ATHEMATICS P2 SG

QUESTION 1 [17]

1.1

$m_{EK} = \frac{y_2 - y_1}{x_1 - x_2} = \frac{-2-4}{2-(-2)} = -\frac{3}{2}$ ✓M ✓A

$y - 4 = -\frac{3}{2}(x+2)$ ✓M✓A

$y = -\frac{3}{2}x + 1$ ✓CA

OR

$m_{EK} = -\frac{3}{2}$ ✓M ✓A

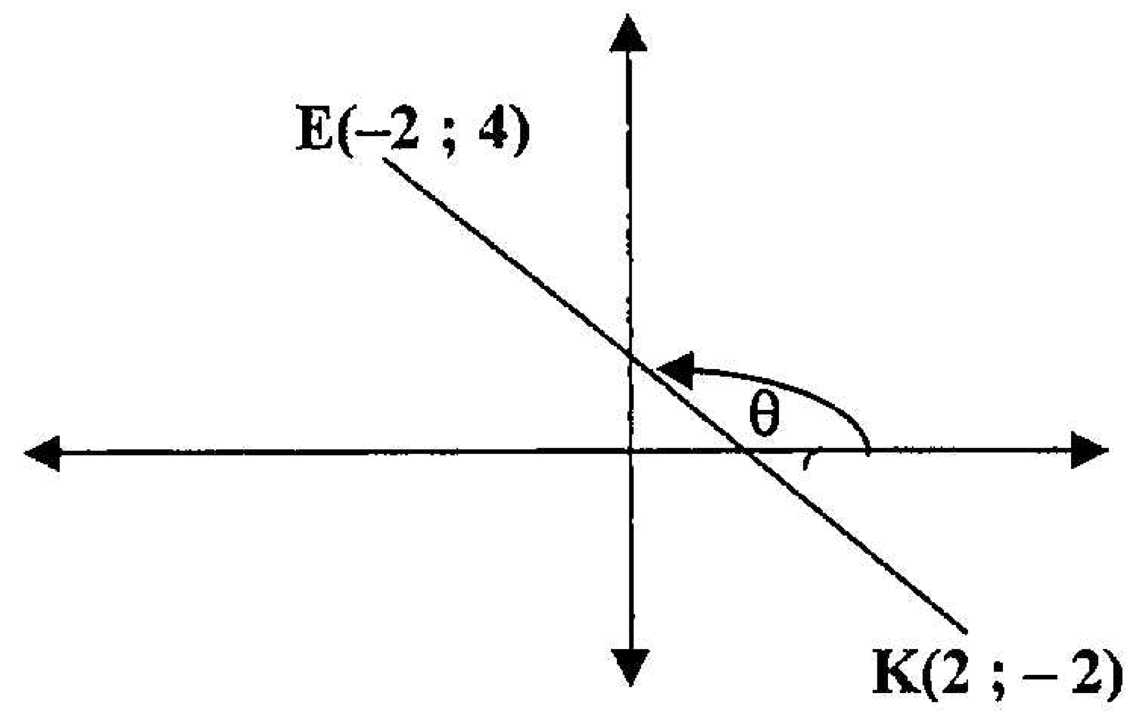
$y = mx + c$

$-2 = -\frac{3}{2}.2 + c$ ✓M✓A

$c = -2 + 3 = 1$

$\therefore\ y = -\frac{3}{2}x + 1$ ✓CA

(5)



$y - y_1 = m(x - x_1)$ ✓M

$2y - 8 = -3(x + 2)$ ✓M ✓A

$2y = -3x - 6 + 8$ ✓A

$2y = -3x + 2$ ✓CA

1.2

Coordinates of D : (0 ; 1) ✓CA

$ED = \sqrt{(-2-0)^2 + (4-1)^2}$ ✓M✓A

$= \sqrt{4 + 9}$

$= \sqrt{13}$ ✓CA

(4)

1.3

$\tan\theta = \frac{-3}{2}$ ✓M

$\theta = 180° - 56,309°.....$ ✓A

$\theta = 123,7°$ ✓CA

(3)

