CCE RF/PF

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

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

ಮಾರ್ಚ್/ಏಪ್ರಿಲ್ 2025 ರ ಪರೀಕ್ಷೆ - 1

MARCH/APRIL 2025 EXAMINATION - 1

ಮಾದರಿ ಉತ್ತರಗಳು

MODEL ANSWERS

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

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / ಖಾಸಗಿ ಅಭ್ಯರ್ಥಿ)

(Regular Fresh / Private Fresh)

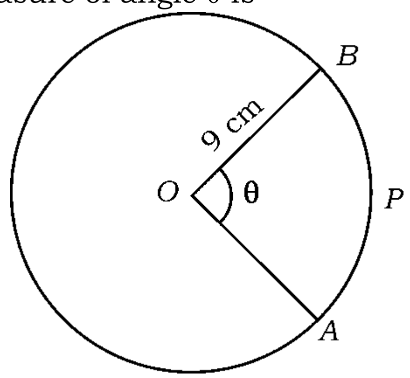
(ಆಂಗ್ಲ ಮಾಧ್ಯಮ / English Medium)

ದಿನಾಂಕ : 24. 03. 2025] **[ಗರಿಷ್ಠ ಅಂಕಗಳು : 80**

Date : 24. 03. 2025] **[Max. Marks : 80**

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **$8 \times 1 = 8$**	
1.		LCM of 2 and 3 is	
		(A) 2 (B) 3	
		(C) 5 (D) 6	
		Ans. :	
	(D)	6	1

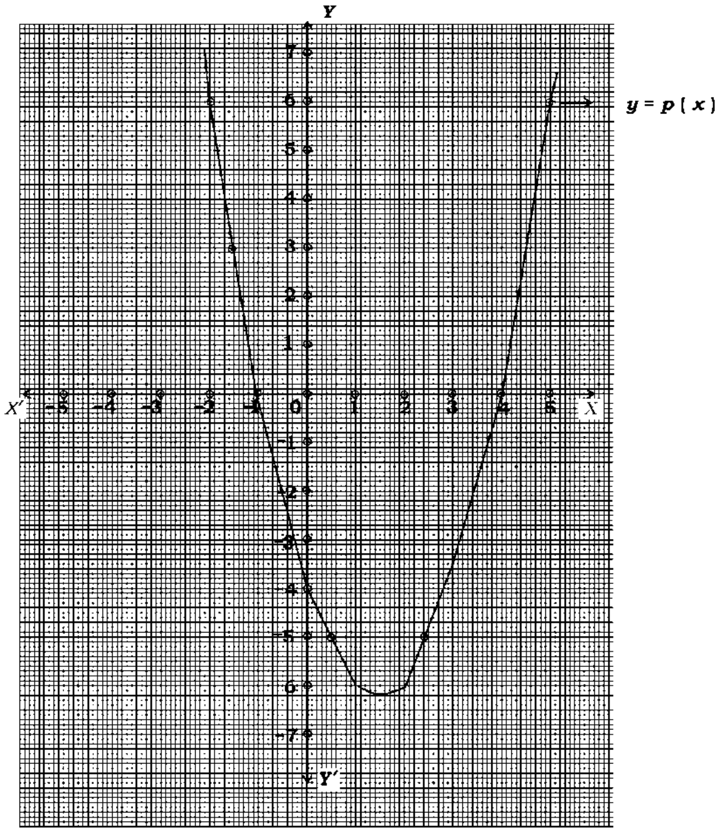
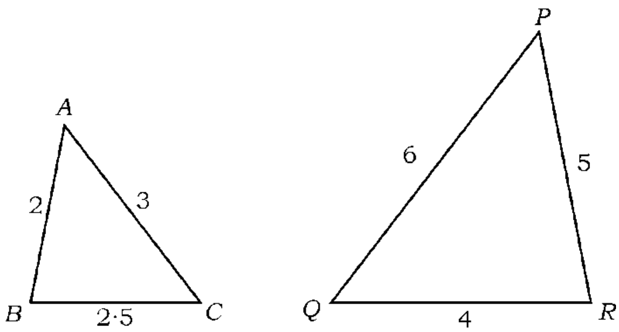
Qn. Nos.	Ans. Key	Value Points	Marks allotted
2.		If the lines represented by the equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ are coincident, then the correct relation is	
		(A) $\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ (B) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$	
		(C) $\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}=\frac{c_1}{c_2}$	
		Ans. :	
	(A)	$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$	1
3.		The quadratic equation in the following is	
		(A) x^3-6x (B) $p(x)=x^2+7x$	
		(C) $3x=9$ (D) $x^2+3x+4=0$	
		Ans. :	
	(D)	$x^2+3x+4=0$	1
4.		In the following, the shapes which are always similar are,	
		(A) any two equilateral triangles	
		(B) square and rectangle	
		(C) square and rhombus	
		(D) any two trapeziums	
		Ans. :	
	(A)	any two equilateral triangles	1
5.		The volume of a sphere of radius '*r*' units is	
		(A) $\frac{2}{3}\pi r^3$ cubic units (B) $\frac{4}{3}\pi r^3$ cubic units	
		(C) $\frac{1}{3}\pi r^3$ cubic units (D) $\frac{3}{2}\pi r^3$ cubic units	
		Ans. :	
	(B)	$\frac{4}{3}\pi r^3$ cubic units	1

