c = 4$		
	Discriminant = $b^2 - 4ac$	½	
	$= 4^2 - 4(1)(4)$	½	
	$= 16 - 16$		
	$= 0$	½	
	Nature of roots : Two equal real roots.	½	2
22.	Find the distance between the points $A(2, 6)$ and $B(5, 10)$ by using distance formula.		
	OR		
	Find the coordinates of the mid-point of the line segment joining the points $P(3, 4)$ and $Q(5, 6)$ by using 'mid-point' formula.		
	Ans. :		
	$A(2, 6)$ $B(5, 10)$		
	x_1, y_1 x_2, y_2		
	Distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$	½	
	$= \sqrt{(5-2)^2 + (10-6)^2}$	½	
	$= \sqrt{3^2 + 4^2}$		
	$= \sqrt{9 + 16}$		
	$= \sqrt{25}$	½	
	$d = 5$ units	½	2
	OR		
	$P(3, 4)$ $Q(5, 6)$		
	x_1, y_1 x_2, y_2		
	Mid-point formula $(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$	½	

Qn. Nos.	Value Points		Marks allotted
	$= \left(\frac{3+5}{2}, \frac{4+6}{2} \right)$	½	
	$= \left(\frac{8}{2}, \frac{10}{2} \right)$	½	
	$P(x, y) = (4, 5)$	½	2
23.	Draw a line segment of length 10 cm and divide it in the ratio 2 : 3 by geometric construction.		
	Ans. :  $AC : CB = 2 : 3$		
	Drawing line segment (10 cm)	½	
	Constructing acute angle at A	½	
	Marking 5 arcs	½	
	constructing $A_2C \mid\mid A_5B$	½	2
24.	In the given figure find the values of i) sin θ ii) tan α. 		

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	(i) $\sin\theta = \frac{12}{13}$ 1	
	(ii) $\tan\alpha = \frac{5}{12}$ 1	2
25.	In the given figure identify and name the following :	
	i) Chord	
	ii) Secant of the circle.	



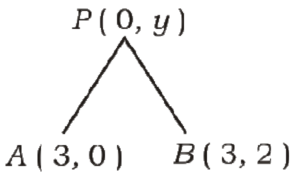
Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	(i) *XY* 1	
	(ii) *KN* 1	2
26.	What is an Arithmetic progression ? Write its general form.	
	Ans. :	
	An arithmetic progression is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term. 1	
	General form : a, $a + d$, $a + 2d$, $a + 3d$ 1	
	Note : If any other correct alternate definition is written for Arithmetic progression, give full marks.	2

Qn. Nos.	Value Points		Marks allotted
27.	Construct a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60°.		
	Ans. :		
	$\angle AOB = 180° - 60° = 120°$		
			
	Drawing a circle of radius 4 cm	½	
	Construction angle 120°	½	
	Drawing 2 tangents (½ + ½) =	1	2
28.	Find the roots of the equation $(x + 3) (x - 4) = 0$.		
	Ans. :		
	$(x + 3) (x - 4) = 0$		
	$x + 3 = 0$	½	
	$\boxed{x = -3}$	½	
	or		
	$x - 4 = 0$	½	
	$\boxed{x = 4}$	½	2

Qn. Nos.	Value Points	Marks allotted

29. If the point $P(0, y)$ is equidistant from the points $A(3, 0)$ and $B(3, 2)$, then find the value of y.

Ans. :



$PA = PB$ ½

$\sqrt{(3-0)^2+(0-y)^2} = \sqrt{(3-0)^2+(2-y)^2}$ ½

$\sqrt{3^2+y^2} = \sqrt{3^2+4+y^2-4y}$

Squaring on both sides

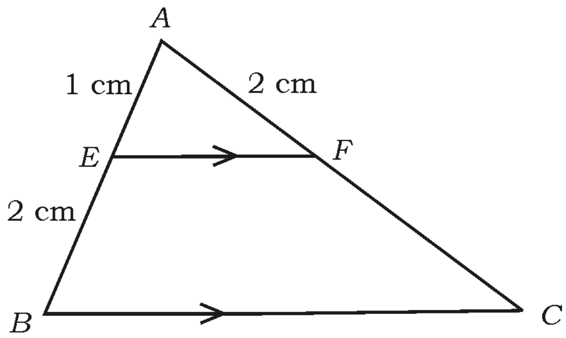
$\cancel{9}+\cancel{y^2} = \cancel{9}+4+\cancel{y^2}-4y$ ½

$4y = 4$

$y = \frac{4}{4}$

$y = 1$ ½ 2

30. In ΔABC as shown in the figure, $EF \parallel BC$. If $AE = 1$ cm, $BE = 2$ cm and $AF = 2$ cm, then find FC.

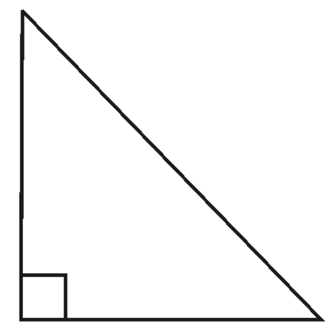


Ans. :

In ΔABC, $EF \parallel BC$.

