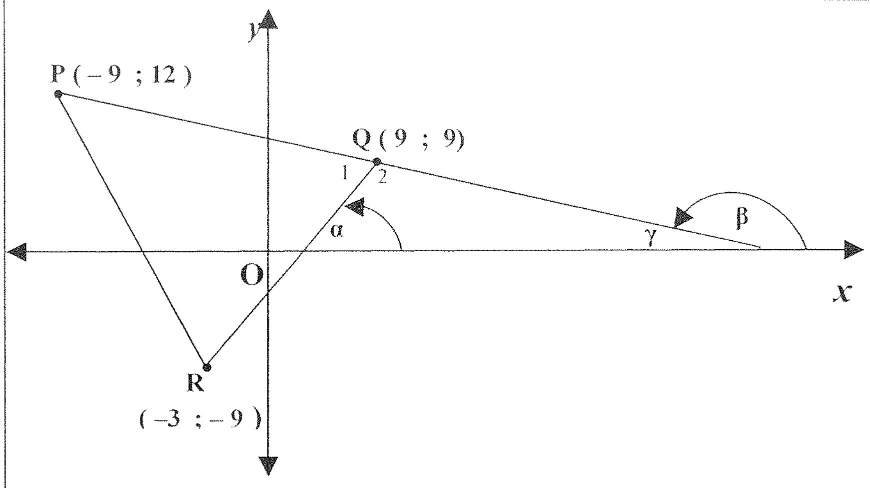
POSSIBLE ANSWERS
FEB / MARCH 2007

QUESTION 1 [25]		
		
1.1	$m_{PQ} = \frac{9-12}{9+9} = -\frac{1}{6}$ ✓M ✓A (2)	gradient form & subst
1.2	$m_{PQ} = -\frac{1}{6}$ $\tan\beta = -\frac{1}{6}$ $\beta = 170{,}54^\circ$ ✓A $m_{RQ} = \frac{3}{2}$ $\tan\alpha = \frac{3}{2}$ ✓M $\alpha = 56{,}31^\circ$ ✓A $\hat{Q}_2 = 170{,}54^\circ - 56{,}31^\circ$ $= 114{,}23^\circ$ ✓A $\hat{Q}_1 = 180^\circ - 114{,}23^\circ$ $= 65{,}77^\circ$ ✓A **OR** $m_{PQ} = -\frac{1}{6}$ $\tan\gamma = \frac{1}{6}$ ✓A $\gamma = 9{,}46^\circ$ ✓A $m_{RQ} = \frac{3}{2}$ $\tan\alpha = \frac{3}{2}$ ✓M $\alpha = 56{,}31^\circ$ ✓A $\hat{Q}_1 = 9{,}46^\circ + 56{,}31^\circ$ $= 65{,}77^\circ$ ✓A (5)	Correct angle Inclination correct angle correct angle correct angle
1.3	$M\left(\frac{-3+9}{2} ; \frac{-9+9}{2}\right)$ ✓M $M\ (3 ; 0)$ ✓A (2)	correct formula simplification
1.4	$m_{PM} = \frac{12-0}{-9-3}$ ✓M $= -1$ ✓A $y - y_1 = m(x - x_1)$ **OR** $y = mx + c$ ✓M $y - 0 = -1(x-3)$ $y = -x + 3$ ✓A **OR** $0 = -1(3) + c$ ✓M $3 = c$ $y = -x + 3$ ✓M (4)	Correct formula Gradient of PM Substitution into any line formula Equation of line