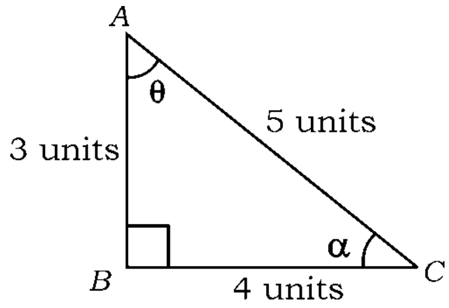
Qn. Nos.	Ans. Key	Value Points	Marks allotted
6.		The distance of a point $P(x, y)$ from the origin is (A) $\sqrt{x^2 - y^2}$ (B) $\sqrt{x + y}$ (C) $\sqrt{x^2 + y^2}$ (D) $\sqrt{x - y}$ *Ans.* :	
	(C)	$\sqrt{x^2 + y^2}$	1
7.		The common difference of the arithmetic progression $-1, -3, -5 \ldots$ is (A) -1 (B) 2 (C) -2 (D) 3 *Ans.* :	
	(C)	-2	1
8.		In the given figure *'O'* is the centre of the circle and the length of the arc *APB* is 4π cm. If $OB = 9$ cm, then the measure of angle θ is  (A) 60° (B) 80° (C) 85° (D) 70° *Ans.* :	
	(B)	80°	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.	Write the degree of a linear polynomial.	
	Ans. :	
	1 (one)	1
10.	Write the formula to find the total surface area of a cube of edge *'a'* units.	
	Ans. :	
	$6a^2$ sq.units	1
11.	In the given frequency distribution table, write the modal class :	

Class-interval	*Frequency*
1 – 3	4
3 – 5	8
5 – 7	2
7 – 9	2

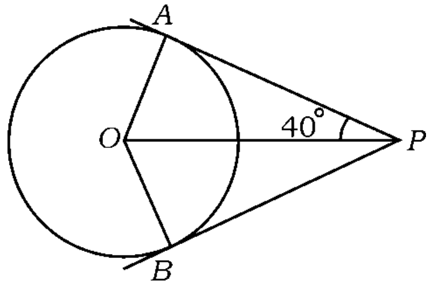
	Ans. :	
	3 – 5	1
12.	Write the probability of an impossible event.	
	Ans. :	
	0	1
13.	How many solutions do the pair of linear equations $2x + 3y - 9 = 0$ and $3x + 2y - 6 = 0$ has ?	
	Ans. :	
	One solution / unique solution	1

Qn. Nos.	Value Points	Marks allotted
14.	Write the zeroes of the polynomial $y = p(x)$ in the given graph.  *Ans.* : -1 and 4 ½ + ½	1
15.	Write the roots of the quadratic equation $x(x+2) = 0$. *Ans.* : 0 and -2 ½ + ½	1
16.	In the given figure, write the similarity criterion used to show that $\Delta ABC \sim \Delta QRP$.  	

Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	SSS or side – side - Side	1
	Note : Q. No. from 9 to 16 give full marks for direct answer.	
III.	**Answer the following questions : $8 \times 2 = 16$**	
17.	In the given figure, $\angle ABC = 90°$. Write the values of the following : i) $\sin\alpha$ ii) $\tan\theta$  *Ans.* : (i) $\sin\alpha = \frac{3}{5}$ 1 (ii) $\tan\theta = \frac{4}{3}$ 1	2
18.	Prove that $6 + \sqrt{2}$ is an irrational number. **OR** The HCF and LCM of two positive integers are respectively 4 and 60. If one of the integers is 20, then find the other integer. *Ans.* : Let us assume to the contrary that $6+\sqrt{2}$ is rational. $6+\sqrt{2} = \frac{a}{b}$ ' a ' and ' b ' are coprimes ($b \neq 0$) ½ $\left.\begin{array}{l}\sqrt{2} = \frac{a}{b} - 6 \\ \sqrt{2} = \frac{a-6b}{b}\end{array}\right\}$ ½	

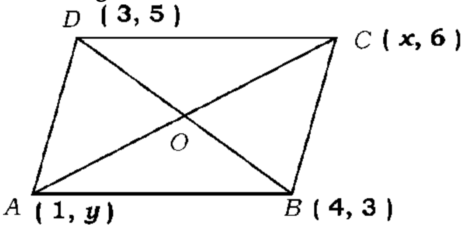
Qn. Nos.	Value Points	Marks allotted
	This shows that $\sqrt{2}$ is rational.	
	But this contradicts the fact that $\sqrt{2}$ is irrational. ½	
	This contradiction has arisen because of our wrong assumption.	
	$\therefore\ 6+\sqrt{2}$ is an irrational number. ½	2
	OR	
	Let '*a*' and ' *b* ' be two positive integers	
	HCF (a, b) = 4	
	LCM (a, b) = 60	
	$a = 20$	
	$b = ?$	
	$a \times b =$ HCF (a, b) $\times$ LCM (a, b) ½	
	$20 \times b = 4 \times 60$ ½	
	$b = \dfrac{4 \times \cancel{60}^{3}}{\cancel{20}_{1}}$ ½	
	$\boxed{b = 12}$ ½	2
19.	Solve the given pair of linear equations by elimination method :	
	$2x + y = 10$	
	$x - y = 2$	
	Ans. :	
	$2x + \cancel{y} = 10$ .... (1)	
	$x - \cancel{y} = 2$ ....(2)	
	Adding $3x = 12$ ½	
	$x = \dfrac{12}{3}$	
	$\boxed{x = 4}$ ½	
	Substitute $x = 4$ in equation (1)	
	$2 (4) + y = 10$ ½	
	$8 + y = 10$	
	$y = 10 - 8$	
	$\boxed{y = 2}$ ½	
	Note : Marks should be given if the value of 'x' is substituted in equation (2)	2
20.	Find the roots of the quadratic equation $x^2 + 8x + 12 = 0$.	
	OR	

