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

ಮೇ 2026 ರ ಪರೀಕ್ಷೆ - 2

MAY 2026 EXAMINATION - 2

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)

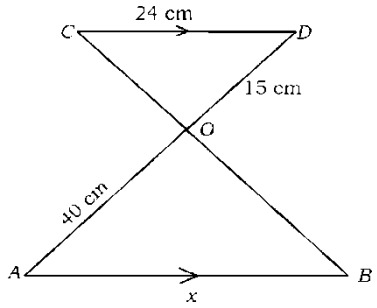
(ಆಂಗ್ಲ ಮಾಧ್ಯಮ / English Medium)

ದಿನಾಂಕ : 21. 05. 2026] **[ಗರಿಷ್ಠ ಅಂಕಗಳು : 80**

Date : 21. 05. 2026] **[Max. Marks : 80**

Qn. Nos.	Ans. Key	Value Points	Marks allotted
I.		**Multiple choice questions :** **8 × 1 = 8**	
1.		If the lines represented by the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are coincident, then the correct relation among the following is (A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (B) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (C) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (D) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	

Qn. Nos.	Ans. Key	Value Points	Marks allotted
2.	(A)	*Ans.* : $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ The coordinates of the point *'P'* which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio 1 : 1 is, (A) $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ (B) $(x_1 + x_2, y_1 + y_2)$ (C) $(x_1 - x_2, y_1 - y_2)$ (D) $\left(\frac{x_1 - x_2}{2}, \frac{y_1 - y_2}{2}\right)$	1
3.	(A)	*Ans.* : $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ If $\sin\theta = \frac{5}{13}$, then the value of cosec θ is, (A) $\frac{13}{12}$ (B) $\frac{5}{12}$ (C) $\frac{13}{5}$ (D) $\frac{12}{13}$	1
4.	(C)	*Ans.* : $\frac{13}{5}$ The surface area of a sphere of radius 7 cm is (A) $77\ cm^2$ (B) $154\ cm^2$ (C) $308\ cm^2$ (D) $616\ cm^2$	1
5.	(D)	*Ans.* : $616\ cm^2$ If the n^{th} term of an arithmetic progression $a_n = 3n - 2$, then its 9^{th} term is	1

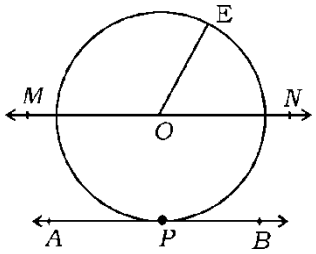
Qn. Nos.	Ans. Key	Value Points	Marks allotted
		(A) – 5 (B) 25 (C) 5 (D) – 25 *Ans.* :	
	(B)	25	1
6.		Which of the following can be the probability of an event ? (A) $\frac{3}{2}$ (B) – 1·5 (C) 105% (D) 0·7 *Ans.* :	
	(D)	0·7	1
7.		In the figure, the value of '*x*' is  (A) 60 cm (B) 25 cm (C) 64 cm (D) 53 cm *Ans.* :	
	(C)	64 cm	1
8.		If the sum of the zeroes of the polynomial $P(x) = kx^2 + 2x + 3k$ is equal to the product of its zeroes, then the value of '*k*' is (A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) $\frac{-2}{3}$ (D) $\frac{-3}{4}$ *Ans.* :	
	(C)	$\frac{-2}{3}$	1

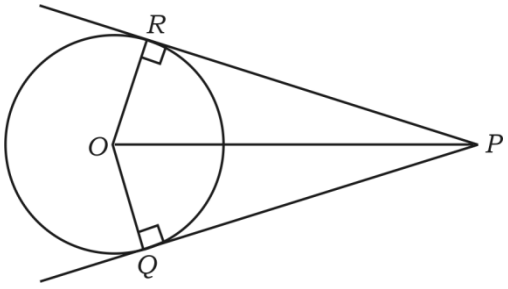
Qn. Nos.	Value Points	Marks allotted
II.	**Answer the following questions : $8 \times 1 = 8$** **(Direct answers from Q. Nos. 9 to 16 full marks should be given)**	
9.	Write the degree of a cubic polynomial. *Ans.* : 3	1
10.	How many solutions does the pair of linear equations in two variables have if they are inconsistent ? *Ans.* : No solution	1
11.	State Basic Proportionality theorem (Thales theorem). *Ans.* : If a line is drawn parallel to one side of a triangle to intersect the ther two sides in distinct points, the other two sides are divided in the same ratio.	1
12.	The circumference of the base of a cylinder is 10 cm and its height is 25 cm. Find its curved surface area. *Ans.* : CSA of cylinder = $2\pi rh$ ½ = 10×25 = $250\ cm^2$ ½	1
13.	Find the product of HCF and LCM of the numbers 15 and 20. *Ans.* : $\therefore$ HCF $\times$ LCM = $15 \times 20 = 300$	1