1.4

$m_{EK} = -\frac{3}{2}$

$m_{KN} = \frac{9}{p-2}$ ✓M ✓A

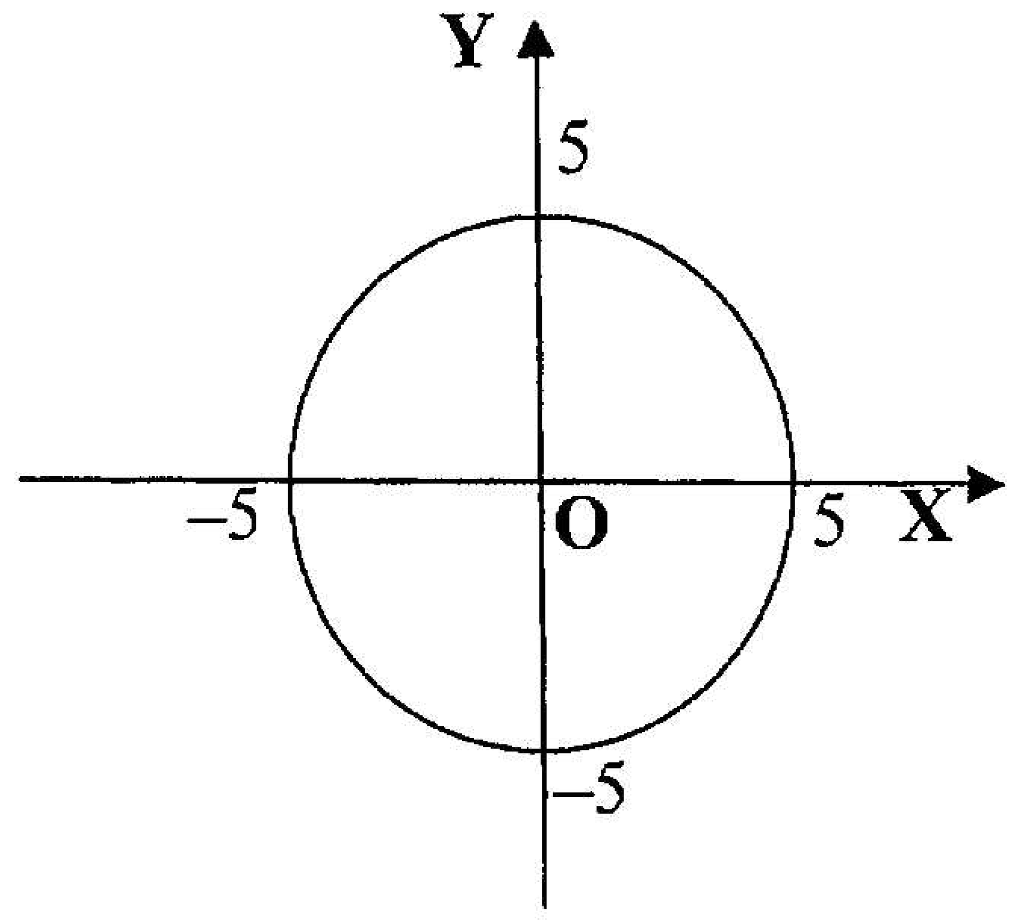
$-\frac{3}{2}.\frac{9}{p-2} = -1$ ✓M

$2p - 4 = 27$ ✓A

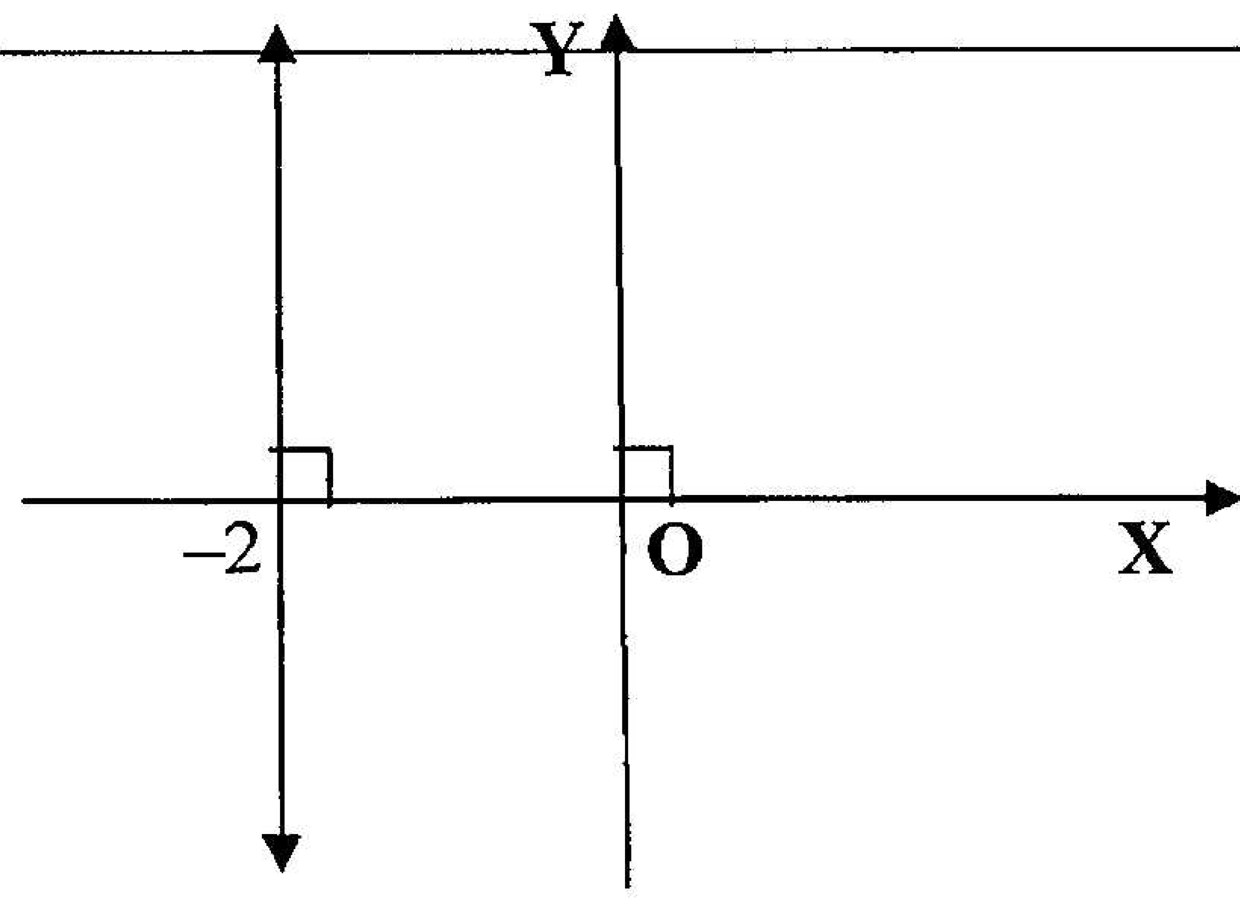
$p = \frac{31}{2}$ ✓CA

(5)

QUESTION 2 (21)		
2.1	$y = 2x + 5$ ....(1) ✓A $x^2 + y^2 = 5$ $x^2 + (2x+5)^2 = 5$ ✓CA $x^2 + 4x^2 + 20x + 25 - 5 = 0$ ✓CA $5x^2 + 20x + 20 = 0$ ✓CA $5(x+2)^2 = 0$ $\therefore x = -2$ ✓CA Substitute in (1) : $y = 2(-2) + 5$ ✓CA $= 1$ A (-2; 1) ✓CA (7)	
2.1.2	midpoint M $\left(\frac{x_1 + x_2}{2};\frac{y_1 + y_2}{2}\right)$ ✓M $= \left(\frac{0+6}{2};\frac{0-3}{2}\right)$ $= \left(3;-\frac{3}{2}\right)$ ✓CA (2)	
2.1.3	Line through M: $y - y_1 = m(x - x_1)$ ✓M ✓CA $y + \frac{3}{2} = 2(x-3)$ ✓A $y = 2x - \frac{15}{2}$ ✓CA **OR** $2y = 4x - 15$ (4)	$y = mx + c$ ✓M $y = 2x + c$ ✓CA M$(3;-\frac{3}{2})$ on line $-\frac{3}{2} = 2(3) + c$ ✓CA $c = -\frac{15}{2}$ ✓CA $y = 2x - \frac{15}{2}$

2.2.1	$x^2 + y^2 = (2+3)^2$ ✓M ✓A $= 25$ (4) ✓CA intercepts ✓CA shape	
2.2.2	$x = -2$ intercept shape ✓A ✓M (4)	

✓CA ✓CA



QUESTION 3 (14)

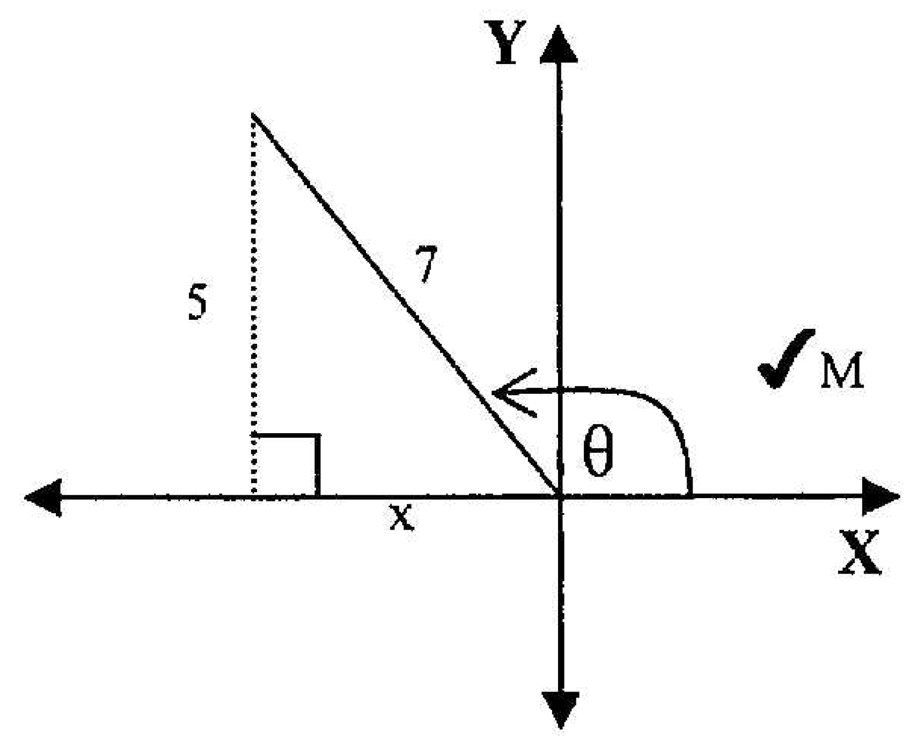
3.1

$\sin\theta = \frac{5}{7}$ ✓A

$x^2 = 49 - 25$
$= 24$
$\therefore x = -\sqrt{24}$ ✓A

$\cot\theta.\cos\theta = \frac{-\sqrt{24}}{5}.\frac{-\sqrt{24}}{7} = \frac{24}{35}$ ✓CA ✓CA ✓CA