By Basic proportionality theorem,

$\frac{AE}{EB} = \frac{AF}{FC}$ 1

Qn. Nos.	Value Points		Marks allotted
	$\frac{1}{2} = \frac{2}{FC}$	½	2
	$FC = 2 \times 2$		
	$FC = 4$ cm	½	
31.	ABC is an isosceles triangle right angled at C. Prove that $AB^2 = 2\,AC^2$.		
			
	Ans. :		
	In ΔABC, $\angle C = 90°$		
	$AB^2 = AC^2 + BC^2$ [By Pythagoras theorem]	½	
	$AB^2 = AC^2 + AC^2$ [$\because$ $BC = AC$] Isosceles triangle	1	
	$\therefore$ $AB^2 = 2AC^2$	½	2
32.	If $\tan A = \cot B$, then prove that $A + B = 90°$.		
	Ans. :		
	$\tan A = \cot B$		
	$\cot(90° - A) = \cot B$	1	
	$90° - A = B$	½	
	or $A + B = 90°$	½	2
	Alternate method		
	$\tan A = \cot B$	1	
	$\tan A = \tan(90° - B)$		
	$A = 90° - B$	½	
	$A + B = 90°$	½	2

Qn. Nos.	Value Points	Marks allotted
33.	Two cubes each of side 4 cm are joined end to end. Find the volume of the resulting cuboid.	
	Ans. :	
	Length of cuboid $l = (4 + 4)$	
	$l = 8$ cm — ½	
	Breadth of cuboid $b = 4$ cm; Height of cuboid $h = 4$ cm — ½	
	$V = l \times b \times h$ — ½	
	$= 8 \times 4 \times 4$	
	$V = 128 \text{ cm}^3$ — ½	2
34.	Find the area of the quadrant of a circle of radius 7 cm. [Take $\pi = \frac{22}{7}$]	
	Ans. :	
	Area of the quadrant of a circle $= \frac{\theta}{360^\circ} \times \pi r^2$ — ½	
	$= \frac{90^\circ}{360^\circ} \times \frac{22}{7} \times 7^2$	
	$= \frac{\cancel{90^\circ}^{1}}{\cancel{360^\circ}\,\cancel{4}_{2}} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \cancel{7} \times 7$ — 1	
	$= \frac{77}{2} \text{ cm}^2$	
	$= 38{\cdot}5 \text{ cm}^2$ — ½	2
	Alternate method	
	Area of quadrant of a circle $= \frac{1}{4} \times \pi r^2$ — 1	
	$= \frac{1}{4} \times \frac{22}{7} \times 7^2$	
	$= \frac{1}{\cancel{4}_{2}} \times \frac{\cancel{22}^{11}}{7} \times \cancel{7} \times 7$ — ½	

Qn. Nos.	Value Points		Marks allotted
	$= \frac{77}{2}\ \text{cm}^2$		
	or		
	$= 38{\cdot}5\ \text{cm}^2$	½	2
IV.	Answer the following questions :	9 × 3 = 27	
35.	The sum of first 9 terms of an Arithmetic progression is 144 and its 9th term is 28 then find the first term and common difference of the Arithmetic progression.		
	Ans. :		
	$S_n = \frac{n}{2}\ [\ a + l\ )$	½	
	$S_9 = \frac{9}{2}\ [\ a + 28\ ]$		
	$\left.\begin{array}{l} 144 = \frac{9}{2}\ [\ a + 28\ ] \\ \frac{\overset{16}{\cancel{144}} \times 2}{\cancel{9}} = a + 28 \end{array}\right\}$	½	
	$32 = a + 28$		
	$\left.\begin{array}{l} a = 32 - 28 \\ a = 4 \end{array}\right\}$	½	
	$a_n = a + (\ n - 1\ )\ \text{d}$	½	
	$\left.\begin{array}{l} a_9 = 4 + (\ 9 - 1\ )\ \text{d} \\ 28 = 4 + 8\text{d} \end{array}\right\}$	½	
	$24 = 8\text{d}$		
	$d = \frac{24}{8}$		
	$d = 3$	½	3
	✳ Any other correct alternate method, may be given full marks.		

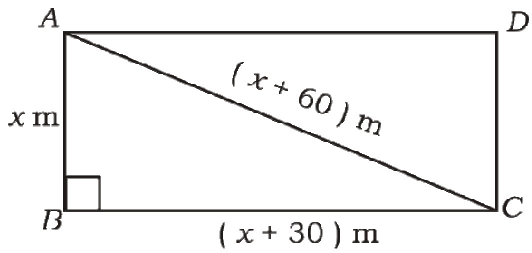
Qn. Nos.	Value Points	Marks allotted

36. The diagonal of a rectangular field is 60 m more than its shorter side. If the longer side is 30 m more than the shorter side, then find the sides of the field.