Qn. Nos.	Value Points	Marks allotted
14.	If one of the roots of the quadratic equation $(x + 4)(x + 3) = 0$ is -4, then find the other root. *Ans.* : $(x + 4)(x + 3) = 0$ ½ $\therefore$ Another root $x = -3$ ½	1
15.	If 6, *x*, 14 are in arithmetic progression, then find the value of '*x*'. *Ans.* : $x = \frac{6+14}{2}$ ½ $x = \frac{20}{2}$ $x = 10$ ½	1
16.	If the mode and mean of a data is 7 and 8 respectively, then find the median. *Ans.* : $3 \times \text{median} = \text{mode} + 2 \times \text{mean}$ $= 7 + (2 \times 8)$ ½ $= 7 + 16$ $3 \text{ median} = 23$ $\therefore$ Median $= \frac{23}{3} = 7 \cdot 66$ ½	1
III.	**Answer the following questions :** **$8 \times 2 = 16$**	
17.	Prove that $6 + \sqrt{2}$ is an irrational number. *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 $\sqrt{2} = \frac{a}{b} - 6$ $\sqrt{2} = \frac{a-6b}{b}$ ½	

Qn. Nos.	Value Points	Marks allotted
	$\sqrt{2}$ is rational number $\frac{a-6b}{b}$ is rational but $\sqrt{2}$ is not a rational number. Our assumption that $6+\sqrt{2}$ is a rational number is wrong. ½ $\therefore 6+\sqrt{2}$ is an irrational number. ½	
18.	Solve the given pair of linear equations by elimination method : $3x - y = 15$ $2x - y = 5$ *Ans.* : $3x - y = 15$ ..... (1) $2x - y = 5$ ..... (2) ½ (–) (+) (–) $x = 10$ $x = 10$ $\therefore \boxed{x = 10}$ ½ Substitute the value of x in equation 1 $3x - y = 15$ $3(10) - y = 15$ ½ $30 - 15 = y$ $15 = y$ $\therefore \boxed{y = 15}$ ½	2
19.	Find the roots of the quadratic equation $2x^2 + x - 6 = 0$ by factorisation method. **OR** Find the discriminant of the quadratic equation $4x^2 - 4x + 1 = 0$ and write the nature of roots. *Ans.* : $2x^2 + x - 6 = 0$ $2x^2 + 4x - 3x - 6 = 0$ ½ $2x(x+2) - 3(x+2) = 0$ ½ $(x+2)(2x-3) = 0$ ½ $x + 2 = 0$ or $2x - 3 = 0$ $x = -2$ or $x = \frac{3}{2}$ ½ **OR**	2

Qn. Nos.	Value Points	Marks allotted
	$4x^2-4x+1=0$	
	$ax^2+bx+c=0$	
	$a = 4 \quad b = -4 \quad c = 1$ ½	
	Discriminant = b^2-4ac ½	
	$= (-4)^2-4(4)(1)$	
	$= 16 - 16$ ½	
	Discriminant = 0 , Roots are real and equal. ½	2
20.	Find the sum of the first 20 terms of the arithmetic progression 3, 7, 11, ... using formula.	
	OR	
	Find how many two digit numbers are divisible by 3 using formula.	
	Ans. :	
	3, 7, 11, ...	
	$a = 3 \quad d = a_2 - a_1 \quad S_{20} = ?$ ½	
	$d = 7-3 \rightarrow d = 4$	
	$S_n = \frac{n}{2}[\,2a+(n-1)\,d\,]$ ½	
	$S_{20} = \frac{20}{2}[\,2\times3+(20-1)\,4\,]$	2
	$S_{20} = 10\,[\,6+76\,]$ ½	
	$\boxed{S_{20} = 820}$ ½	
	OR	
	Arithmetic Progression is 12, 15, 18, ... 99 ½	
	$a_n = a + (n-1)\,d$ ½	
	$99 = 12 + (n-1)\,3$	
	$\frac{99-12}{3} = n-1$ ½	
	$\frac{87}{3} = n-1$	
	$29 = n-1$	
	$\boxed{n = 30}$ ½	2

Qn. Nos.	Value Points		Marks allotted
21.	What is secant of a circle ? Name the tangent of the circle in the given figure. 		
	Ans. :		
	A line intersecting a circle in two points is a secant.	1	
	The tangent is *AB*.	1	2
22.	Find the distance between the points P (2, 4) and Q (8, 12) using 'distance formula'.		
	Ans. :		
	$P(2, 4)=(x_1, y_1)$ $\quad Q(8, 12)=(x_2, y_2)$		
	$PQ=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$	½	
	$PQ=\sqrt{(8-2)^2+(12-4)^2}$	½	
	$PQ=\sqrt{6^2+8^2}$		
	$PQ=\sqrt{100}$ = 10	½	
	$\therefore$ Distance PQ = 10 units.	½	2
23.	Prove that $\sin 30° \times \cos 60° + \cos 30° \times \sin 60° = \sin 90°$.		
	Ans. :		
	$\sin 30° \times \cos 60° + \cos 30° \times \sin 60°$ =		
	$= \frac{1}{2} \times \frac{1}{2} + \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2}$	1	
	$= \frac{1}{4} + \frac{3}{4}$		
	$= \frac{4}{4}$	½	
	$= 1$		
	$= \sin 90°$	½	
	$\therefore \sin 30° \times \cos 60° + \cos 30° \times \sin 60° = \sin 90°$		2