Qn. Nos.	Value Points		Marks allotted
	Find the discriminant of the quadratic equation $x^2 + 4x + 5 = 0$ and hence write the nature of the roots.		
	Ans. :		
	$x^2 + 8x + 12 = 0$		
	$x^2 + 6x + 2x + 12 = 0$	½	
	$x(x+6) + 2(x+6) = 0$		
	$(x+6)(x+2) = 0$	½	
	$x + 6 = 0$ or $x + 2 = 0$	½	
	$\boxed{x = -6}$ or $\boxed{x = -2}$	½	2
	Note: If alternate method is followed to get correct answer, then give full marks.		
	OR		
	$x^2 + 4x + 5 = 0$		
	$ax^2 + bx + c = 0$		
	$a = 1$, $b = 4$, $c = 5$		
	Discriminant $= b^2 - 4ac$	½	
	$= (4)^2 - 4(1)(5)$	½	
	$= 16 - 20$		
	$= -4 < 0$	½	2
	Nature of roots : No real roots.	½	
21.	Find the sum of first 20 terms of the arithmetic progression 5, 9, 13, ... using formula.		
	Ans. :		
	$a = 5$		
	$d = 9 - 5 = 4$		
	$n = 20$		
	$S_n = \frac{n}{2}[2a + (n-1)d]$	½	
	$S_{20} = \frac{20}{2}[2(5) + (20-1)4]$	½	
	$= 10[10 + 76]$		
	$= 10(86)$	½	
	$S_{20} = 860$	½	
	Note : If alternate method is used to get the correct answer, then give full marks.		2

Qn. Nos.	Value Points	Marks allotted
22.	In the given figure, *PA* and *PB* are tangents to the circle with centre '*O*'. If $PA = 4$ cm and $\angle APO = 40°$, then find the measure of $\angle AOB$ and length of *PB*.	
		
	Ans. :	
	In ΔOAP, $\angle OAP = 90°$ $[\because OA \perp AP]$ ½	
	$\therefore \angle AOP = 180° - (90° + 40°)$	
	$= 180° - 130°$	
	$\angle AOP = 50°$ ½	
	$\angle AOP = \angle BOP$ $[\because \Delta AOP \cong \Delta BOP]$	
	$\therefore \angle BOP = 50°$	
	$\therefore \angle AOB = 50° + 50° = 100°$ ½	
	$PA = PB$ (By theorem) $\therefore PB = 4$ cm ½	
	Note : If alternate method is used to get correct answer, then give full mars.	2
23.	According to Fundamental Theorem of Arithmetic, if $40 = x^y . z$, then find the values of *x*, *y* and *z*.	
	Ans. :	
	$\begin{array}{r\|l} 2 & 40 \\ 2 & 20 \\ 2 & 10 \\ & 5 \end{array}$	
	$40 = 2^3 \times 5^1$ ½	
	Given $40 = x^y \times z$	
	$\therefore$ $\boxed{x = 2}$ $\boxed{y = 3}$ $\boxed{z = 5}$ ½ + ½ + ½	2

Qn. Nos.	Value Points	Marks allotted

24. If $A(1, y)$, $B(4, 3)$, $C(x, 6)$ and $D(3, 5)$ are the vertices of a parallelogram taken in an order, then find the values of x and y.



Ans. :

Mid-point of AC = Mid-point of BD (Diagonals of a parallelogram bisect each other)

$$\left(\frac{x+1}{2}, \frac{6+y}{2}\right) = \left(\frac{4+3}{2}, \frac{3+5}{2}\right)$$ ½

$$\left(\frac{x+1}{2}, \frac{6+y}{2}\right) = \left(\frac{7}{2}, 4\right)$$ ½

$\frac{x+1}{2} = \frac{7}{2}$ $\qquad$ $\frac{6+y}{2} = 4$

$x + 1 = 7$ $\qquad$ $6 + y = 8$

$x = 7 - 1$ $\qquad$ $y = 8 - 6$

$\boxed{x = 6}$ $\qquad$ $\boxed{y = 2}$

Finding x ½

Finding y ½

Note : If alternate method is used to get correct answer, then give full marks. **2**

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

25. Find the zeroes of the quadratic polynomial $p(x) = x^2 + 7x + 10$ and verify the relationship between the zeroes and the coefficients.