(6)



✓M

$\cot\theta.\cos\theta = \frac{\cos\theta}{\sin\theta}.\cos\theta$

$= \frac{\cos^2\theta}{\sin\theta}$ OR $\frac{1-\sin^2\theta}{\sin\theta}$

$= \frac{\frac{-\sqrt{24}}{7}.\frac{-\sqrt{24}}{7}}{\frac{5}{7}}$ ✓CA ✓CA $= \frac{1-\left(\frac{5}{7}\right)^2}{\frac{5}{7}}$ ✓CA ✓CA

$= \frac{24}{49}.\frac{7}{5}$ $= \frac{24}{35}$ ✓CA

$= \frac{24}{35}$ ✓CA

3.2

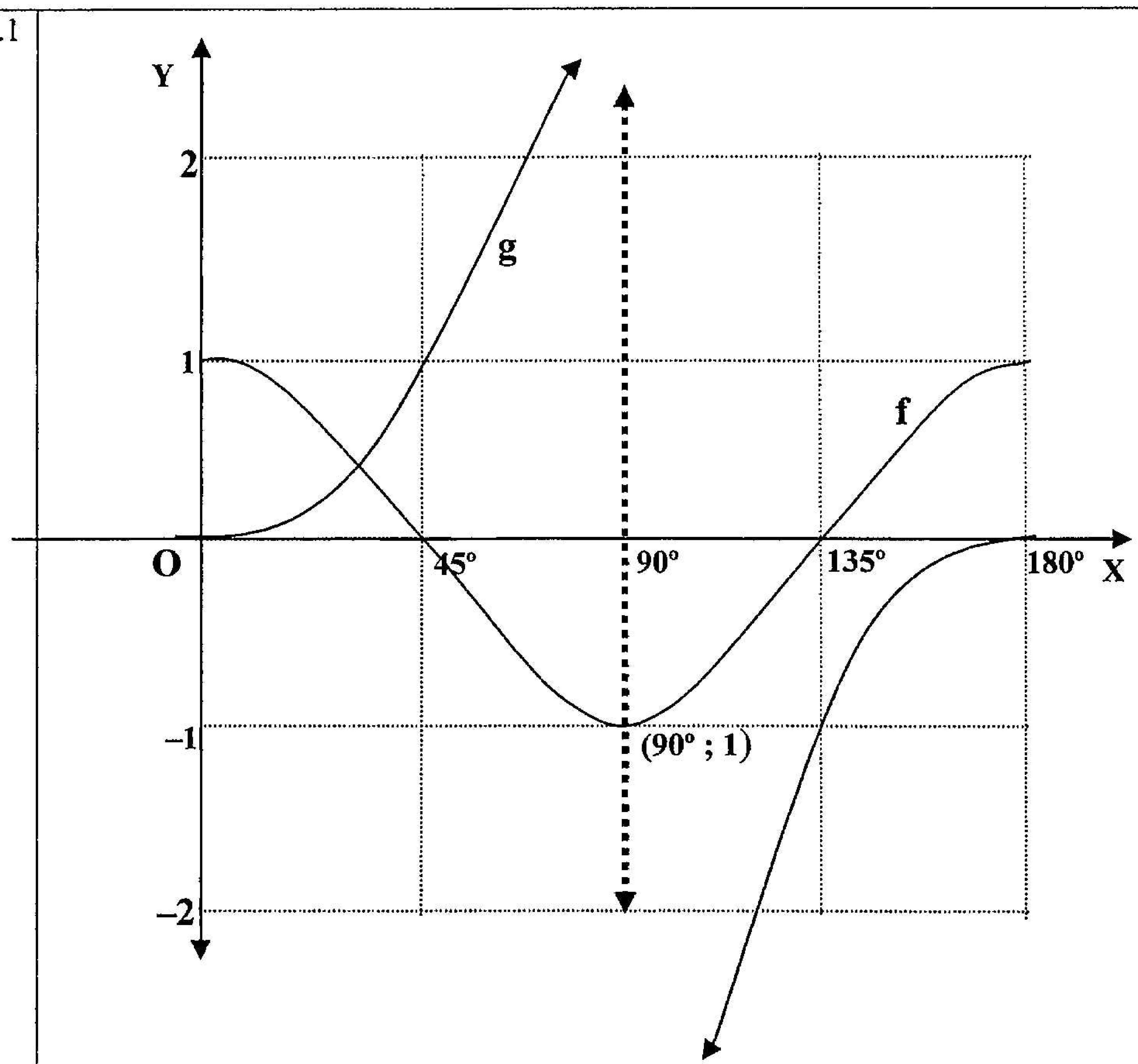
$\frac{\sin(180°-x).\sec(360°-x).\cos(180°+x).\tan 300°}{\cos(90°-x)}$