Qn. Nos.	Value Points	Marks allotted
24.	The LCM and HCF of the numbers $2^m \times 3^2$, $3^n \times 2^2$ and $3^3 \times 2$ are $3^4 \times 2^3$ and $3^y \times 2^x$ respectively. Find the values of *m, n, x* and *y*. *Ans.* : $A \to 2^m \times 3^2$, $B \to 3^n \times 2^2$, $C \to 3^3 \times 2$ L.C.M. $\to 3^4 \times 2^3$ H.C.F. $\to 3^y \times 2^x$ Comparing LCM with 3 numbers, the highest power of 3 is 4 $\therefore$ $n = 4$ ½ and the highest power of 2 is 3 $\therefore$ $m = 3$ ½ Comparing HCF with 3 numbers, the least power of 3 is 2 $\therefore$ $y = 2$ ½ and the least power of 2 is 1 $\therefore$ $x = 1$. ½	2
IV.	**Answer the following questions :** **9 × 3 = 27**	
25.	Prove that, "The lengths of tangents drawn from an external point to a circle are equal". *Ans.* :  ½ Given : *PQ* and *PR* are the two tangents drawn from the external point *P* to a circle of centre of '*O*'. ½ To prove : *PQ* = *PR* ½ Construction : Join *OP*, *OQ*, *OR* ½ Proof : In ΔOQP and ΔORP *OQ* = *OR* (Radii of same circle) *OP* = *OP* ($\because$ Common side) ½ $\angle OQP = \angle ORP = 90°$ $\therefore$ $\Delta OQP \cong \Delta ORP$ $\therefore$ *PQ* = *PR* ½ **Note** : If the theorem is proved as given in textbook give full marks	3

Qn. Nos.	Value Points	Marks allotted
26.	Find the coordinates of the point which divides the line segment joining the points A (4, – 3) and B (8, 5) internally in the ratio 3 : 1. *Ans.* : $(4,-3)=(x_1, y_1)$, $(8,5)=(x_2,y_2)$ $m_1 : m_2 = 3:1$ $\quad P(x,y)=?$ ½ $P(x,y)=\left[\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right]$ ½ $P(x,y)=\left[\frac{3\times 8+1\times 4}{3+1}, \frac{3\times 5+1\times(-3)}{3+1}\right]$ ½ $P(x,y)=\left[\frac{24+4}{4}, \frac{15-3}{4}\right]$ ½ $P(x,y)=\left[\frac{28}{4}, \frac{12}{4}\right]$ ½ $P(x,y)=[7,\ 3]$ ½	3
27.	Find the zeroes of the quadratic polynomial $p(x) = x^2 - 2x - 8$ and verify the relationship between the zeroes and the coefficients. *Ans.* : $P(x)=x^2-2x-8$ $P(x)=x^2-4x+2x-8$ ½ $P(x)=x(x-4)+2(x-4)$ $P(x)=(x-4)\ (x+2)$ $\quad P(x)=0$ $\Rightarrow\ (x-4)\ (x+2)=0$ $\quad x+2=0$ $x-4=0$ $\quad x=-2$ $x=4$ $\quad x=-2$ $\quad \therefore\ \alpha=4$ ½ Sum of polynomials = $\alpha+\beta$ $\quad \beta=-2$ $\alpha+\beta=4+(-2)$ $=2$ 1 $\alpha+\beta=2$ $\frac{-b}{a}=\frac{2}{1}$ $\therefore\quad \alpha+\beta=\frac{-b}{a}=2$	

Qn. Nos.	Value Points	Marks allotted
	Product of polynomials = $\alpha \times \beta$ 1 $\alpha \times \beta = 4 \times -2$ $\alpha \times \beta = -8$ $\alpha\beta = \frac{c}{a} = \frac{-8}{1}$ $\therefore \quad \alpha\beta = \frac{c}{a} = -8$	3
28.	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***
5 – 10	3
10 – 15	5
15 – 20	8
20 – 25	4
25 – 30	5

Ans. :

Class interval	Frequency f_i	Mid-point x_i	$f_i\, x_i$
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

Qn. Nos.	Value Points	Marks allotted

Mean $\overline{X} = \frac{\sum f_i x_i}{\sum f_i} = \frac{195}{15} = 13$ ½

Mean = $\overline{X} = 13$ ½ — 3

OR

Class Interval	*Frequency*
5 – 10	3
10 – 15	5
15 – 20	8
20 – 25	4
25 – 30	5

Here modal class is (15-20)

$L = 15$ 1

$f_0 = 5$

$f_1 = 8$

$f_2 = 4$

$h = 5$ ½

mode = $L + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$

$= 15 + \left[\frac{8-5}{2(8)-5-4}\right] \times 5$ ½

$= 15 + \left[\frac{3}{7}\right] \times 10$ ½

$= 15 + 4{\cdot}28$

mode = 19·28 $\therefore$ mode = 19·28 ½

29. The area of the sector of a circle is numerically equal to the length of the arc of the same sector. If the length of the arc is $\frac{44}{21}$ cm then, find the angle subtended by the arc at the centre and the radius of the circle.