Ans. :

$$p(x) = x^2 + 7x + 10$$

$$= x^2 + 5x + 2x + 10$$

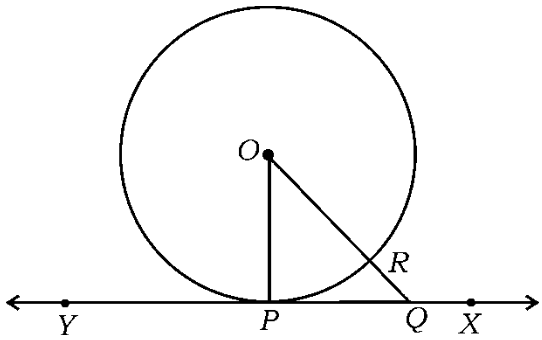
$$= x(x+5) + 2(x+5)$$

$p(x) = (x+5)(x+2)$ ½

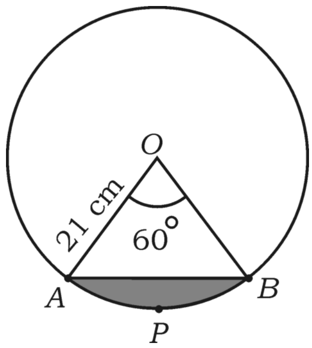
$(x + 5)(x + 2) = 0$

$x + 5 = 0$ or $x + 2 = 0$

$x = -5$ or $x = -2$ ½

Qn. Nos.	Value Points	Marks allotted
	– 5 and – 2 are the zeroes of given polynomial.	
	Sum of zeroes = – 2 + (– 5) = – 7 = $\frac{-(7)}{1}$	
	$= \frac{-\text{coefficient of } x}{\text{coefficient of } x^2} \left(\frac{-b}{a}\right)$ 1	
	Product of zeroes = (– 2) × (– 5) = 10 = $\frac{10}{1}$	
	$= \frac{\text{constant term}}{\text{coefficient of } x^2} \left(\frac{c}{a}\right)$ 1	3
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	
	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 the points on XY. ½	
	$\therefore$ $OP \perp XY$	
	Note : If the theorem is proved as given in textbook give full marks.	3
27.	Prove that :	
	$\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2 \sec A.$	
	OR	

Qn. Nos.	Value Points	Marks allotted
	Find the value of : $\left(\dfrac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}\right)$	
	Ans. :	
	LHS $= \dfrac{\cos A}{1+\sin A} + \dfrac{1+\sin A}{\cos A}$	
	$= \dfrac{\cos^2 A+(1+\sin A)^2}{\cos A(1+\sin A)}$ ½	
	$= \dfrac{\cos^2 A+1+\sin^2 A+2\sin A}{\cos A(1+\sin A)}$ ½	
	$= \dfrac{1+1+2\sin A}{\cos A(1+\sin A)}$ $[\because \sin^2 A+\cos^2 A=1]$ ½	
	$= \dfrac{2+2\sin A}{\cos A(1+\sin A)}$ ½	
	$= \dfrac{2(1+\cancel{\sin A})}{\cos A(1+\cancel{\sin A})}$ ½	
	$= \dfrac{2}{\cos A}$	
	= 2 sec A $[\because \dfrac{1}{\cos A}=\sec A]$ ½	
	LHS = RHS	3
	OR	
	$\cos 60^\circ=\dfrac{1}{2}$, $\sec 30^\circ=\dfrac{2}{\sqrt{3}}$, $\tan 45^\circ = 1$ ½ + ½ + ½	
	$\sin 30^\circ=\dfrac{1}{2}$, $\cos 30^\circ=\dfrac{\sqrt{3}}{2}$	
	$= \dfrac{5\left(\dfrac{1}{2}\right)^2+4\left(\dfrac{2}{\sqrt{3}}\right)^2-(1)^2}{\left(\dfrac{1}{2}\right)^2+\left(\dfrac{\sqrt{3}}{2}\right)^2}$ ½	
	$= \dfrac{5\left(\dfrac{1}{4}\right)+4\left(\dfrac{4}{3}\right)-1}{\dfrac{1}{4}+\dfrac{3}{4}}$ ½	

Qn. Nos.	Value Points	Marks allotted
	$= \dfrac{\frac{5}{4}+\frac{16}{3}-1}{1}$ $= \dfrac{15+64-12}{12}$ $= \dfrac{67}{12}$ ½ Note : If directly taken as $\sin^2 30° + \cos^2 30° = 1$, then also give full marks.	3
28.	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 $\sqrt{3}$ = 1·73]  *Ans.* : Area of the sector $OAPB = \dfrac{\theta}{360°} \times \pi r^2$ ½ $= \dfrac{\cancel{60°}}{\cancel{360°}\,\cancel{6}\,2} \times \dfrac{\cancel{22}^{11}}{\cancel{7}} \times \cancel{21}^{3} \times 21$ $= 11 \times 21$ $= 231\ \text{cm}^2$ ½ ΔOAB is an equilateral triangle Area of equilateral $\Delta OAB = \dfrac{\sqrt{3}}{4} a^2$ ½ $= \dfrac{1 \cdot 73}{4} \times 21 \times 21$ $= \dfrac{762 \cdot 93}{4}$ $= 190{\cdot}73\ \text{cm}^2$ ½	

Qn. Nos.	Value Points	Marks allotted

$$\left.\begin{array}{c}\text{Area of the segment}\\ APB\end{array}\right\} = \left\{\begin{array}{c}\text{Area of sector}\\ OAPB\end{array}\right\} - \left\{\begin{array}{c}\text{area of}\\ \Delta OAB\end{array}\right\} \quad \tfrac{1}{2}$$

$= 231 - 190{\cdot}73$

$= 40{\cdot}27\ \text{cm}^2$ ½

Note : If the final answer is upto 4 decimal places (40.2675 cm^2) then also give full marks. **3**

29. Find the coordinates of a point which divides the line segment joining the points (– 1, 7) and (4, – 3) internally in the ratio 2 : 3.