$= \frac{\sin x\ .\ \sec x\ .(-\cos x).(-\tan 60°)}{\sin x\ .}$ ✓A ✓A ✓A ✓A ✓A

$= \frac{1}{\cos x}.\cos x.\left(\frac{\sqrt{3}}{1}\right)$ ✓CA ✓CA

$= \sqrt{3}$ ✓CA

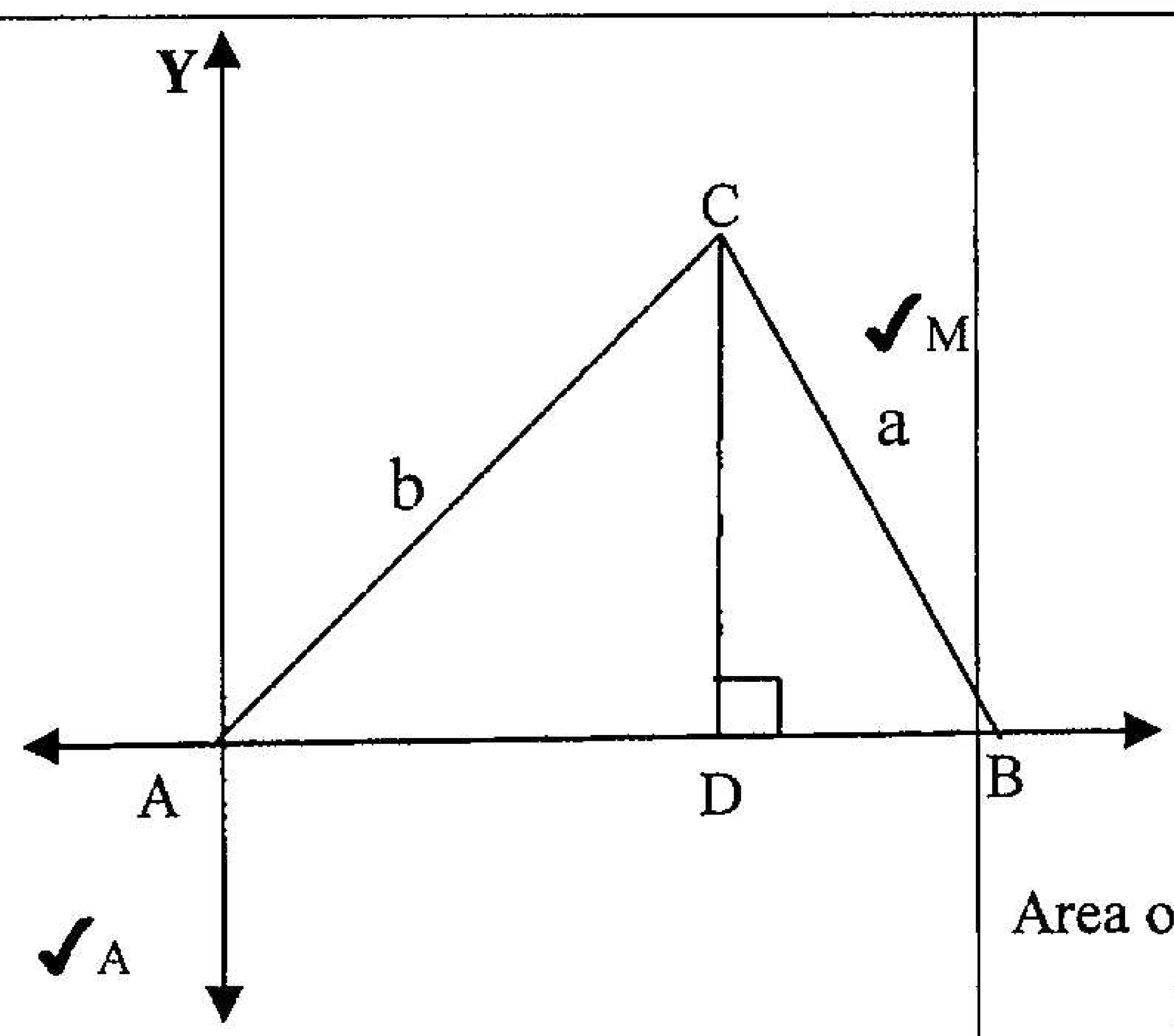
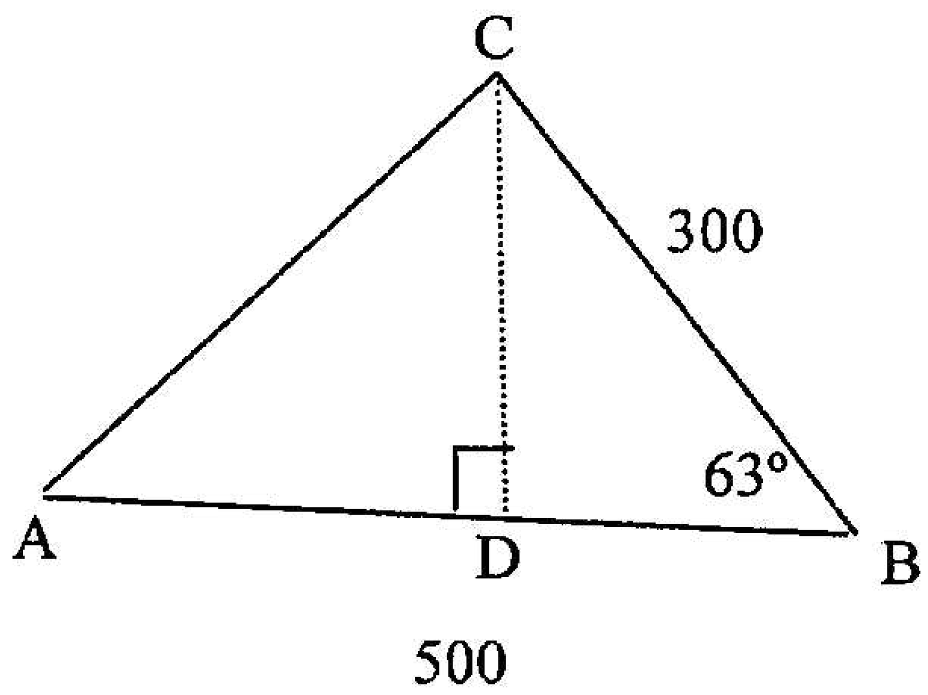
(8)

QUESTION 4 (18)	
4.1.1	

f : ✓A shape; ✓A period; ✓A intercepts ✓A endpoints	
g : ✓A asymptote; ✓A shape ✓A x- intercepts (45° ; 1) (135° ; -1) ✓A for both	(8)