OR

In a right angled triangle, the length of the hypotenuse is 13 cm. Among the remaining two sides, the length of one side is 7 cm more than the other side. Find the sides of the triangle.

Ans. :



$ABCD \rightarrow$ rectangular field

Let $AB = x$ m then $BC = (x + 30)$ m, $AC = (x + 60)$ m

$AC^2 = AB^2 + BC^2$ ½

$(x + 60)^2 = x^2 + (x + 30)^2$ ½

$\cancel{x^2} + 60^2 + 2 \times x \times 60 = \cancel{x^2} + x^2 + 30^2 + 2 \times x \times 30$

$3600 + 120x = x^2 + 900 + 60x$

$x^2 + 900 + 60x - 3600 - 120x = 0$

$x^2 - 60x - 2700 = 0$ ½

$x^2 - 90x + 30x - 2700 = 0$

$x(x - 90) + 30(x - 90) = 0$

$(x - 90)(x + 30) = 0$ ½

$x - 90 = 0$ or $x + 30 = 0$

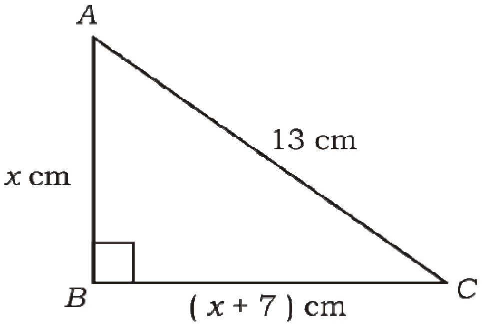
$x = 90$ or $x = -30$ (not considered) ½

$\therefore \quad x = 90$

$AB = x = 90$ m

$BC = (x + 30) = 90 + 30 = 120$ m ½ 3

OR

Qn. Nos.	Value Points		Marks allotted
			
	Let ABC be a right angled triangle.		
	Let AC = 13 cm, AB = x cm and BC = (x + 7) cm		
	$AC^2 = AB^2 + BC^2$	½	
	$13^2 = x^2 + (x+7)^2$	½	
	$\Rightarrow\ 169 = x^2 + x^2 + 49 + 14x$		
	$\Rightarrow\ 169 = 2x^2 + 49 + 14x$		
	$\Rightarrow\ 2x^2 + 49 + 14x - 169 = 0$		
	$\Rightarrow\ 2x^2 + 14x - 120 = 0$	½	
	$\div 2,\quad x^2 + 7x - 60 = 0$		
	$\Rightarrow\ x^2 + 12x - 5x - 60 = 0$		
	$\Rightarrow\ x(x+12) - 5(x+12) = 0$		
	$\Rightarrow\ (x+12)(x-5) = 0$	½	
	$x + 12 = 0$ or $x - 5 = 0$		
	$x = -12$ or $x = 5$		
	(not considered) $\therefore\ x = 5$	½	
	$AB = x = 5$ cm		
	$BC = (x + 7) = 5 + 7 = 12$ cm	½	3

Qn. Nos.	Value Points		Marks allotted
37.	Prove that		
	$(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A.$		
	OR		
	Prove that : $\sec\theta (1 - \sin\theta) (\sec\theta + \tan\theta) = 1.$		
	Ans. :		
	LHS $= (\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2$		
	$= \sin^2 A + \operatorname{cosec}^2 A + 2\sin A . \operatorname{cosec} A + \cos^2 A + \sec^2 A$ $+ 2\cos A . \sec A$	1	
	$= \underline{\sin^2 A + \cos^2 A} + \operatorname{cosec}^2 A + 2\cancel{\sin} A . \frac{1}{\cancel{\sin} A} + \sec^2 A$ $+ 2\cancel{\cos} A . \frac{1}{\cancel{\cos} A}$	1	
	$= 1 + (1 + \cot^2 A) + 2 + (1 + \tan^2 A) + 2$		
	$[\because \operatorname{cosec}^2 A = 1 + \cot^2 A$, $\sec^2 A = 1 + \tan^2 A$, $\sin^2 A + \cos^2 A = 1]$	½	
	$= 7 + \tan^2 A + \cot^2 A$	½	
	LHS = RHS		3
	OR		
	LHS $= \sec\theta(1 - \sin\theta)(\sec\theta + \tan\theta)$		
	$= \frac{1}{\cos\theta}(1 - \sin\theta)\left(\frac{1}{\cos\theta} + \frac{\sin\theta}{\cos\theta}\right)$	1	
	$= \frac{(1 - \sin\theta)}{\cos\theta} \times \frac{(1 + \sin\theta)}{\cos\theta}$	½	
	$= \frac{1 - \sin^2\theta}{\cos^2\theta}$	½	
	$= \frac{1 - \sin^2\theta}{\cos^2\theta}$ $[\because 1 - \sin^2\theta = \cos^2\theta]$	½	
	$= 1$	½	
	$\therefore$ L.H.S. = R.H.S		3