OR

Find a relation between x and y such that the point (x, y) is equidistant from the points (3, 6) and (– 3, 4)

Ans. :

$(-1, 7)$ $\quad$ $(4, -3)$ $\quad$ $2:3$

x_1, y_1 $\quad$ x_2, y_2 $\quad$ $m_1 = 2,\ m_2 = 3$

$$P(x, y) = \left(\frac{m_1x_2 + m_2x_1}{m_1 + m_2}, \frac{m_1y_2 + m_2y_1}{m_1 + m_2}\right) \quad 1$$

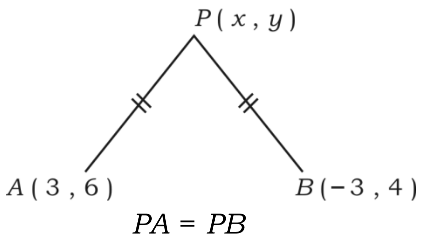
$$= \left(\frac{2(4) + 3(-1)}{2+3}, \frac{2(-3) + 3(7)}{2+3}\right) \quad \tfrac{1}{2}$$

$$= \left(\frac{8-3}{5}, \frac{-6+21}{5}\right) \quad \tfrac{1}{2}$$

$$= \left(\frac{5}{5}, \frac{15}{5}\right) \quad \tfrac{1}{2}$$

$P(x, y) = (1, 3)$ ½ **3**

OR



$PA = PB$

$$\sqrt{(x-3)^2 + (y-6)^2} = \sqrt{(x+3)^2 + (y-4)^2} \quad \tfrac{1}{2}$$

Squaring on both sides

$$(x-3)^2 + (y-6)^2 = (x+3)^2 + (y-4)^2 \quad \tfrac{1}{2}$$

$$\cancel{x^2} + \cancel{9} - 6x + \cancel{y^2} + 36 - 12y = \cancel{x^2} + \cancel{9} + 6x + \cancel{y^2} + 16 - 8y \quad 1$$

$$-6x - 6x - 12y + 8y + 36 - 16 = 0 \quad \tfrac{1}{2}$$

Qn. Nos.	Value Points		Marks allotted
	$-12x - 4y + 20 = 0$ $\div\ -4$ $3x + y - 5 = 0$	½	
30.	Find the mean for the following data :		

Class-interval	*Frequency*
10 – 20	2
20 – 30	3
30 – 40	6
40 – 50	5
50 – 60	4

OR

Find the median for the following data :

Class-interval	*Frequency*
15 – 20	4
20 – 25	5
25 – 30	10
30 – 35	5
35 – 40	6

Ans. :

Class interval	frequency (f_i)	Mid-point x_i	$x_i f_i$
10 – 20	2	15	30
20 – 30	3	25	75
30 – 40	6	35	210
40 – 50	5	45	225
50 – 60	4	55	220
	$\sum f_i = 20$		$\sum f_i x_i = 760$

2

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

$= \dfrac{76\cancel{0}}{2\cancel{0}}$

Mean $(\overline{X}) = 38$ ½ 3

OR

Qn. Nos.	Value Points	Marks allotted

Class interval	frequency	Cumulative frequency
15 – 20	4	4
20 – 25	5	9
25 – 30	10	19
30 – 35	5	24
35 – 40	6	30
	$n = 30$	

1

$\frac{n}{2} = \frac{30}{2} = 15$, $l = 25$, $c_f = 9$, $f = 10$, $h = 5$ ½

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

$$= 25 + \left[\frac{15 - 9}{10}\right] \times 5$$

$$= 25 + \frac{6}{10} \times 5$$ ½

$= 25 + 3$ ½

Median = 28 — 3

31. A box contains 20 cards numbered from 1 to 20. One card is drawn randomly from the box. Find the probability of getting a card bearing —

i) a perfect square number

ii) a number which is divisible by both 2 and 3.