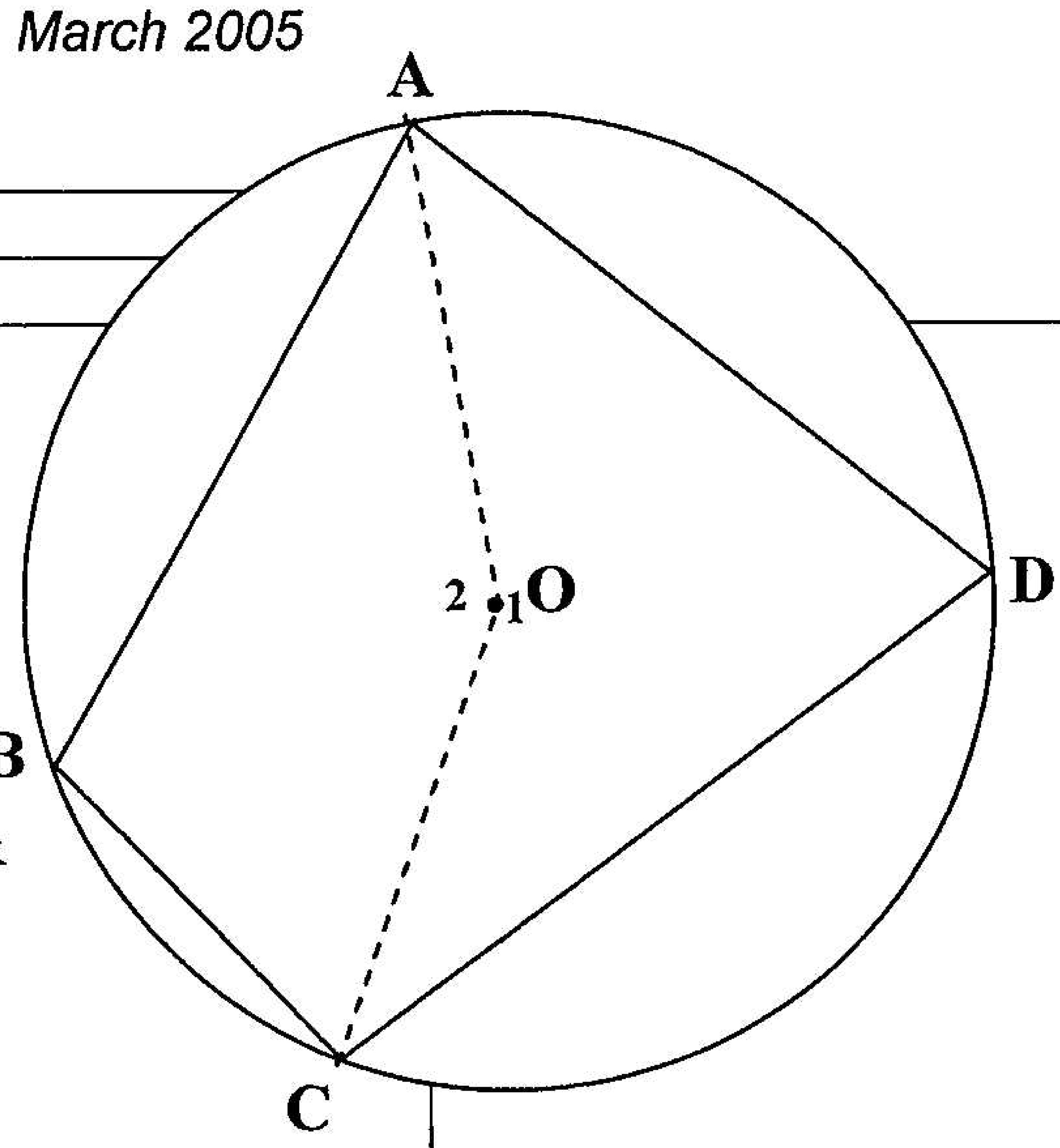
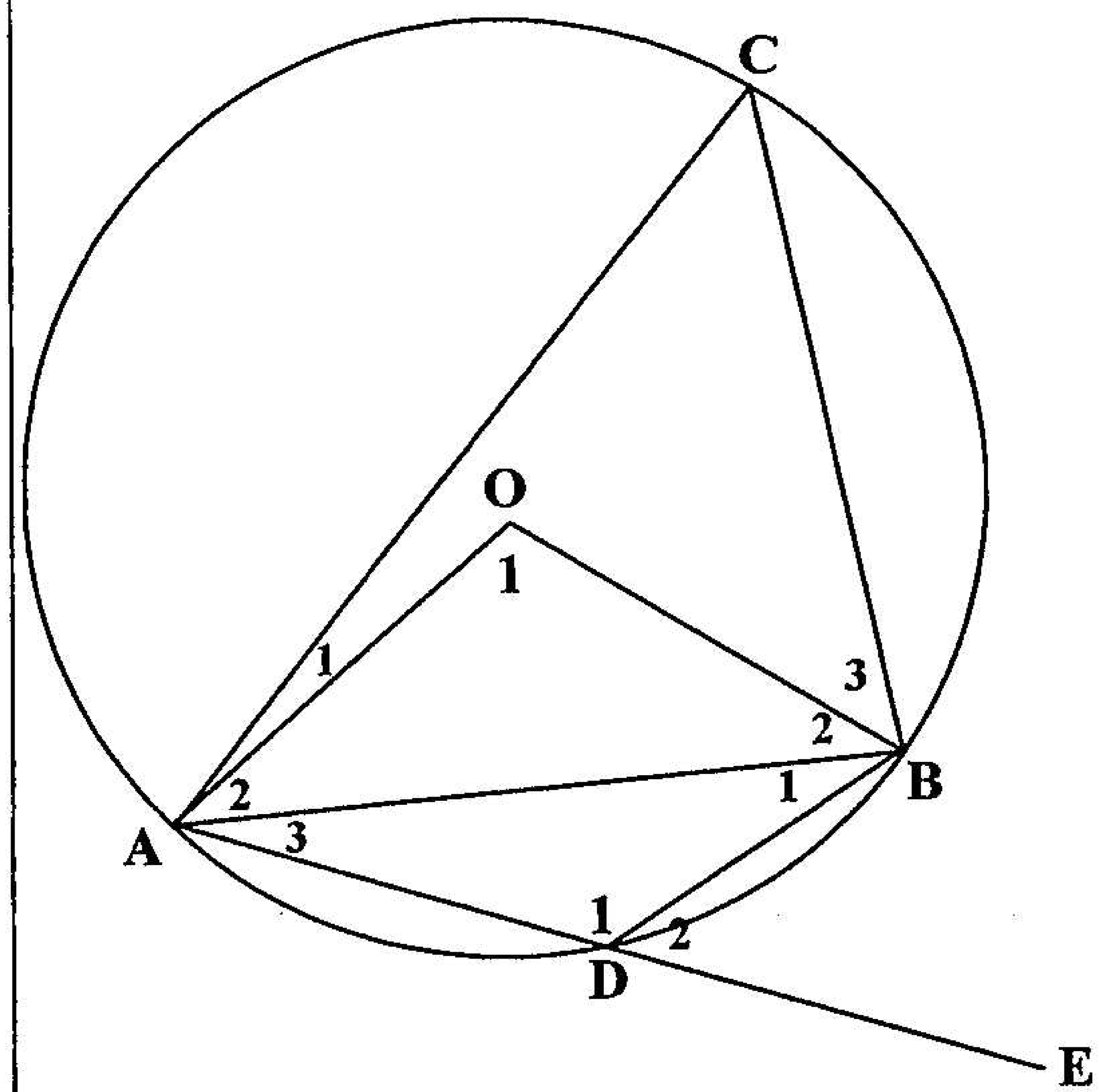
4.1.2(a)	90° (1)	
4.1.2(b)	180° ✓CA (1)	
4.1.2(c)	x = 0°; ✓CA 135°; ✓CA 180° ✓CA (3)	
4.1.2(d)	90° < x ≤ 180° ✓M notation ✓A ✓A (3)	x ∈ (90° ; 180°] ✓M Notation ✓A ✓A
4.2	g or y = – 2 sinx ✓✓A (2)	