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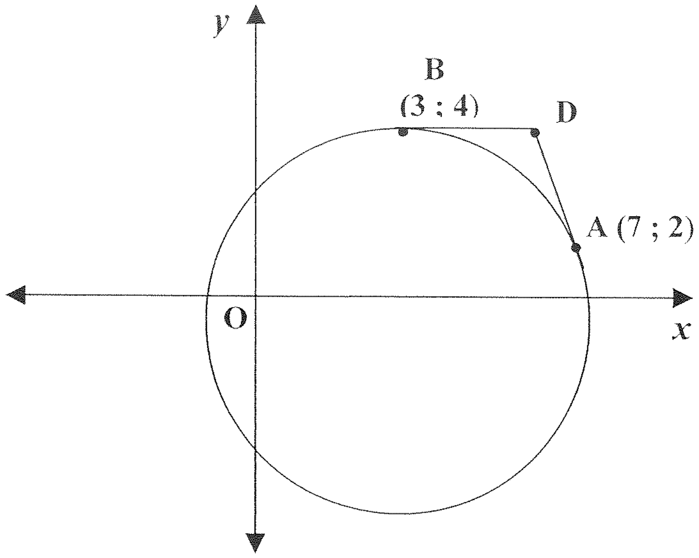
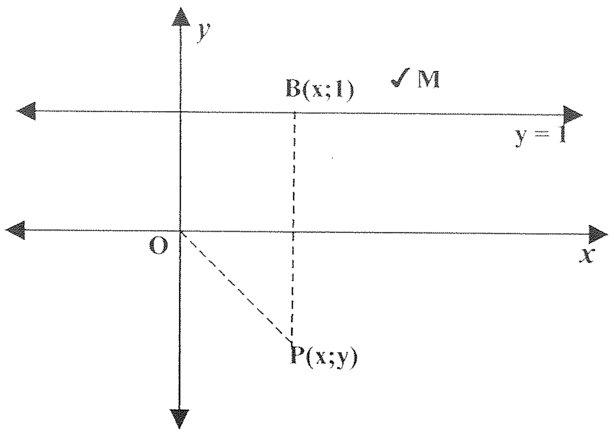
2007 -03- 14
PRETORIA
DEPT. OF EDUCATION

1.5	N (a ; b) $b = -a + 3$ ……✓M Eq.1 $QN = 5\sqrt{5}$ ✓A ✓M $(a-9)^2 + (b-9)^2 = (5\sqrt{5})^2$ ………. Eq. 2 substitute Eq. 1 into Eq. 2 $(a-9)^2 + (-a-6)^2 = 125$ ✓CA $a^2 - 18a + 81 + a^2 + 12a + 36 - 125 = 0$ ✓ CA ✓ CA $2a^2 - 6a - 8 = 0$ ✓ CA $2(a-4)(a+1) = 0$ ✓M $a = -1$ ✓ CA ✓ CA $b = -(-1) + 3 = 4$ N (–1 ; 4) (10)	subst. in equation of line Use of distance formula & equating Correct substitution simplification simplification factorizing value of a value of b
1.6	$x = -1$ ✓ CA ✓ M **OR** $x = a$ ✓ CA ✓ M (2)	Form

QUESTION 2 [25]		
2.1		
2.1.1	If Q(3;–1) $d(QB) = \sqrt{(3-3)^2 + (-1-4)^2}$ ✓M $= 5$ ✓A $d(QA) = \sqrt{(3-7)^2 + (-1-2)^2}$ ✓M $= 5$ ✓A ✓CA $\therefore$ (3;-1) is the centre since radii are equal **or** QB = QA **OR** Centre $(a ; b)$ $\therefore (3-a)^2 + (4-b)^2 = r^2$ ✓A and $(7-a)^2 + (2-b)^2 = r^2$ ✓A $9 - 6a + a^2 + 16 - 8b + b^2 = r^2$ ..... Eq. 1 $49 - 14a + a^2 + 4 - 4b + b^2 = r^2$ .....Eq. 2 Eq. 1 – Eq. 2: $-40 + 8a + 12 - 4b = 0$ ✓M $-7 + 2a = b$ when a = 3 ✓A LHS $-7 + 2(3) = -1$ $= b$ ✓A $\therefore (3 ; -1)$ centre. (5)	Substitution simplification substitution simplification conclusion
2.1.2	Centre (3 ; –1) $r^2 = (3-3)^2 + (-1-4)^2$ ✓A $= 25$ ✓M ✓CA Equation of circle is : $(x-3)^2 + (y+1)^2 = 25$ (3)	Correct value r Subst. into circle eq. Correct form

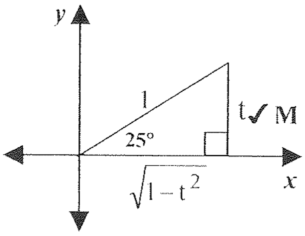
2.1.3	$m_{rad} = \frac{2+1}{7-3} = \frac{3}{4}$ ✓M ✓A $m_{tan} = -\frac{4}{3}$ ✓CA $y - 2 = -\frac{4}{3}(x - 7)$ ✓M ✓A **OR** $3y = -4x + 28 + 6$ **OR** $3y = -4x + 34$ (5)	Correct subst. and simplification Perpendicular slopes Subst. slope and point Simplification Form of straight line
2.1.4	Equation of AD : $3y = -4x + 34$ ✓CA ∴ Equation of BD is : $y = 4$ ✓M $\therefore 3y = -4x + 34$ $\therefore 3(4) = -4x + 34$ ✓A ✓M $\therefore x = \frac{11}{2}$ ✓A $D\left(\frac{11}{2};4\right)$ ✓A **OR** D (n ;m) , D (n ;3) ✓A $BD^2 = DA^2$ ✓M $(m-4)^2 + (n-3)^2 = (m-2)^2 + (n-7)^2$ ✓A $m^2 - 8m + 16 + n^2 - 6n + 9 = m^2 - 4m + 4 + n^2 - 14n + 49$ ✓CA $-4m + 8n = 28$ $m - 2n = -7$ ✓CA but $m = 4$ $-2n = -7 - 4$ $n = \frac{11}{2}$ ✓A $D\left(\frac{11}{2};4\right)$ (6)	