Ans. :

Area of sector = Length of arc

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

$\pi r^2 = 2\pi r$ ½

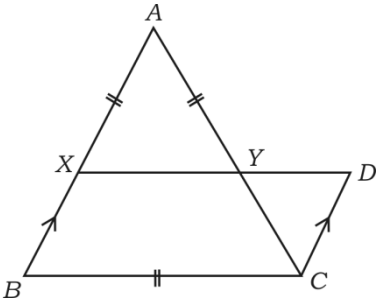
$\therefore r = 2$ radius $r = 2$ units ½

Length of arc = $\frac{44}{21}$ cm

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

$\frac{44}{21} = \frac{\theta}{360°} \times \frac{22}{7} \times 2 \times 2$ ½

Qn. Nos.	Value Points	Marks allotted
	$\therefore\ \theta = \frac{44 \times 360 \times 7}{21 \times 22 \times 2 \times 2}$ ½	
	$\therefore\ \theta = 60°$ ½	3
	$\therefore$ The angle subtended by the arc at the centre $\theta = 60°$.	
30.	The denominator of a fraction is one more than twice its numerator. The sum of this fraction and its reciprocal is $\frac{29}{10}$. Find the fraction.	
	OR	
	The area and perimeter of a rectangular field are 60 m^2 and 32 m respectively. Find the length and breadth of the field.	
	Ans. :	
	Let the numerator = x	
	Then denominator = $2x + 1$. According to the data, ½	
	$\frac{x}{2x+1} + \frac{2x+1}{x} = \frac{29}{10}$ ½	
	$\frac{x^2 + (2x+1)^2}{(2x+1)x} = \frac{29}{10}$ ½	
	$\frac{x^2 + 4x^2 + 4x + 1}{2x^2 + x} = \frac{29}{10}$	
	$50x^2 + 40x + 10 = 58x^2 + 29x$ ½	
	$8x^2 - 11x - 10 = 0$	
	$8x^2 - 16x + 5x - 10 = 0$	
	$8x(x-2) + 5(x-2) = 0$	
	$(8x+5)(x-2) = 0$ ½	
	$x = \frac{-5}{8}$ or $x = 2$	
	$\therefore$ Numerator $x = 2$	
	Denominator = $2x + 1 = 5$ ½	
	The fraction = $\frac{2}{5}$	3
	OR	

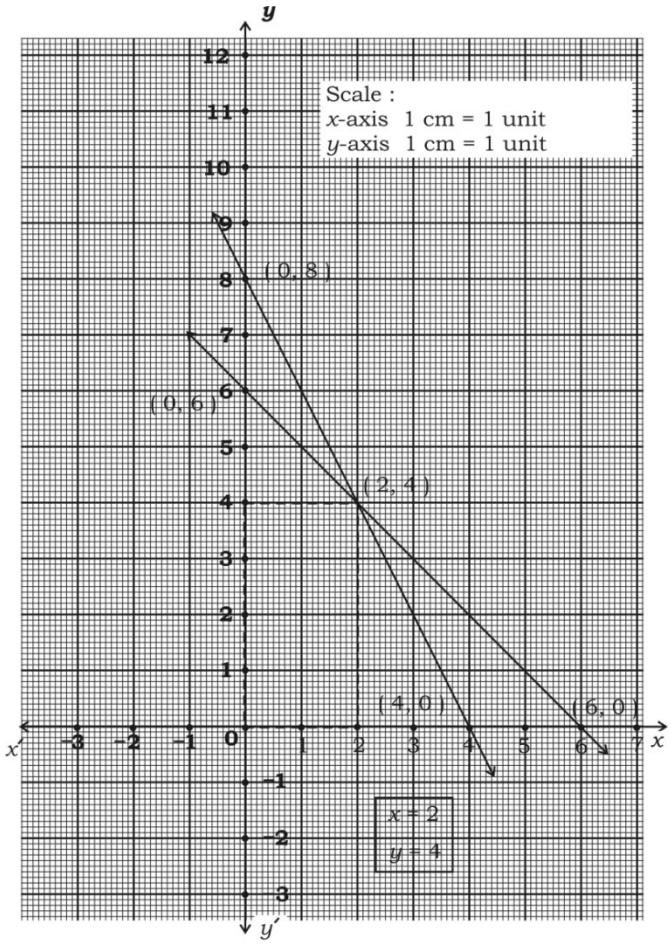
Qn. Nos.	Value Points	Marks allotted
	Let the length of the rectangular field = l and breadth = b According to the data $2(l + b) = 32$ m $\quad lb = 60\ m^2$ $l = 16 - b$ 1 $\therefore \quad (16 - b)\, b = 60$ $16b - b^2 = 60$ ½ $b^2 - 16b + 60 = 0$ $b^2 - 10b - 6b + 60 = 0$ ½ $b(b - 10) - 6(b - 10) = 0$ $(b - 10)(b - 6) = 0$ $b = 10 \quad b = 6$ ½ $b = 10 \quad l = 6$ $b = 6 \quad l = 10$ ½	
31.	ABC is an equilateral triangle. X and Y are the midpoints of AB and AC respectively. The line segment joining the points X and Y is produced to the point D. C and D are joined such that $AB \parallel CD$. Prove that $AX : CD = XY : YD$. *Ans.* :  1 To prove : $AX : CD = XY : YD$ Proof : In the ΔAXY and ΔCYD	