Qn. Nos.	Value Points	Marks allotted
38.	Find the coordinates of the point on the line segment joining the points $A(-1, 7)$ and $B(4, -3)$ which divides AB internally in the ratio 2 : 3.	
	OR	
	Find the area of triangle PQR with vertices $P(0, 4)$, $Q(3, 0)$ and $R(3, 5)$.	
	Ans. :	
	$A(-1, 7)$, $B(4, -3)$ 2 : 3	
	x_1, y_1 x_2, y_2 m_1 m_2	
	$P(x, y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right)$ 1	
	$= \left(\frac{2(4)+3(-1)}{2+3}, \frac{2(-3)+3(7)}{2+3}\right)$ ½	
	$= \left(\frac{8-3}{5}, \frac{-6+21}{5}\right)$ ½	
	$= \left(\frac{5}{5}, \frac{15}{5}\right)$ ½	
	$P(x, y) = (1, 3)$ ½	3
	OR	
	$P(0, 4)$, $Q(3, 0)$ $R(3, 5)$	
	x_1, y_1 x_2, y_2 x_3, x_3	
	$A = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$ 1	
	$= \frac{1}{2}[0(0-5) + 3(5-4) + 3(4-0)]$ ½	

Qn. Nos.	Value Points		Marks allotted
	$= \frac{1}{2}[0(-5)+3(1)+3(4)]$	½	
	$= \frac{1}{2}[0+3+12]$	½	
	$= \frac{1}{2} \times 15$		
	$A = \frac{15}{2}$ or $7{\cdot}5$ sq. units	½	3
39.	Find the mean for the following grouped data by Direct method :		

Class-interval	*Frequency*
10 — 20	2
20 — 30	3
30 — 40	5
40 — 50	7
50 — 60	3

OR

Find the mode for the following grouped data :

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

Qn. Nos.	Value Points	Marks allotted

Ans. :

C-I	f_i	x_i	$f_i x_i$
10-20	2	15	30
20-30	3	25	75
30-40	5	35	175
40-50	7	45	315
50-60	3	55	165
	$N = 20$		$\sum f_i x_i = 760$

Table 2

[Mid points – 01
finding $f_i x_i$ - 01]

Mean, $\overline{X} = \dfrac{\sum f_i x_i}{N}$ OR $\dfrac{\sum FX}{N}$ ½

$= \dfrac{760}{20}$

$\overline{X} = 38$ ½ 3

OR

From the frequency distribution table we find that,
$f_0 = 4,\ f_1 = 8,\ f_2 = 7,\ h = 10$ and $l = 25$

Mode = $l + [\dfrac{f_1 - f_0}{2f_1 - f_0 - f_2}] \times h$ 1

$= 25 + [\dfrac{8-4}{2(8)-4-7}] \times 10$ ½

$= 25 + [\dfrac{4}{16-11}] \times 10$ ½

$= 25 + \dfrac{4}{\cancel{5}_1} \times \cancel{10}^2$ ½

$= 25 + 8$

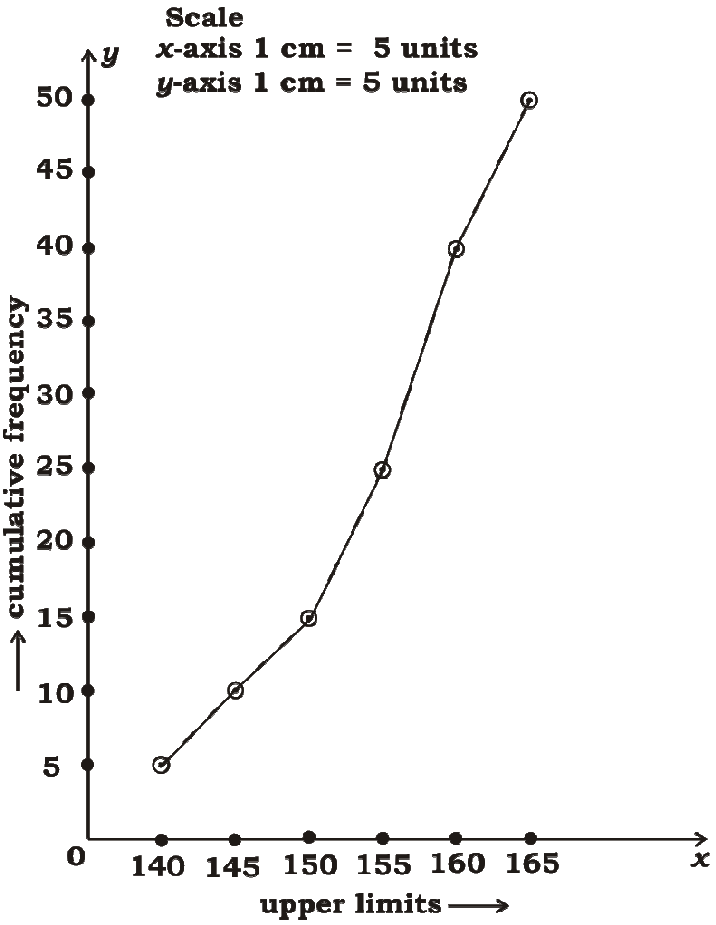
Mode = 33 ½ 3

Qn. Nos.	Value Points	Marks allotted
40.	During a medical check-up of 50 students of a class, their heights were recorded as follows :	

