KENDRIYA VIDYALAYA SANGATHAN,ERNAKULAM REGION
PRE BOARD EXAMINATION 2025-26

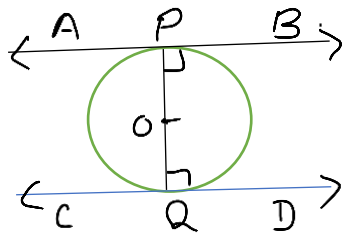CLASS : X   MATHEMATICS(BASIC)   Subject Code:241
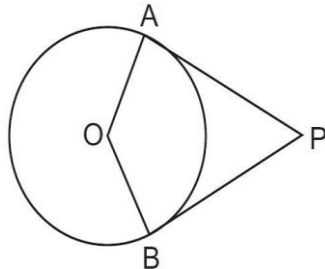
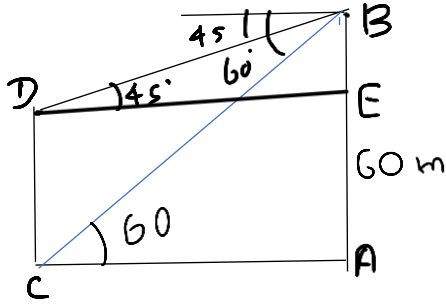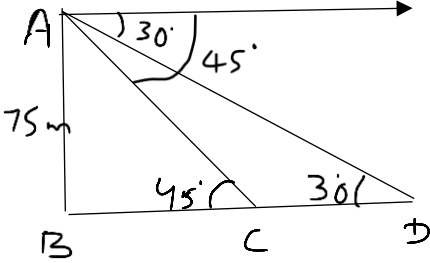Duration : 3 hrs.   Marking Scheme   Maximum Marks : 80

Question No	Solutions	Marks
	SECTION A	
1	(a) $5^2 \times 3^2$	1
2	(b) One solution	1
3	(b) 1	1
4	(b) $4x + 3y = 320$	1
5	(c) 8	1
6	(a) -5	1
7	(c) 207	1
8	(d) 12	1
9	(d) countless	1
10	(a) 10 m	1
11	(a) 4.5 cm	1
12	(d) 5 cm	1
13	(a) 0	1
14	(d) 35	1
15	(c)Median $= \frac{Mode+2Mean}{3}$	1
16	(c) 40^0	1
17	(d) $\frac{44}{3}$ cm	1
18	(a) $\frac{2}{13}$	1
19	(d)Assertion (A) is false but reason (R) is true.	1
20	(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	1
21	Smallest two-digit composite number = 10 Greatest one-digit composite number = 9 LCM = 2 ×3×3×5 =90 OR Minimum distance each should walk = LCM of 40 cm ,42 cm ,45 cm = 2520 cm	½ ½ 1 1 1
22	Correct Figure ∟OPB = 90^0 ∟OQD = 90^0 ∟OPB + ∟OQD = 180^0 Therefore AB is parallel to CD	½ ½ 1

23	Let the present age of Santhosh be x and present age of Son be y	
	$x = 3y$	½
	$x + 5 = \frac{5}{2}(y + 5)$	½
	Simplifying $2x - 5y = 15$	
	Solving to get $x = 45$ and $y = 15$	1
	OR	
	$7x - 2y = 5$	
	$8x + 7y = 15$	
	Solve using algebraic method to get $x = 1$, $y = 1$	1
	For verification of both equations	1
24	$2\sqrt{2}\cos 45^0 \sin 30^0 + 2\sqrt{3}\cos 30^0$	
	$2\sqrt{2} \times \frac{1}{\sqrt{2}} \times \frac{1}{2} + 2\sqrt{3} \times \frac{\sqrt{3}}{2}$	1
	$1 + 3$	½
	4	½
	OR	
	$\sin(A + B) = \sin A \cos B + \cos A \sin B$	
	Put $A = 60^0$ and $B = 30^0$	
	$\sin(60^0 + 30^0) = \sin 60^0 \cos 30^0 + \cos 60^0 \sin 30^0$	½
	$\sin 90^0 = \sin 60^0 \cos 30^0 + \cos 60^0 \sin 30^0$	
	$1 = \frac{\sqrt{3}}{2} \times \frac{\sqrt{3}}{2} + \frac{1}{2} \times \frac{1}{2}$	1
	$1 = \frac{3}{4} + \frac{1}{4}$	
	$1 = 1$, verified	½
25	$ax^2 + bx + c = 0$	
	For real and equal roots, $b^2 - 4ac = 0$	1
	$\qquad b^2 = 4ac$	
	$\qquad c = b^2 / 2a$	1
26	Prove that $\sqrt{3}$ is an irrational number.	
	Let us assume that $\sqrt{3}$ is rational	
	Then $\sqrt{3} = \frac{a}{b}$, where a and b are coprimes	½
	Squaring both sides	
	$3 = \frac{a^2}{b^2}$	
	$a^2 = 3b^2$ ....(1)	½
	3 divides a^2	
	3 divides a	½
	Put $a = 3c$ in Equation 1	
	$(3c)^2 = 3b^2$	
	$9c^2 = 3b^2$	
	$b^2 = 3c^2$	½
	3 divides b^2	
	3 divides b	½
	3 is a common factor of a and b	