<table>
<tr><td>2.2</td><td>

$PB^2 = PO^2 + 3$ ✓M
✓A ✓A
$(x - x)^2 + (y - 1)^2 = x^2 + y^2 + 3$
$y^2 - 2y + 1 = x^2 + y^2 + 3$ ✓CA
$-2y = x^2 + 2$ ✓CA
OR $y = -\frac{x^2}{2} - 1$ (6)</td><td>Coordinates of B

Setting up correct equation

Substitution X 2
Simplification

Any form of equation</td></tr>
<tr><td>**QUESTION 3**</td><td>**[15]**</td><td></td></tr>
<tr><td>3.1.1</td><td>$\sin 25° = \sqrt{1 - \cos^2 25°}$ ✓M
$= \sqrt{1 - (\sqrt{1 - t^2})^2}$
$= t$ ✓A
OR


$\sin 25° = t$ ✓A
(2)</td><td>Correct identity

Substitution

Use of Pythagoras

substitution</td></tr>
<tr><td>3.1.2</td><td>$\cot 115° = -\cot 65°$
= **OR** $-\tan 25°$ ✓A
$= -\frac{t}{\sqrt{1 - t^2}}$ ✓CA
(2)</td><td>Reduction
cofunction

substitution</td></tr>
<tr><td>3.1.2</td><td>$\sin 50° = \sin 2(25°)$ ✓M
$= 2 \sin 25° \cos 25°$ ✓A
✓CA ✓CA
$= 2t\sqrt{1 - t^2}$
(4)</td><td>Reduction
Compound ∠ expansion

Substitution</td></tr>
</table>

3.2

$$\frac{\sin(1530°-x)\sec(x-360°)\tan(x-180°)}{\sin(-x)\operatorname{cosec}(x-90°)}$$

$$=\frac{\overset{✓A}{\cos x}.\overset{✓A}{\sec(x)}.\overset{✓A}{(\tan x)}}{\underset{✓A}{-\sin x}\,.\,\underset{✓A}{-\sec x}}$$

One for each correct reduction

$$=\frac{\overset{✓CA}{\cos x.\sin x}}{\sin x.\cos x}$$

One for each correct reduction

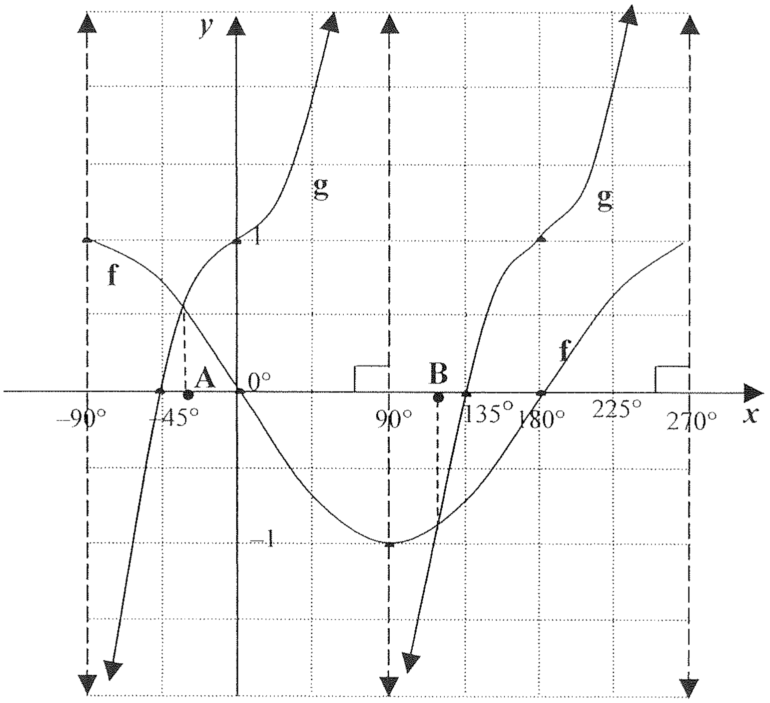
$= 1$ ✓CA (7)