Draw "less than type" ogive for the given data :

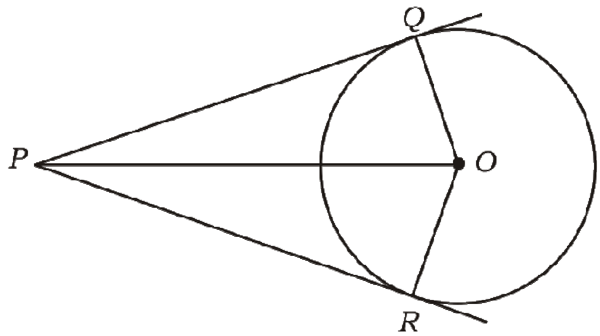
Height in cm	*Number of students (Cumulative frequency)*
Less than 140	5
Less than 145	10
Less than 150	15
Less than 155	25
Less than 160	40
Less than 165	50

Ans. :



Qn. Nos.	Value Points		Marks allotted
	Drawing axes and writing scale	1	
	Marking points	1	
	Drawing Ogive	1	3
41.	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 figure

$\angle OQP = \angle ORP = 90°$ $\left[\begin{array}{l} OQ \perp PQ \\ OR \perp PR \end{array}\right]$

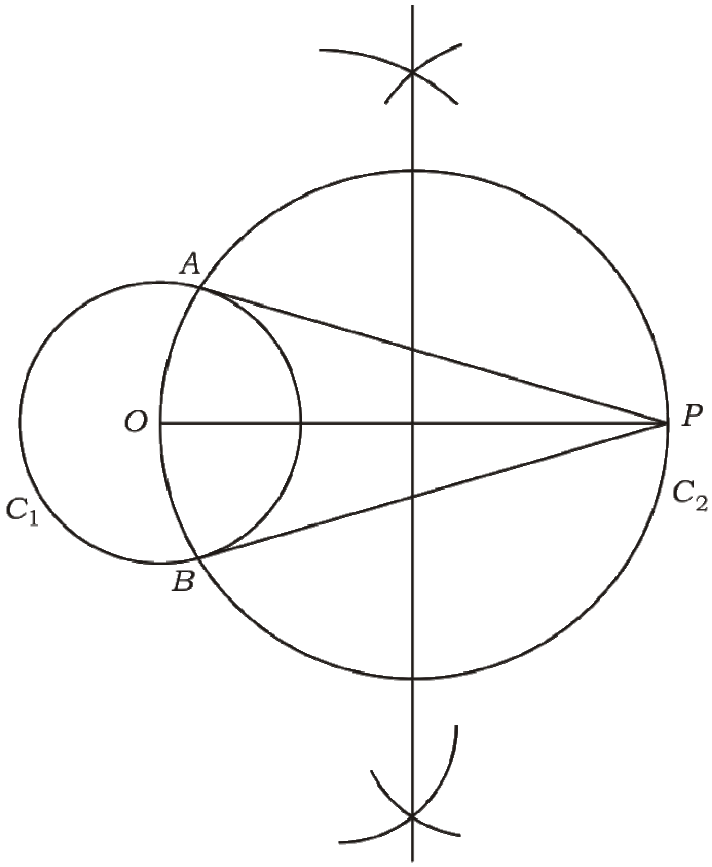
$OQ = OR$ [radii of same circle] ½

$OP = OP$ [common side]

$\Delta\ OQP \cong \Delta ORP$ [RHS] ½

$PQ = PR$ [CPCT]