Qn. Nos.	Value Points		Marks allotted
	$\angle XAY = \angle YCD$ (Alternate angle)	½	
	$\angle AXY = \angle YDC$ (Alternate angle)		
	$\angle AYX = \angle CYD$ (Vertically opposite angle)		
	$\therefore\ \Delta AXY \sim \Delta CDY$	½	
	$\frac{AX}{CD} = \frac{XY}{YD}$	½	
	$\Rightarrow AX : CD = XY : YD$	½	3
32.	Prove that $\frac{1 + 2\sin^2\theta}{1 + 3\tan^2\theta} = \cos^2\theta$.		
	OR		
	Prove that ($\sin\theta + \cos\theta$) . ($\tan\theta + \cot\theta$) = $\sec\theta + \text{cosec}\,\theta$.		
	Ans. :		
	$\frac{1+2\sin^2\theta}{1+3\tan^2\theta} = \frac{1+2\sin^2\theta}{1+3\left(\frac{\sin\theta}{\cos\theta}\right)^2}$	½	
	$= \frac{1+2\sin^2\theta}{1+3\frac{\sin^2\theta}{\cos^2\theta}}$	½	
	$= \frac{1+2\sin^2\theta}{\frac{\cos^2\theta+3\sin^2\theta}{\cos^2\theta}}$	½	
	$= \frac{(1+2\sin^2\theta)\cos^2\theta}{\cos^2\theta+3\sin^2\theta}$	½	
	$= \frac{(1+2\sin^2\theta)\cos^2\theta}{1-\sin^2\theta+3\sin^2\theta}$	½	
	$= \frac{\cancel{(1+2\sin^2\theta)}\cos^2\theta}{\cancel{(1+2\sin^2\theta)}}$	½	
	$\frac{1+2\sin^2\theta}{1+3\tan^2\theta} = \cos^2\theta$		3
	OR		

Qn. Nos.	Value Points	Marks allotted
	$(\sin\theta+\cos\theta)\,(\tan\theta+\cot\theta)$ $= (\sin\theta+\cos\theta)\left(\frac{\sin\theta}{\cos\theta}+\frac{\cos\theta}{\sin\theta}\right)$ ½ $= (\sin\theta+\cos\theta)\left(\frac{\sin^2\theta+\cos^2\theta}{\sin\theta.\cos\theta}\right)$ ½ $= (\sin\theta+\cos\theta)\left(\frac{1}{\sin\theta.\cos\theta}\right)$ ½ $= \frac{\sin\theta+\cos\theta}{\sin\theta.\cos\theta}$ $= \frac{\cancel{\sin\theta}}{\cancel{\sin\theta}.\cos\theta}+\frac{\cancel{\cos\theta}}{\sin\theta.\cancel{\cos\theta}}$ ½ $= \frac{1}{\cos\theta}+\frac{1}{\sin\theta}$ ½ $= \sec\theta + \operatorname{cosec}\,\theta$ ½ $\therefore$ (sin θ + cos θ) (tan θ + cot θ) = sec θ + cosec θ	3
33.	A box contains cards numbered from 6 to 70. A card is drawn at random from the box. Find the probability that the card drawn bears a number that is i) divisible by 5 ii) a perfect square number iii) an odd number less than 30 **OR** A bag contains white, black and red balls only. A ball is taken out at random from the bag. The probability of taking out a white ball is $\frac{3}{10}$ and the probability of taking out a black ball is $\frac{2}{5}$. Find the probability of taking out the red ball. If the bag contains 20 black balls, then find the total number of balls in the bag.	

Qn. Nos.	Value Points		Marks allotted
	Ans.		
	$S = \{ 6, 7, 8, \ldots\ldots\ldots\ldots 70 \} \therefore n(s) = 65$		
	$A = \{ 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 70 \}$	½	
	$n(A) = 12$		
	$P(A) = \frac{n(A)}{n(S)} = \frac{12}{65}$	½	
	$B = \{ 9, 16, 25, 36, 49, 64 \}$	½	
	$n(B) = 6$		
	$P(B) = \frac{n(B)}{n(S)} = \frac{6}{65}$	½	
	$C = \{ 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29 \}$	½	
	$n(C) = 12$		
	$P(C) = \frac{n(C)}{n(S)} = \frac{12}{65}$	½	3
	OR		
	$P(W) + P(B) + P(R) = 1$	½	
	$\frac{3}{10} + \frac{2}{5} + P(R) = 1$		
	$\frac{3+4}{10} + P(R) = 1$	½	
	$\frac{7}{10} + P(R) = 1$		
	$P(R) = 1 - \frac{7}{10} = \frac{10-7}{10}$		
	$\therefore \boxed{P(R) = \frac{3}{10}}$	½	
	Total number of black ball $n(B) = 20$ probability of taking Black ball is $\frac{2}{5}$.		
	$\therefore \quad P(B) = \frac{n(B)}{n(S)}$	½	
	$\frac{2}{5} = \frac{20}{n(S)}$		
	$\therefore \quad n(S) = \frac{20 \times 5}{2}$	½	
	$\therefore \quad \boxed{n(S) = 50}$	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 :	
	$2x + y = 8$	
	$x + y = 6$	
	Ans. :	