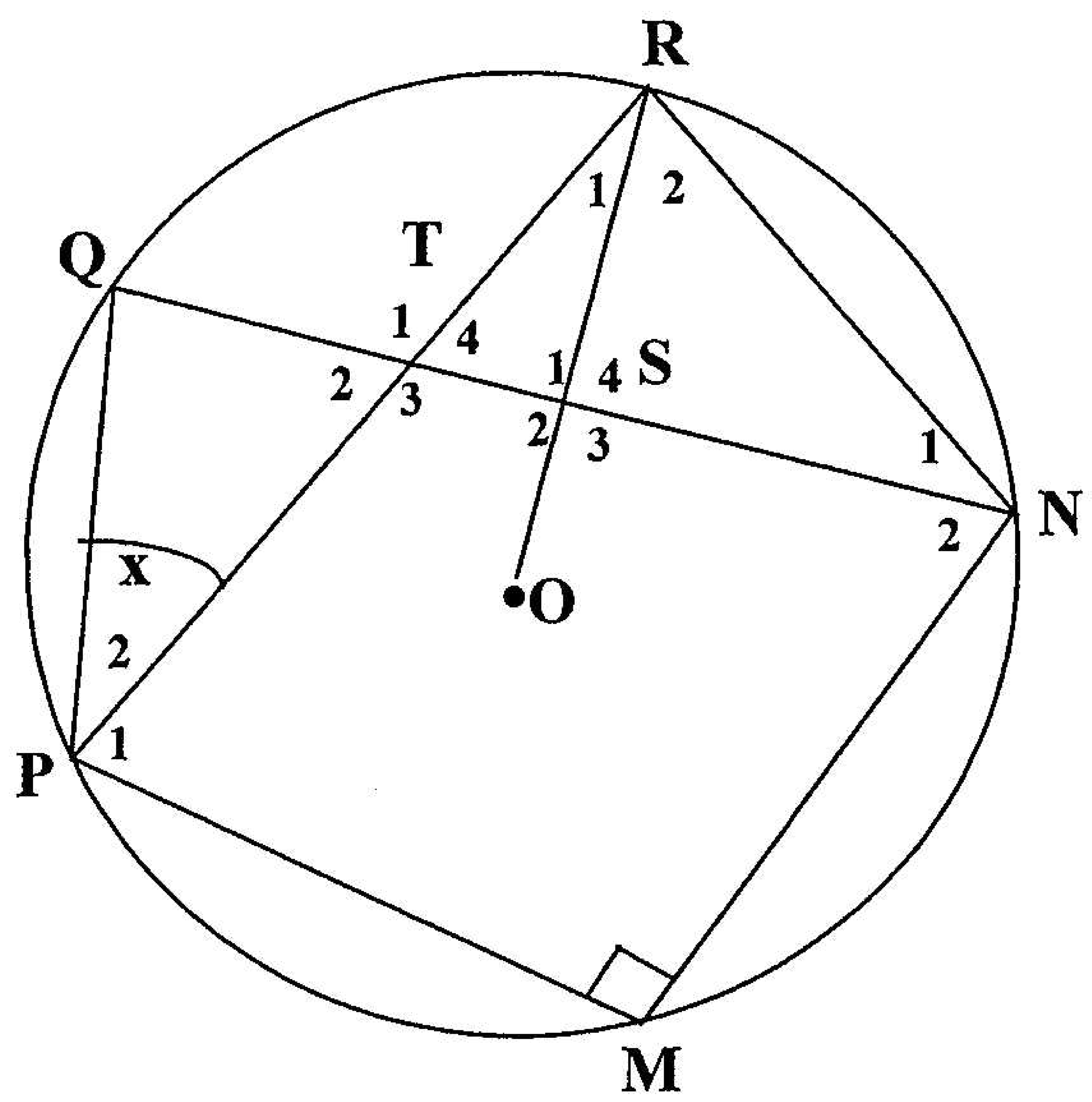
QUESTION 5 (11)		
5.1	LHS $= \left(\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}\right)\cos x$ ✓A ✓A $= \frac{\cos^2 x}{\sin x} + \sin x$ ✓A ✓A $= \frac{\cos^2 x + \sin^2 x}{\sin x}$ ✓A $= \frac{1}{\sin x}$ ✓A $= \text{cosec}\, x$ $=$ RHS (6)	LHS : $\left(\frac{\cos x}{\sin x} + \frac{\sin x}{\cos x}\right)\cos x$ ✓A ✓A $= \frac{(\cos^2 x + \sin^2 x)}{\sin x.\cos x}.\frac{\cos x}{1}$ ✓A ✓A $= \frac{1}{\sin x}$ ✓A $= \text{cosec}\ x$
5.2.1	$3\cos x = 2{,}151$ $\cos x = \frac{2{,}151}{3}$ ✓A $x = 44{,}19°$ ✓A or $x = 360° - 44{,}19°$ $= 315{,}80°$ ✓A (3)	
5.2.2	$\cot \frac{1}{2}x = \cot \frac{315{,}8°}{2}$ $= \cot 157{,}9°$ ✓A $= -2{,}46$ ✓A (2)	

QUESTION 6	(17)	
6.1	$\sin A = \frac{CD}{b}$ ✓M $CD = b\sin A$ $\sin B = \frac{CD}{a}$ $CD = a\sin B$ $\therefore\ a\sin B = b\sin A$ ✓A $\therefore\ \frac{a\sin B}{ab} = \frac{b\sin A}{ab}$ ✓A $\therefore\ \frac{\sin B}{b} = \frac{\sin A}{a}$ (4)	 ✓S Area of ΔABC: $\frac{1}{2}bc\sin A = \frac{1}{2}ac\sin B$ ✓M $b\sin A = a\sin B$ $\frac{\sin B}{b} = \frac{\sin A}{a}$
6.2.1	$AC^2 = CB^2 + AB^2 - 2(CB)(AB)\cos B$ ✓M $AC^2 = 300^2 + 500^2 - 2.500.300\cos 63°$ ✓A $= 203802,85$ ✓CA $AC = 451,45\ m$ (4)	
6.2.2	$\frac{\sin A\hat{C}B}{AB} = \frac{\sin B}{AC}$ ✓M $\sin A\hat{C}B = \frac{500.\sin 63°}{451,45}$ ✓CA $\therefore\ A\hat{C}B = 80,69°$ ✓CA (3)	
6.2.3	Area of $\triangle ABC = \frac{1}{2}(AB)(CB)\sin 63°$ ✓M $= \frac{1}{2}(500)(300)(\sin 63°)$ ✓A $= 66825,49\ m^2$ ✓A (3)	

6.2.4	$\frac{DC}{CB} = \sin B$ $DC = CB \sin B$ ✓M $= 300 \sin 63°$ ✓CA $= 267,30$ m ✓A (3)	$A = \frac{1}{2}.b.h$ ✓M $66825,49 = \frac{1}{2}.500.CD$ ✓CA $CD = 267,30$ ✓A OR $\frac{CD}{\sin B} = \frac{BC}{\sin CDB}$ ✓M $CD = \frac{BC \sin B}{\sin CDB}$ $CD = \frac{300 \sin 63°}{\sin 90°}$ ✓CA $= 267,30$ m ✓A

QUESTION 7 (24)