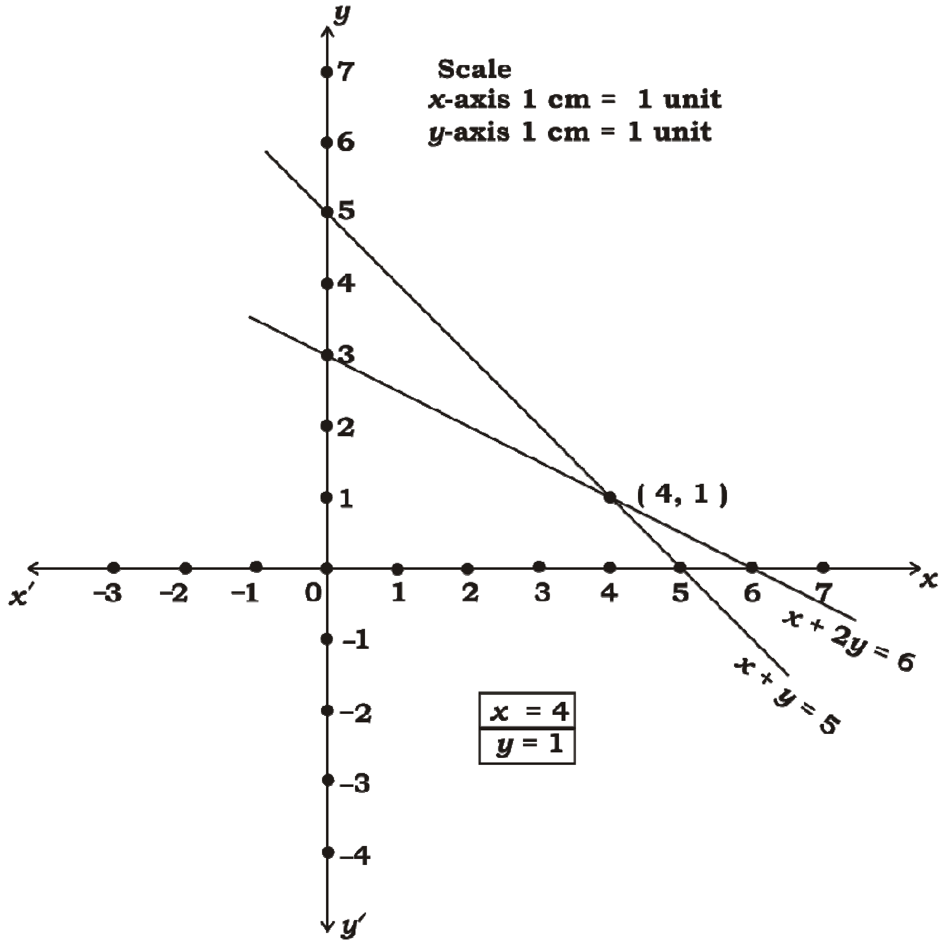
Note : If the theorem is proved as given in the text book, give full marks. 3

Qn. Nos.	Value Points		Marks allotted
42.	Construct two tangents to a circle of radius 3 cm from a point 8 cm away from its centre.		
	Ans. :		
			
	Drawing a circle C_1 of radius 3 cm	½	
	Drawing OP = 8 cm	½	
	Constructing perpendicular bisector of OP	1	
	Drawing C_2 circle	½	
	Joining PA and PB	½	3
43.	The volume of a solid right circular cylinder is 2156 cm^3. If the height of the cylinder is 14 cm, then find its curved surface area. [Take $\pi = \frac{22}{7}$]		

Qn. Nos.	Value Points		Marks allotted
	Ans. :		
	$V = 2156 \text{ cm}^3$		
	$h = 14$ cm		
	$r = ?$		
	CSA = ?		
	Volume of cylinder = $\pi r^2 h$	½	
	$2156 = \frac{22}{\cancel{7}_1} \times r^2 \times \cancel{14}^2$	½	
	$r^2 = \frac{2156}{44}$		
	$r^2 = 49$		
	$r = \sqrt{49}$		
	$r = 7$ cm	½	
	Curved surface area of cylinder $= 2\pi r h$	½	
	$= 2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times 14$	½	
	$= 2 \times 22 \times 14$		
	$= 616 \text{ cm}^2$	½	3
V.	Answer the following questions :	$4 \times 4 = 16$	
44.	Find the solution of the given pair of linear equations by graphical method :		
	$x + 2y = 6$		
	$x + y = 5$		

Qn. Nos.	Value Points	Marks allotted

Ans. :