Ans. :

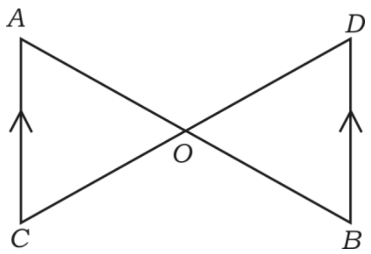
$n(s) = 20$ ½

(i) $A = \{1, 4, 9, 16\}$ $\therefore$ $n(A) = 4$ ½

$$P(A) = \frac{n(A)}{n(S)}$$ ½

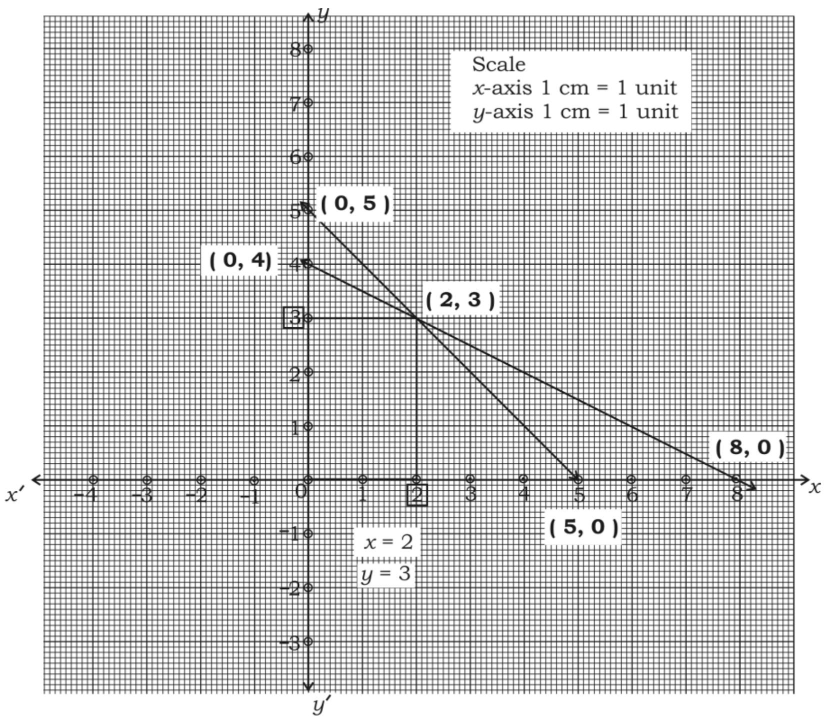
$\boxed{P(A) = \frac{4}{20}}$ or $P(A) = \frac{1}{5}$ ½

Qn. Nos.	Value Points		Marks allotted
	(ii) B = { 6, 12, 18 } $\therefore n(B) = 3$	½	
	$P(B) = \frac{n(B)}{n(S)}$		
	$\boxed{P(B) = \frac{3}{20}}$	½	3
32.	The difference between the altitude and base of a right angled triangle is 5 cm. If the area of the triangle is 150 cm^2, then find the base and altitude of the triangle.		
	OR		
	The sum of the squares of two consecutive even positive integers is 164. Find the integers.		
	Ans. :		
	Let altitude = x cm, then	½	
	base = ($x - 5$) cm		
	Area of triangle = 150 cm^2		
	$\frac{1}{2}. x. (x-5) = 150$	½	
	$x^2 - 5x = 300$		
	$x^2 - 5x - 300 = 0$	½	
	$x^2 - 20x + 15x - 300 = 0$		
	$x(x - 20) + 15(x - 20) = 0$		
	$(x - 20)\ (x + 15) = 0$	½	
	$x - 20 = 0$ or $x + 15 = 0$		
	$x = 20$ or $x = -15$	½	
	Since the length can't be negative, x = 20 cm		
	$\therefore$ Altitude = x = 20 cm		
	Base = $x - 5 = 20 - 5 = 15$ cm	½	
	Note : If x and $x + 5$ are considered to solve the problem to get the correct answer, then give full marks.		3
	OR		
	Let the two consecutive even positive integers be x and ($x + 2$)		
	By data $x^2 + (x+2)^2 = 164$	½	
	$x^2 + x^2 + 2^2 + 4x = 164$		
	$2x^2 + 4x + 4 - 164 = 0$	½	
	$2x^2 + 4x - 160 = 0$		

Qn. Nos.	Value Points	Marks allotted
	$\div 2$	
	$x^2+2x-80=0$ ½	
	$x^2+10x-8x-80=0$	
	$x(x+10)-8(x+10)=0$	
	$(x+10)(x-8)=0$	
	$x+10=0$ or $x-8=0$ ½	
	$x=-10$ or $x=8$	
	x is positive integer $\therefore$ $x=8$ ½	
	$x+2=8+2=10$	
	Two consecutive even positive integers are 8 and 10. ½	3
33.	Two line segments AB and CD intersect each other at a point *'O'*. Join AC and BD such that $AC \parallel BD$ and prove that $\Delta AOC \sim \Delta BOD$.	
	Ans. 	
	To draw AB & CD → ½ + ½	
	Joining AC & BD → ½	
	In ΔACO and ΔBDO	
	$\angle CAO = \angle DBO$ [Alternate angles $AC \parallel BD$] ½	
	$\angle ACO = \angle BDO$	
	$\angle AOC = \angle BOD$ [Vertically opposite angles] ½	
	$\therefore \Delta AOC \sim \Delta BOD$ [AAA similarity] ½	
	Note : If AA similarity criterion is used to prove $\Delta ACO \sim \Delta BDO$, then also give full marks.	3
V.	**Answer the following questions : $4 \times 4 = 16$**	
34.	Find the solution of the given pair of linear equations by graphical method : $x+2y=8$ $x+y=5$	

Qn. Nos.	Value Points	Marks allotted

Ans. :