	This is a contradiction to assumption that a and b are coprimes So, the assumption is wrong Therefore √3 is irrational	½
27	From an external point P, tangents PA and PB are drawn to a circle with centre O.If OP = 17 cm and radius = 8 cm,find the perimeter of quadrilateral OAPB Correct figure ∟A = ∟B = 90^0 $OP^2 = OA^2 + AP^2$ $17^2 = 8^2 + AP^2$ AP = 15 cm Perimeter of OAPB = 15+8+8+15 = 46 cm	½ ½ ½ 1 1
28		

28 table:

Class Interval	Frequency	c f
0 - 10	8	8
10 - 20	16	24
20 - 30	36	60
30 - 40	34	94
40 - 50	6	100
Total	100	

1

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$$
$$= 20 + \left(\frac{50-24}{36} \right) \times 10$$
$$= 20 + \frac{260}{36}$$
$$= 27.22$$

1

½

½

OR

Class Interval	Frequency	x_i	$f_i x_i$
0 – 20	12	10	120
20 – 40	15	30	450
40 – 60	32	50	1600
60 – 80	k	70	70 k
80 – 100	13	90	1170
Total	72 + k		3340 + 70 k

$1\frac{1}{2}$

$$\text{Arithmetic Mean} = \frac{\Sigma fixi}{\Sigma f i}$$
$$53 = \frac{3340+70\,k}{72+k}$$

½

	$53(72 + k) = 3340 + 70 k$	½
	$3816 + 53 k = 3340 + 70 k$ $3816 – 3340 = 70 k – 53 k$ $476 = 17 k$ $k = 28$	½
29	Let x be the monthly charges and y be the cost of food per day $x + 22 y = 1380$ $x + 28 y = 1680$ Solving to get $x = 280$ and $y = 50$ **OR** The ratio of income of two persons is 9 : 7 and the ratio of their expenditure is 4 : 3, if each of them manage to save Rs. 2000/month. Find their monthly incomes. Incomes of two persons – 9 x and 7 x Expenditures of two persons – 4y and 3y $9x – 4 y = 2000$ $7x – 3y = 2000$ Solving to get $x = 2000$ and $y = 4000$ Monthly incomes are Rs 18000 and Rs14000 respectively	1 2 1 1 ½ ½
30	LHS $= \dfrac{(1+sin A)^2 + cos^2 A}{cos A(1+sin A)}$ $= \dfrac{1+2 sin A+sin^2 A+cos^2 A}{cos A(1+sin A)}$ $= \dfrac{2+2 sin A}{cos A(1+sin A)}$ $= \dfrac{2(1+sin A)}{cos A(1+sin A)}$ $= \dfrac{2}{cos A} = 2 \, sec A$	1 ½ ½ ½ ½
31	$a_3 + a_8 = 7$, $a_7 + a_{14} = - 3$ $a + 2 d + a + 7 d = 7$ $2 a + 9 d = 7$ $a + 6 d + a + 13 d = - 3$ $2a + 19 d = - 3$ Solving to get $a = 8$ and $d = - 1$ $a_{15} = 8 + 14 \times (- 1) = - 6$	1 ½ 1 ½

32	Figure, Given, to prove, Construction Correct Proof	2 3

33	Solutions of 3 x + 2 y = 12	

x	0	4
y	6	0

solutions 5 x – 2 y = 4

x	0	2
y	-2	3

For drawing each correct graph
Coordinates are (0 – 2) , (0 , 6) and (2 , 3)

OR

x + y =30
(x + 2)(y-3) = 210
Solving x=12 or x=13
When x =12 , y=18
When x=13, y=17