$2x + y = 8$

x	0	4
y	8	0

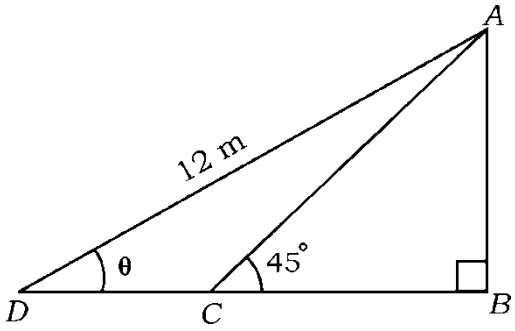
$x + y = 6$

x	0	6
y	6	0

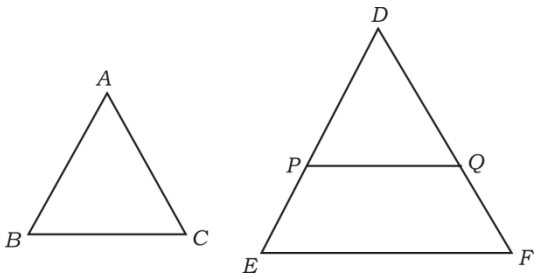
For table construction	1 + 1	
Drawing two lines by marking points	1	
Writing the values of x and y.	1	4

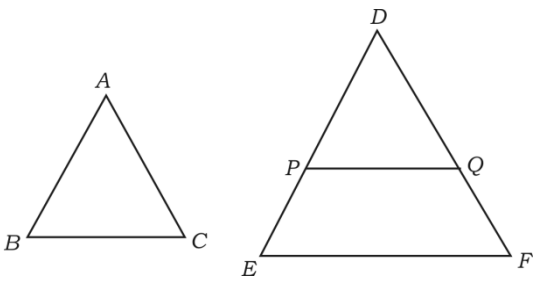
Qn. Nos.	Value Points	Marks allotted
35.	An Arithmetic progression consists of 14 terms. The first term of this progression is equal to the sum of the first 8 positive integers. If the sum of the first term and last term of the progression is 111, then find the last three terms of the arithmetic progression.	
	OR	
	An Arithmetic progression consists of 37 terms. The sum of the last three terms of the progression is 429, and the middle term of the progression is 75. Find by how much the 33^{rd} term of the progression exceeds its 28^{th} term.	
	Ans. :	
	Total terms n = 14	
	First term a = $\Sigma 8$ $\quad \Sigma 8 = \frac{n(n+1)}{2}$ ½	
	$\therefore \quad a = 36$ $\quad \Sigma 8 = \frac{8(8+1)}{2}$	
	$\Sigma 8 = \frac{8 \times 9}{2} = 36$ ½	
	$a + a_n = 111$	
	$36 + a_n = 111$	
	$a_n = 111 - 36$ ½	
	$a_n = 75$	
	$a_n = a + (n-1)d$	
	$75 = 36 + (14-1)d$ ½	
	$75 = 36 + 13d$	
	$75 - 36 = 13d$	
	$39 = 13d$	
	$\therefore \ d = \frac{39}{13} = 3$ ½	
	$\boxed{d = 3}$	

Qn. Nos.	Value Points		Marks allotted
	$\therefore$ Last three terms of A.P.		
	$a_{12} = a + 11d = 36 + 11(3) = 69$	½	
	$a_{13} = a + 12d = 36 + 12(3) = 72$	½	
	$a_{14} = a + 13d = 36 + 13(3) = 75$	½	4
	$\boxed{69, 72, 75}$		
	OR		
	Total terms n = 37		
	Sum of last three terms = 429		
	$a_{35} + a_{36} + a_{37} = 429$		
	$a + 34d + a + 35d + a + 36d = 429$		
	$3a + 105d = 429$		
	$\boxed{a + 35d = 143}$ ..... (1)	½	
	Middle term of A.P. = $\frac{n+1}{2} = \frac{37+1}{2} = \frac{38}{2}$		
	$\therefore$ Middle term = a_{19}		
	$\therefore$ $\boxed{a_{19} = 75}$	½	
	$a + 18d = 75$ ..... (2)	½	
	Solving equations (1) and (2)		
	$a + 35\,d = 143$		
	$a + 18\,d = 75$		
	(–) (–) (–)		
	$17d = 68$		
	$d = \frac{68}{17} = 4$ $\therefore$ $\boxed{d = 4}$	½	
	$a + 18\,d = 75$		
	$a + 18\,(4) = 75$		
	$a = 75 - 72$ $\therefore$ $\boxed{a = 3}$	½	
	$\therefore$ $a_{28} = a + 27d = 3 + 27(4) = 111$	½	
	$a_{33} = a + 32d = 3 + 32(4) = 131$	½	
	$\therefore$ 33rd term of the progression is		
	20 more than 28th term.	½	4