$x + 2y = 8$ — For table construction — 1 + 1

x	0	8
y	4	0

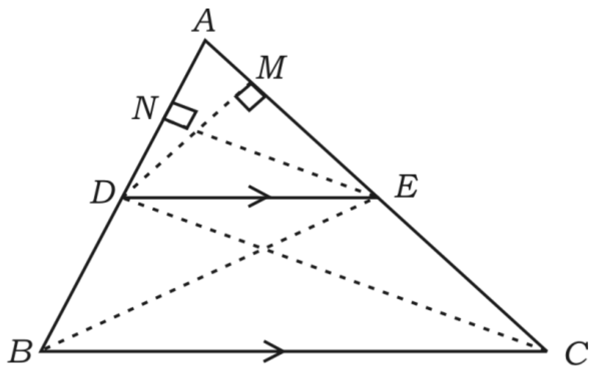
$x + y = 5$ — Drawing two lines by marking points — 1

x	0	5
y	5	0

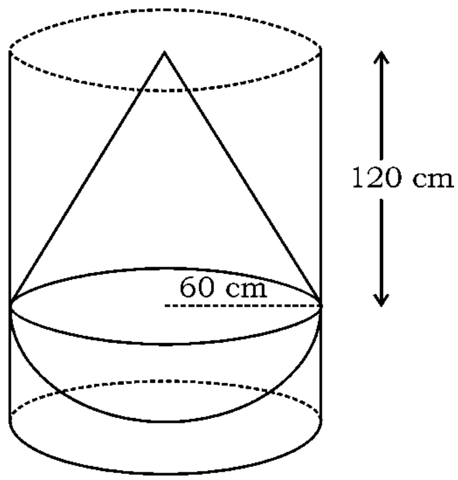
Writing the values of x and y — 1 — **4**

35. Prove that "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".

Ans. :

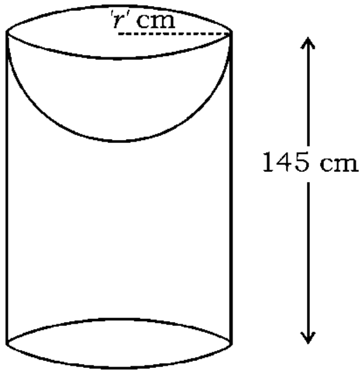


½

Qn. Nos.	Value Points	Marks allotted
	Data : In ΔABC, $DE \mid\mid BC$ ½	
	To prove : $\frac{AD}{DB} = \frac{AE}{EC}$ ½	
	Construction : Draw $DM \perp AC$ and $EN \perp AB$. Join BE and CD ½	
	Proof : $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2} \times AD \times EN}{\frac{1}{2} \times DB \times EN} = \frac{AD}{DB}$ .... (1) ½	
	$\frac{ar(\Delta ADE)}{ar(\Delta DEC)} = \frac{\frac{1}{2} \times AE \times DM}{\frac{1}{2} \times EC \times DM} = \frac{AE}{EC}$ .... (2) ½	
	ΔBDE and ΔDEC are on the same base DE and between the same parallels BC and DE. $\therefore\ ar(\Delta BDE) = ar(\Delta DEC)$ .... (3) ½	
	From (1), (2) and (3) $\frac{AD}{DB} = \frac{AE}{EC}$ ½	4
	Note : If the theorem is proved as in the textbook, then give full marks.	
36.	A solid consisting of a right circular cone of height 120 cm and radius 60 cm standing on a hemisphere of radius 60 cm is placed upright in a right circular cylinder full of water such that it touches the bottom as shown in the figure. If the radius of the cylinder is 60 cm and height is 180 cm, then find the volume of water left in the cylinder in terms of π. 	
	OR	

Qn. Nos.	Value Points	Marks allotted

A solid is made of a cylinder with a hemispherical depression having the same radius (*'r'* cm) as that of cylinder at the top end as shown in the figure. The volume of the hemispherical depression is $18000\,\pi\text{ cm}^3$. If the height of the cylinder is 145 cm, then find the total surface area of the solid.



Ans. :

Volume of cylinder $= \pi r^2 h$ ½

$= \pi(60)^2 \times 180$

$= \pi(3600) \times 180$

$= 6{,}48{,}000\,\pi\text{ cm}^3$ ½

Volume of the solid $= \left\{\begin{matrix}\text{Volume of} \\ \text{cone}\end{matrix}\right\} + \left\{\begin{matrix}\text{Volume of} \\ \text{Hemisphere}\end{matrix}\right\}$ ½

$= \frac{1}{3}\pi r^2 h + \frac{2}{3}\pi r^3$ ½

$= \frac{1}{3}\pi r^2 [\,h + 2r\,]$

$= \frac{1}{3}\pi \times 60^2\ [120 + 2(60)\,]$ ½

$= \frac{1}{\cancel{3}} \times \pi \times 60^2 \times \cancel{240}^{80}$

$= 2{,}88{,}000\,\pi\text{ cm}^3$ ½

$\left.\begin{matrix}\text{Volume of water} \\ \text{left in the cylinder}\end{matrix}\right\} = \left\{\begin{matrix}\text{Volume of} \\ \text{Cylinder}\end{matrix}\right\} - \left\{\begin{matrix}\text{Volume of} \\ \text{Solid}\end{matrix}\right\}$ ½