$x + 2y = 6$

x	0	6
y	3	0

$x + y = 5$

x	0	5
y	5	0

For table construction (1 + 1) 2

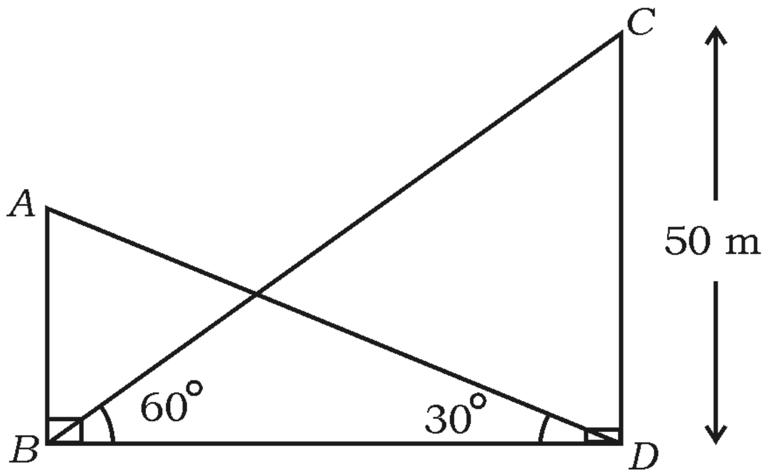
Drawing two lines by marking points 1

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

Note : Any other points are also may be considered to get straight lines. 4

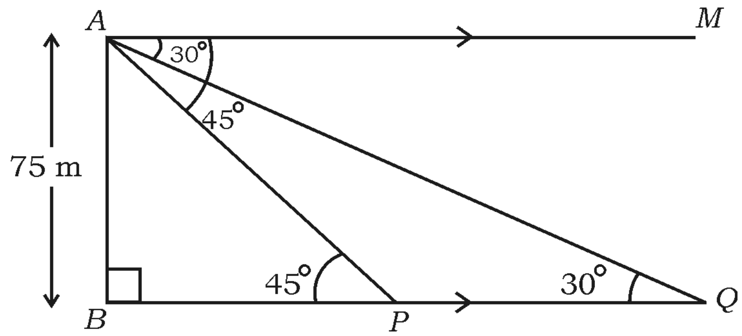
45. The angle of elevation of the top of a building from the foot of a tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. Both the tower and building are on the same level

Qn. Nos.	Value Points	Marks allotted
	ground. If the height of the tower is 50 m, then find the height of the building.	



OR

As observed from the top of a 75 m high light house from the sea-level, the angles of depression of two ships are 30° and 45°. If one ship is exactly behind the other on the same side of the light house, then find the distance between the two ships.



Ans. :

In ΔBDC, $\tan 60° = \dfrac{CD}{BD}$ ½

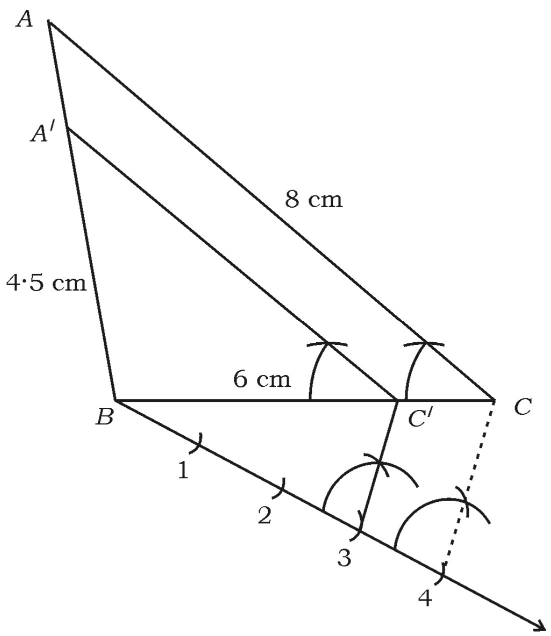
$\sqrt{3} = \dfrac{50}{BD}$ ½

$BD = \dfrac{50}{\sqrt{3}}$ .... (1) ½

In ΔABD, $\tan 30° = \dfrac{AB}{BD}$ ½

Qn. Nos.	Value Points		Marks allotted
	$\frac{1}{\sqrt{3}} = \frac{AB}{BD}$		
	$BD = \sqrt{3} . AB$ .... (2)	½	
	From (1) and (2)		
	$\sqrt{3} . AB = \frac{50}{\sqrt{3}}$	½	
	$AB = \frac{50}{\sqrt{3} . \sqrt{3}}$	½	
	$AB = \frac{50}{3}$ or $16\frac{2}{3}$ m	½	4
	OR		
	Distance between the two ships is PQ		
	In ΔABP, $\tan 45° = \frac{AB}{BP}$	½	
	$1 = \frac{75}{BP}$	½	
	$\therefore$ $BP = 75$	½	
	In ΔABQ, $\tan 30° = \frac{AB}{BQ}$	½	
	$\frac{1}{\sqrt{3}} = \frac{75}{BP + PQ}$	½	
	$\frac{1}{\sqrt{3}} = \frac{75}{75 + PQ}$	½	
	$75 + PQ = 75\sqrt{3}$		
	$PQ = 75\sqrt{3} - 75$	½	
	$PQ = 75(\sqrt{3} - 1)$ m	½	4
46.	Construct a triangle with sides 4·5 cm, 6 cm and 8 cm. Then construct another triangle whose sides are $\frac{3}{4}$ of the corresponding sides of the first triangle.		