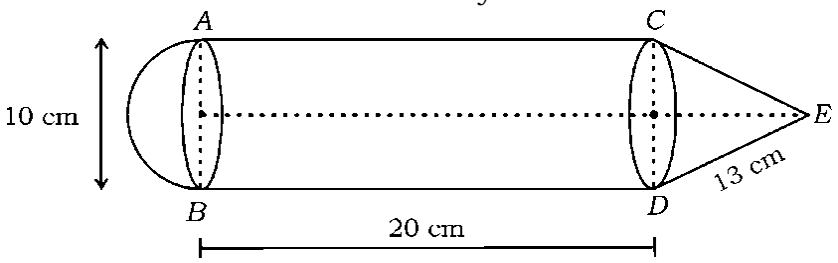
Qn. Nos.	Value Points	Marks allotted
36.	A person observes the top of a pole standing vertically on a level ground from the point '*C*' on the same ground. Then the angle of elevation is found to be 45° as shown in the figure. The person moves a distance of ($\sqrt{3}-1$) times the length of *BC* (in metres) from the point '*C*' and reaches the point '*D*' on the same ground. If *AD* = 12 m, then find the angle of elevation (θ) from the point '*D*' to the top of the pole, the height of the pole and the distance between the foot of the pole and the point *D*.  *Ans.* : $\angle ACB = 45°$, $\angle ADB = \theta$, $BC = x$, $DC = (\sqrt{3}-1)x$, $AD = 12$ m In ΔABC, $\tan 45° = \frac{AB}{BC}$ $\tan 45° = \frac{AB}{x}$ $1 = \frac{AB}{x}$ ½ $\therefore \boxed{AB = x}$ In ΔADB, $\tan\theta = \frac{AB}{BD}$ $\tan\theta = \frac{AB}{BC + CD}$ ½ $\tan\theta = \frac{x}{x + (\sqrt{3}-1)x}$	

Qn. Nos.	Value Points	Marks allotted
	$\tan\theta = \frac{x}{x + \sqrt{3}x - x}$	
	$\tan\theta = \frac{x}{\sqrt{3}x}$ ½	
	$\tan\theta = \frac{1}{\sqrt{3}}$	
	$\tan\theta = \frac{1}{\sqrt{3}}$	
	$\therefore$ $\boxed{\theta = 30°}$ ½	
	In ΔABD ,	
	$\sin\theta = \frac{AB}{AD}$	
	$\sin 30° = \frac{AB}{12}$	
	$\frac{1}{2} = \frac{AB}{12}$ ½	
	$\therefore\ AB = \frac{12}{2}$ = 6 cm	
	But $AB = BC$ $\therefore$ BC = 6 cm ½	
	$\therefore$ $BD = BC + DC$	
	$BD = 6 + (\sqrt{3} - 1)x$	
	$BD = 6 + (\sqrt{3} - 1)6$ ½	
	$BD = 6 + (1{\cdot}7 - 1) 6$	
	$BD = 6 + (0{\cdot}7)6$	
	$BD = 6 + 4{\cdot}2$	
	$\boxed{BD = 10{\cdot}2 \text{ m}}$ ½	4
	$\therefore$ The distance between the foot of the pole and the point 'D' is 10·2 m.	
37.	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	

Qn. Nos.	Value Points	Marks allotted
	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". *Ans.* :  ½ Data : In triangles ABC , $\angle A = \angle D$, $\angle B = \angle E$, $\angle C = \angle F$ ½ To prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ½ Construction : Mark P and Q on DE and DF such that, $AB = DP$ and $AC = DQ$. Join PQ. ½ Proof : In ΔABC & ΔDPQ $AB = DP$ $AC = DQ$ } construction $\therefore \quad \angle BAC = \angle PDQ$ (Data) ½ $\Delta ABC \cong \Delta DPQ$ (SAS congruency rule) $\angle ABC = \angle DPQ$ (But $\angle ABC = \angle DEF$) $\therefore \quad \angle DPQ = \angle DEF$ PQ || EF (Since corresponding angles are equal) ½ $\frac{DP}{DE} = \frac{PQ}{EF} = \frac{DQ}{DF}$ But $AB = DP$, $BC = PQ$, $AC = DQ$ ½	

Qn. Nos.	Value Points	Marks allotted
	$\therefore \quad \frac{AB}{DE}=\frac{BC}{EF}=\frac{AC}{DF}$, $\Delta ABC \sim \Delta DEF$. ½	4
	Note : If the theorem is proved as given in the textbook, then give full marks.	
	OR	
	 ½	
	Data : In ΔABC and ΔDEF,	
	$\angle A = \angle D$ ½	
	and $\frac{AB}{DE}=\frac{AC}{DF}$ ½	
	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	
	$AB = DP$, $AC = DQ$ } construction	
	$\angle A = \angle D$ (Data)	
	$\therefore \quad \Delta ABC \cong \Delta DPQ$ [SAS] ½	
	$\therefore \quad \angle B = \angle P$	
	$\angle C = \angle Q$ ..... (1)	
	(corresponding sides of similar triangles) ½	
	$\frac{AB}{DE}=\frac{AC}{DF}$ (Data)	
	$\frac{DP}{DE}=\frac{DQ}{DF}$ ($AB = DP$ & $AC = DQ$)	