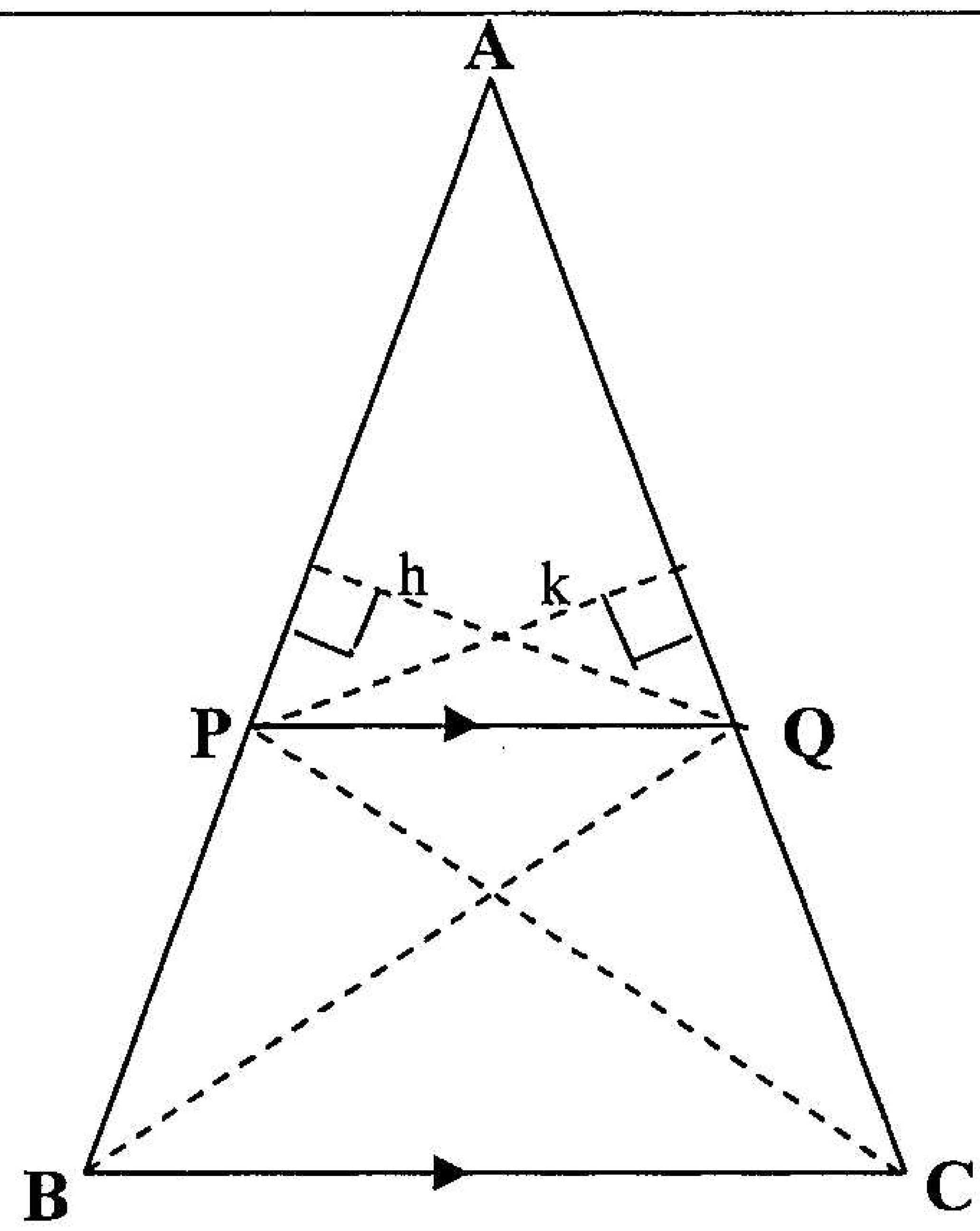
7.1	Construction : Draw AO and CO ✔M Proof : $\hat{O}_1 = 2\hat{B}$.(∠at centre = 2 ∠ at circum) ✔S/R $\hat{O}_2 = 2\hat{D}$ (∠at centre = 2 ∠ at circum) ✔S/R $\hat{O}_1 + \hat{O}_2 = 360°$ (∠s around a point) ✔S/R $\therefore 2\hat{B} + 2\hat{D} = 360°$ ✔A $\therefore \hat{B} + \hat{D} = 180°$ (5)	
7.2.1	$\hat{A}_2 = \hat{B}_2 = 40°$ (∠s opp. equal sides)✔S/R $A\hat{O}B = 100°$ (sum of ∠ s of Δ) ✔S/R $\hat{C} = 50°$ ✔S (∠ at centre = 2 × ∠ at circumf)✔R $\hat{D}_2 = 50°$ ✔S (ext. ∠ of cyclic quad)✔R (6)	 $\hat{D}_1 = 130°$ (int .opp.∠s of cycl. quad) OR $\therefore \hat{D}_2 = 50°$ (sup pl. ∠s)
7.2.2	$O\hat{A}D = 50°$ (∥ corr. ∠s) ✔S/R (1)	
7.3.1	diameter ✔A (1)	
7.3.2	tangent ✔A (1)	

7.4		
7.4.1	$\hat{N}_1 = x$ ✓S (∠s in same segment) ✓R (2)	
7.4.2	$\hat{Q} = 90°$ ✓S (opp.∠s of cycl. quad.)✓R ∴ PT is a diameter (chord subt. a rt ∠ at circ.) ✓S/R (3)	
7.4.3	QS = SN ✓S (given) ∴ OS ⊥ QN (line from centre ⊥ chord) ✓R i.e. $\hat{S}_4 = 90°$ ∴ RN is a diameter of circle RSN ✓S (3)	

7.4.4	$\hat{R}_1 + \hat{R}_2 = 90°$ (opp.∠s of cycl. quad.) ✓S/R (2) ∴ TR is a tangent (line ⊥ diam) ✓R	

QUESTION 8 (12)

8.1



Construction: Draw PC and BQ. ✓A

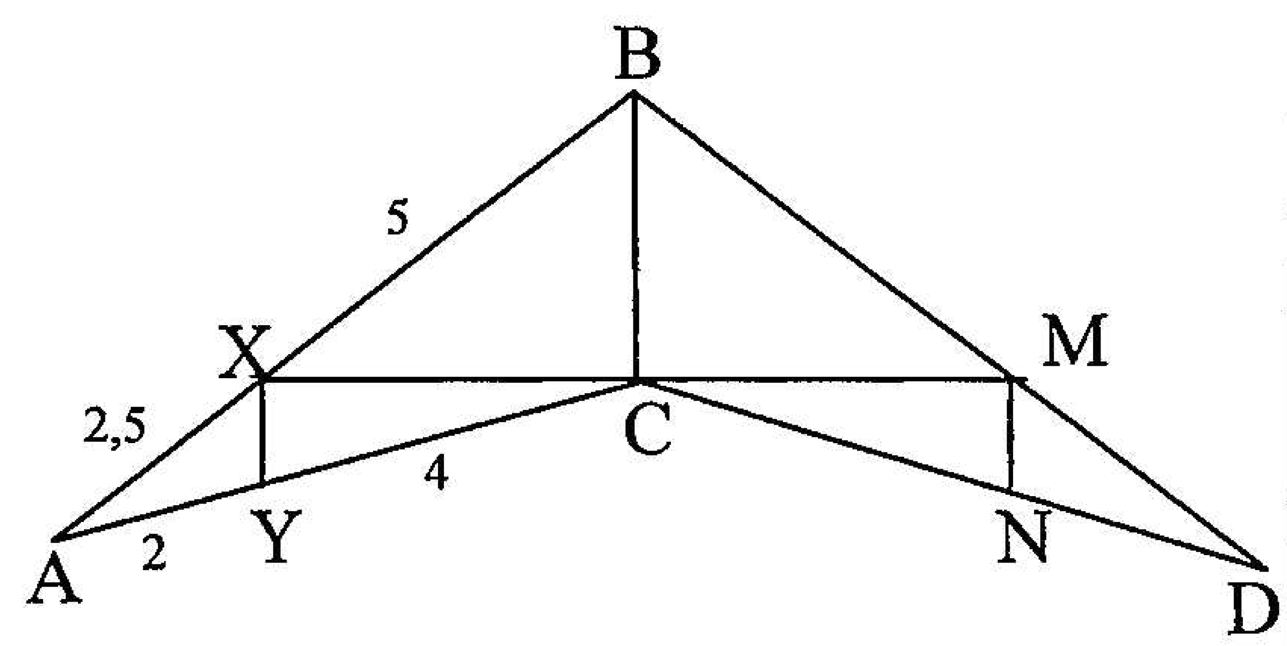
Proof : $\dfrac{\text{Area of }\Delta APQ}{\text{Area of }\Delta PQB} = \dfrac{\frac{1}{2}h.AP}{\frac{1}{2}h.PB} = \dfrac{AP}{PB}$ ✓S ✓S