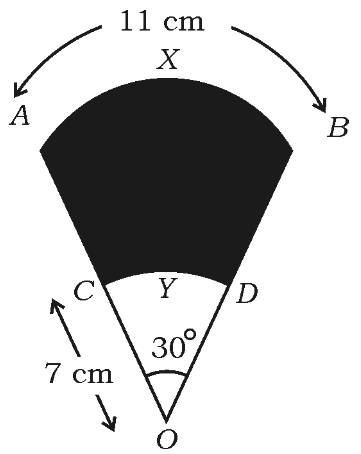
Qn. Nos.	Value Points	Marks allotted
	Ans. :	



	Construction of given triangle	1	
	Construction of acute angle with division	1	
	Drawing parallel lines	1	
	Obtaining required triangle	1	4

47. In the figure *AXB* and *CYD* are the arcs of two concentric circles with centre *O*. The length of the arc *AXB* is 11 cm. If $OC = 7$ cm and $\angle AOB = 30°$, then find the area of the shaded region.

[Take $\pi = \frac{22}{7}$]



Qn. Nos.	Value Points	Marks allotted

Ans. :

Length of the arc = $\frac{\theta}{360°} \times 2\pi r$ ½

$$11 = \frac{\cancel{30°}}{\cancel{360}_{\cancel{12}\,\cancel{6}\,3}°} \times \cancel{2} \times \frac{\cancel{22}^{11}}{7} \times r$$ ½

$$11 = \frac{11r}{21}$$

$$r = \frac{11 \times 21}{11}$$

r = 21 cm ½

Area of the sector $OAXB$ = $A_1 = \frac{\theta}{360°} \times \pi r^2$ ½

$$= \frac{30°}{360°} \times \frac{22}{7} \times 21^2$$

$$= \frac{1}{\cancel{12}_{\cancel{6}\,2}} \times \frac{\cancel{22}^{11}}{\cancel{7}_1} \times \cancel{21}\,\cancel{3}^1 \times 21$$

$$= \frac{231}{2}\ \text{cm}^2$$ ½

Area of the sector $OCYD$ = $A_2 = \frac{\theta}{360°} \times \pi r^2$

$$= \frac{30°}{360°} \times \frac{22}{7} \times 7^2$$

$$= \frac{1}{\cancel{12}_6} \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \cancel{7} \times 7$$

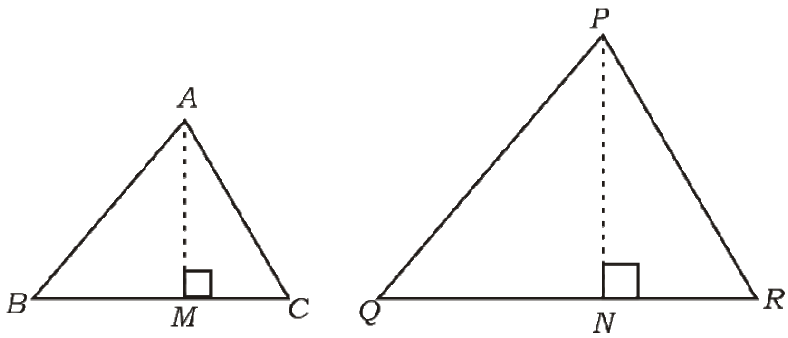
$$A_2 = \frac{77}{6}\ \text{cm}^2$$ ½

Area of the shaded region = $A_1 - A_2$

$$= \frac{231}{2} - \frac{77}{6}$$

$$= \frac{693 - 77}{6}$$ ½

$$= \frac{616}{6}$$

Qn. Nos.	Value Points	Marks allotted
	$= \frac{308}{3}$ cm^2 or $= 102{\cdot}66$ cm^2 OR $102{\cdot}7$ cm^2 ½	4
VI.	Answer the following question : 1 × 5 = 5	
48.	Prove that "the ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides".	
	Ans. :	
	 ½	
	Data : $\Delta ABC \sim \Delta PQR$	
	$\therefore \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ½	
	To prove : $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \frac{BC^2}{QR^2}$ ½	
	Construction : Draw $AM \perp BC$ and $PN \perp QR$ ½	
	Proof : $\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \frac{\cancel{\frac{1}{2}} \times BC \times AM}{\cancel{\frac{1}{2}} \times QR \times PN}$ ½	
	$\frac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \frac{BC}{QR} \times \frac{AM}{PN}$ .... (1) ½	
	In ΔABM and ΔPQN	
	$\angle B = \angle Q$	

Qn. Nos.	Value Points		Marks allotted
	$\angle M = \angle N = 90°$ [By construction]		
	$\Delta ABM \sim \Delta PQN$ [AA similarity criterion]	½	
	$\dfrac{AM}{PN} = \dfrac{AB}{PQ}$ .... (2)	½	
	But $\dfrac{BC}{QR} = \dfrac{AB}{PQ}$ .... (3) (data)		
	From (2) and (3) $\dfrac{AM}{PN} = \dfrac{BC}{QR}$ .... (4)	½	
	Substitute (4) in (1) $\dfrac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \dfrac{BC}{QR} \times \dfrac{BC}{QR}$		
	$\dfrac{\text{Area of } \Delta ABC}{\text{Area of } \Delta PQR} = \dfrac{BC^2}{QR^2}$	½	5
	✳ Proving the theorem as it is in the textbook full marks may be given.		