Qn. Nos.	Value Points	Marks allotted
	$\therefore$ $PQ \mid\mid EF$ (converse of Thales)	
	$\therefore$ $\angle E = \angle P$, $\angle F = \angle Q$ ..... (2)	
	From (1) and (2)	
	$\angle B = \angle E$, $\angle C = \angle F$ and $\angle A = \angle D$	
	$\therefore$ $\Delta ABC \sim \Delta DEF$ ½	
	Note : If the theorem is proved as given in the textbook, give full marks.	
VI.	**Answer the following question :** **1 × 5 = 5**	
38.	A toy is made by attaching a hemisphere to one side and a cone on the other side of a cylinder as shown in the figure. The diameter of these three solids is same. The diameter of cylinder is 10 cm and its height is 20 cm. If the slant height of the cone is 13 cm, then find the total surface area and volume of the toy.	

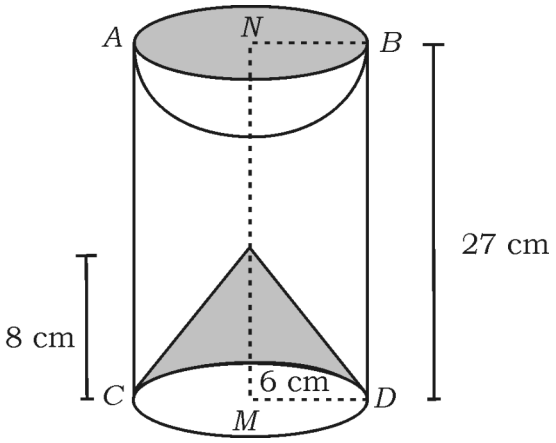


OR

From a solid cylinder of base radius 6 cm and height 27 cm, a hemisphere and a cone of radius same as that of the cylinder are carved out from the bases of the cylinder as shown in the figure. If the height of the cone is 8 cm

Qn. Nos.	Value Points	Marks allotted

then find the total surface area and volume of the remaining solid.



Ans. :

Diameter of cylinder = 10 cm ∴ radius $r = \frac{10}{2} = 5$ cm

∴ Radius of all the solids are equal

∴ Height of cylinder h = 20 cm

Slant height of cone l = 13 cm ½

Total surface area of the toy =

CSA of cylinder + CSA of hemisphere + CSA of cone

$A = 2\pi rh + 2\pi r^2 + \pi rl$ 1

$A = \pi r[2h + 2r + l]$

$A = \frac{22}{7} \times 5\,[2 \times 20 + 2 \times 5 + 13\,]$

$A = \frac{110}{7} \times 63$

$A = 990 \text{ cm}^2$ 1

$l^2 = h^2 + r^2$

$(13)^2 = h^2 + (5)^2$

$h^2 = 144$

$h = 12$ ½

Qn. Nos.	Value Points	Marks allotted
	Volume of Toy V = Volume of Cylinder + Volume of hemisphere + Volume of cone	
	$V = \pi r^2 h + \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h_1$ 1	
	$V = \pi r^2 [h + \frac{2}{3}r + \frac{1}{3}h_1]$	
	$V = \frac{22}{7} \times 5 \times 5 [20 + \frac{2}{3}(5) + \frac{1}{3} \times 12]$ ½	
	$V = 78 \cdot 5 \times 27 \cdot 3$	
	$\boxed{V = 2143 \cdot 05 \text{ cm}^3}$ ½	5
	OR	
	Height of cylinder h = 27 cm	
	radius r = 6 cm	
	Height of cone = 8 cm	
	Slant height of cone = $l^2 = h^2 + r^2$	
	$l^2 = (8)^2 + (6)^2$	
	$l^2 = (10)^2$ ½	
	$\boxed{l = 10 \text{ cm}}$	
	Total surface area of remaining solid =	
	CSA of cylinder + CSA of hemisphere + CSA of cone	
	$A = 2\pi rh + 2\pi r^2 + \pi rl$ 1	
	$A = \pi r [2h + 2r + l]$	
	$A = \frac{22}{7} \times 6 [2 \times 27 + 2 \times 6 + 10]$ ½	
	$A = \frac{22}{7} \times 6 [54 + 12 + 10]$	
	$A = \frac{22}{7} \times 456$	
	$\boxed{A = 1432 \cdot 2 \text{ cm}^2}$ ½	

Qn. Nos.	Value Points	Marks allotted
	Volume of the remaining Solid = Volume of Cylinder − Volume of hemisphere − Volume of cone	
	$V = \pi r^2 h - \frac{2}{3}\pi r^3 - \frac{1}{3}\pi r^2 h_1$ 1	
	$V = \pi r^2 [h - \frac{2}{3} r - \frac{1}{3} h_1]$	
	$V = \frac{22}{7} \times (6)^2 [27 - \frac{2}{3} \times 6 - \frac{1}{3} \times 8]$ ½	
	$V = \frac{22}{7} \times 36 [27 - 4 - \frac{8}{3}]$ ½	
	$V = \frac{22}{7} \times 36 \times \frac{61}{3}$	
	$\boxed{V = 2299{\cdot}4 \text{ cm}^3}$ ½	5
	Note : If alternate method is used to get correct answer, then give full marks.	