$= 648000\pi - 288000\,\pi$

$= 3{,}60{,}000\pi\text{ cm}^3$ ½ **4**

OR

Qn. Nos.	Value Points		Marks allotted
	Volume of Hemisphere = $\frac{2}{3}\pi r^3$	½	
	$18000\,\pi = \frac{2}{3}\times\pi\times r^3$		
	$r^3 = \frac{18000\times 3}{2}$	½	
	$r^3 = 27000$		
	$r = 30$ cm	½	
	TSA of solid $= \left\{\begin{array}{c}\text{CSA of}\\ \text{Hemisphere}\end{array}\right\} + \left\{\begin{array}{c}\text{CSA of}\\ \text{cylinder}\end{array}\right\} + \left\{\begin{array}{c}\text{Area of}\\ \text{circular}\\ \text{base}\end{array}\right\}$	½	
	$= 2\pi r^2 + 2\pi rh + \pi r^2$	½	
	$= \pi r[2r + 2h + r]$		
	$= \frac{22}{7}\times 30\ [\ 2\times 30 + 2\times 145 + 30\ ]$	½	
	$= \frac{22}{7}\times 30\times [\ 60 + 290 + 30\ ]$	½	
	$= \frac{22}{7}\times 30\times 380$		
	$= \frac{250800}{7}\ \text{cm}^2$	½	
	$\approx 35828\cdot 5\ \text{cm}^2$		4
37.	An arithmetic progression consists of 16 terms. The sum of all its terms is 768. If the last term of the progression is 93, then find the arithmetic progression. Also show that the sum of all the terms of this progression is equal to 3 times the sum of first 16 odd natural numbers using formula.		
	Ans. :		
	$n = 16$		
	$S_{16} = 768$		
	$a_n = l = 93$		
	$S_n = \frac{n}{2}[\ a + a_n\ ]$	½	
	$768 = \frac{\cancel{16}^{\,8}}{\cancel{2}}[\ a + 93\ ]$	½	
	$a + 93 = \frac{768}{8}$		

Qn. Nos.	Value Points	Marks allotted

$a + 93 = 96$

$a = 96 - 93$

$\boxed{a = 3}$ ½

$a_n = a + (n-1)\,d$

$93 = 3 + (16 - 1)\,d$ ½

$93 = 3 + 15d$

$15d = 90$

$d = \frac{90}{15}$

$\boxed{d = 6}$ ½

AP is 3, 9, 15, 21, 27 .... ½

$S_{16} = 3 + 9 + 15 + 21 + \ldots$ up to 16 terms

$= 3\,[\,1 + 3 + 5 + 7 + \ldots$ up to 16 terms $]$ ½

$= 3 \times 16^2$ $[\; S_n = n^2 \;]$ ½ **4**

↓

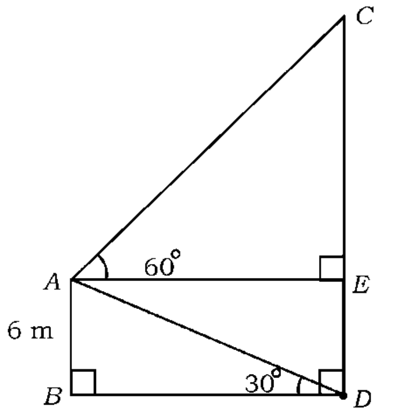
$= 3 \times 256$ sum of first n odd

$\therefore$ $768 = 768$ natural nos.

Note : If $S_n = \frac{n}{2}[\,2a + (n-1)\,d\,]$ formula is used to get the correct answer, then give full marks.

VI. Answer the following question : $1 \times 5 = 5$

38. A pole and a tower are standing vertically on a level ground. The height of the pole is 6 m and the angle of elevation to the top of the pole from the bottom of the tower is 30°. The angle of elevation to the top of the tower from the top of the pole is 60° as shown in the figure. Find the height of the tower (CD). Also find the distance (AC) between the top of the pole and the top of the tower.



Qn. Nos.	Value Points	Marks allotted
	Ans. :	
	In ΔABD, $\tan 30° = \frac{AB}{BD}$ ½	
	$\frac{1}{\sqrt{3}} = \frac{6}{BD}$	
	$BD = 6\sqrt{3}$ m ½	
	$BD = AE = 6\sqrt{3}$ m	
	In ΔAEC, $\tan 60° = \frac{CE}{AE}$ ½	
	$\sqrt{3} = \frac{CE}{6\sqrt{3}}$ ½	
	$6\sqrt{3}.\sqrt{3} = CE$	
	$\therefore$ $CE = 6\ (\ 3\ ) = 18$ m ½	
	In ΔAEC, $\sin 60° = \frac{CE}{AC}$ ½	
	$\frac{\sqrt{3}}{2} = \frac{18}{AC}$	
	$AC = \frac{18 \times 2}{\sqrt{3}}$ ½	
	$= \frac{36}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ ½	
	$= \frac{36\sqrt{3}}{3}$ ½	
	$AC = 12\sqrt{3}$ m	
	$CD = CE + DE = 18 + 6 = 24$ m ½	5
	Note : If alternate method is used to get correct answer, then give full marks.	