$\dfrac{\text{Area of }\Delta APQ}{\text{Area of }\Delta QPC} = \dfrac{\frac{1}{2}.k.AQ}{\frac{1}{2}.k.QC} = \dfrac{AQ}{QC}$ ✓S

But area of ΔPQB = Area of ΔQPC (between same parallels & common base) ✓S/R

$\therefore \dfrac{\text{Area of }\Delta APQ}{\text{Area of }\Delta PQB} = \dfrac{\text{Area of }\Delta APQ}{\text{Area of }\Delta QPC}$ ✓C

$\therefore \dfrac{AP}{PB} = \dfrac{AQ}{QC}$ (6)



8.2.1(a) $\dfrac{AX}{XB} = \dfrac{2,5}{5} = \dfrac{1}{2}$ ✓A (1)

8.2.1(b) $\dfrac{AY}{YC} = \dfrac{2}{4} = \dfrac{1}{2}$ ✓A (1)

8.2.1(c) $\dfrac{AX}{AB} = \dfrac{2,5}{7,5} = \dfrac{1}{3}$ ✓A (1)

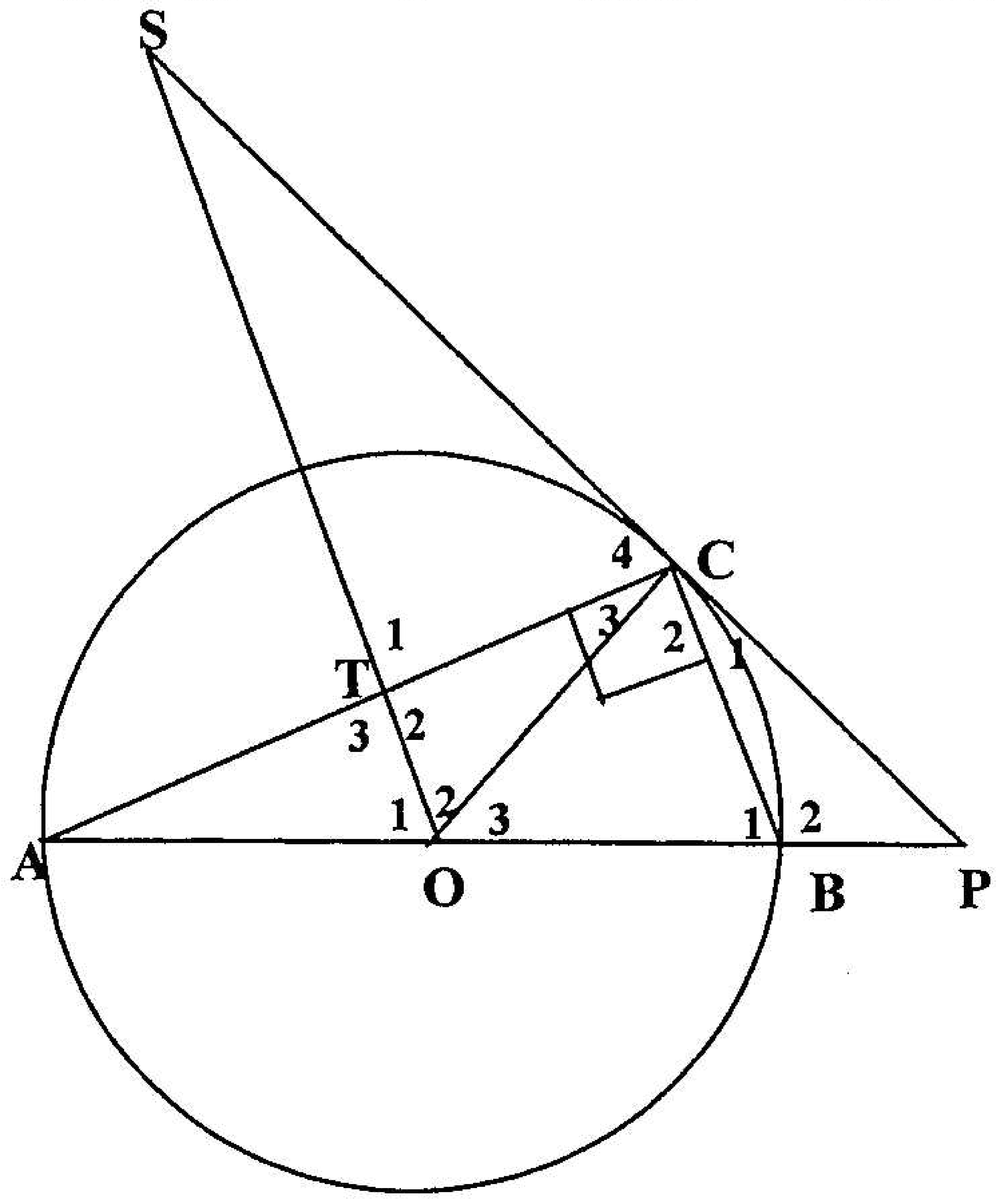
8.2.2 XY || BC ✓S (line dividing sides in prop) ✓R

Similarly by symmetry

BC || MN ✓S/R

$\therefore$ XY || MN (3)

QUESTION 9 (16)



9.1	$\hat{A} = x$ ✓S (∠between tang. and chord) $T\hat{C}O = x$ (∠s opp. equal sides) ✓S/R (3)	
9.2.1	$B\hat{C}A = 90°$ (∠ in a semicircle) $P\hat{C}A = 90° + x$ (3)	
9.2.2	$P\hat{C}O = 90°$ (tan ⊥ radius) $C\hat{B}P = 90° + x$ (ext. ∠ of a Δ) $P\hat{C}A = C\hat{B}P$ (3)	
9.3.1	TO ⊥ AC (given) ∴ AT = TC (line from centre ⊥ to chord) ∴ T is midpoint of AC (2)	
9.3.2	✓S ✓R In ΔCBP and ΔACP $\hat{P}$ is common ✓A $\hat{C}_1 = \hat{A} = x$ ✓R $C\hat{B}P = A\hat{C}P = 90° + x$ or (sum of ∠s of Δ) ∴ Δ PCB ||| ΔPAC (∠∠∠) (2)	
9.4	$\frac{PC}{AP} = \frac{CB}{AC}$ (Δs |||) AC.PC = CB.AP ✓S ✓R 2AT.PC = CB.AP (proved in 9.2.1) ✓S/R (3)	**TOTAL: 150**

END/EINDE