(marks for item 33: 1, 1, 2, 1)

34	

$\frac{AC}{AB} = \text{Cot } 60^0$

$\frac{AC}{60} = \frac{1}{\sqrt{3}}$

$AC = \frac{60}{\sqrt{3}}$

$\frac{BE}{DE} = \tan 45^0$

$BE = \frac{60}{\sqrt{3}}$

AE = AB – AE

$= 60 - \frac{60}{\sqrt{3}}$

$= \frac{60\sqrt{3}-60}{\sqrt{3}}$

$= \frac{180-60\times1\cdot73}{3}$

$= \frac{180-103\cdot8}{3}$

$= \frac{76\cdot2}{3}$

= 25.4

Height of building = 25.4 m

OR

(marks for item 34: 1, 1, 1, ½, 1, 1, ½)

$\frac{BD}{AB} = \text{Cot } 30^0$

$\frac{BD}{75} = \sqrt{3}$

BD = 75√3 m

$\frac{BC}{AB} = \text{Cot } 45^0$

$\frac{BC}{75} = 1$

BC = 75 m

CD = BD – BC

  = 75√3 – 75

  = 75(√3 – 1) = 75(0.73) = 54.75

Distance between the ships = 54.75 m

35	Volume of model = Volume of cylinder + volume of two cones	
	$= \pi\, r^2 H + 2 \times \frac{1}{3}\,\pi\, r^2 h$	1
	$= \pi\, r^2 (H + \frac{2h}{3})$	1
	$= \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} (8 + \frac{4}{3})$	1
	$= \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times \frac{28}{3}$	1
	$= 66 \text{ cm}^3$	1
36	(i)Cordinates of P are P(2 ,5) and coordinates of R are R(8 , 3)	
	PR $= \sqrt{(8-2)^2 + (3-5)^2}$	
	$= \sqrt{6^2 + (-2)^2}$	
	$= \sqrt{36+4}$	1
	$= \sqrt{40}$	
	(ii) Coordinates of midpoint of PR $= \left(\frac{2+8}{2}, \frac{5+3}{2}\right)$	
	$= \left(\frac{10}{2}, \frac{8}{2}\right)$	
	$= (5.4)$	1
	(iii) (a) Let A(x, 0) be the point on the X axis	
	AP = AR	

Marks for row 34: 1, 1, ½, ½, ½, 1, ½

	$\sqrt{(x-2)^2 + (0-2)^2} = \sqrt{(x-8)^2 + (0-3)^2}$	1
	$x^2 - 4x + 4 + 4 = x^2 - 16x + 64 + 9$	
	$12x = 44$	
	$x = \frac{11}{3}$	
	Therefore the point is $(\frac{11}{3}, 0)$	1
	(b) $Q(x.y) = \left(\frac{1 \times 8 + 2 \times 2}{1+2}, \frac{1 \times 3 + 2 \times 5}{1+2} \right)$	1
	$= \left(\frac{12}{3}, \frac{13}{3} \right) = \left(4, \frac{13}{3} \right)$	1
37	(i) Area $= \frac{90}{360} \times 3.14 \times 5 \times 5$	
	$= 19.625 \text{ m}^2$	1
	(ii) Area $= \frac{90}{360} \times 3.14 \times 10 \times 10$	
	$= 78.5 \text{ m}^2$	1
	(iii) (a) Ratio $= \frac{19.625}{78.5} = \frac{1}{4}$	2
	$= 1 : 4$	
	(b) Area not covered $= 400 - (19.625 + 78.5)$	1
	$= 400 - (98.125)$	
	$= 301.875 \text{ m}^2$	1
38	(i) Favourable outcomes are (1,6),(2,5),(3,4),(4,3),(5,2),(6,1)	
	Probability of winning the game $= \frac{6}{36} = \frac{1}{6}$	1
	(ii) Favourable outcomes are (2,6),(3,5),(4,4),(5,3),(6,2)	
	Probability of winning $= \frac{5}{36}$	1
	(iii) (a) Favouable outcomes are (1,1),(2,2),(3,3),(4,4),(5,5),(6,6)	1
	Probability of doublet $= \frac{6}{36} = \frac{1}{6}$	1
	(b) Favourable otcomes are (1,1),(1,2),(1,4),(1,6),(2,1),(2,3), (2,5),(3,2),(3,4),(4,1),(4,3)(5,2),(5,6),(6,1),(6,5)	1
	Probability(prime number) $= \frac{15}{36} = \frac{5}{12}$	1