Simplification

QUESTION 4 **[18]**

4.1

$g(x) = 1 + \tan x$ and $f(x) = -\sin x$



	f	g
shape	✓	✓
x-int	✓	✓
y-int	✓	✓
asym.		✓
TP Inflection		✓ ✓

(9)

4.2.1 Indicated on graph ✓A ✓A ✓M (3)

1M use of A, B, ..
One for each

4.2.2 0° ; 180° ✓A ✓A (2)

One for each value

4.2.3 $\overset{✓A}{-90°} < x \le \overset{✓A}{-45°}$; $0° \le x < \overset{✓A}{90°}$; notation ✓Notation (4)

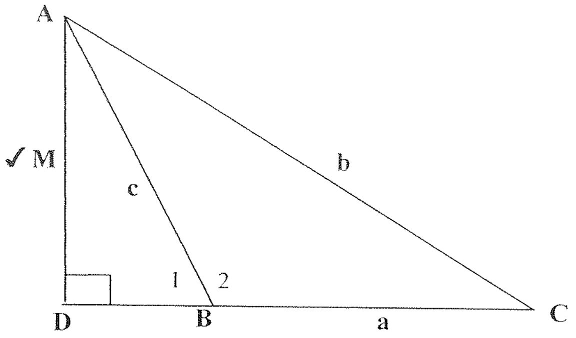
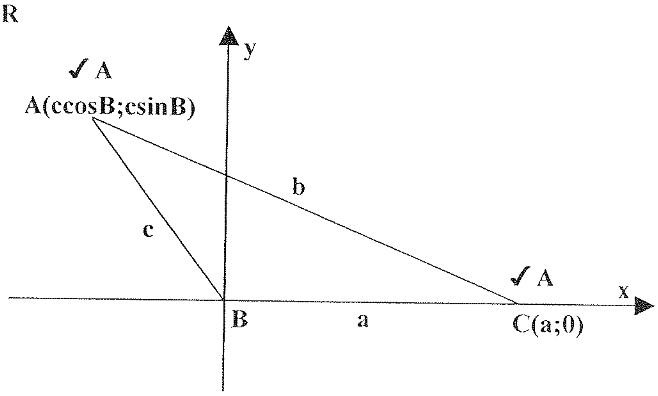
OR $x \in (-90° ; -45°] \cup [0° ; 90°)$

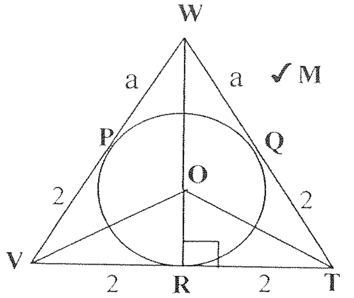
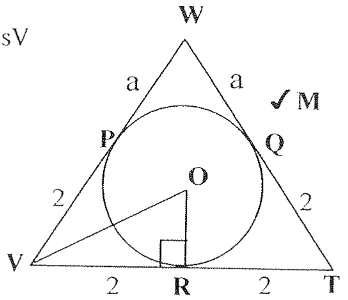
One for each set of end points
One for notation

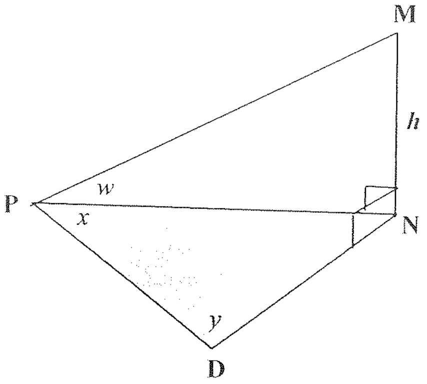
QUESTION 5	[25]	
5.1	$\sin\theta = \cos\theta$ $\tan\theta = 1$ ✓A **OR** $\sin\theta = \sin(90° - \theta)$ ✓A Ref Angle = 45° ✓CA $2\theta = 90° + k.360°$ ✓CA ✓CA ✓A $\theta = 45° + k.180°, n \in Z$ $\theta = 45° + n.180°$ ✓CA ✓A $\theta = 45° + n.180°, n \in Z$ (4)	Identity Ref. ∠ General form and $n \in Z$
5.2	$\cos\theta = m + 1$ $-1 \leq m + 1 \leq 1$ ✓M $-2 \leq m \leq 0$ ✓A (2)	Correct interval Simplification
5.3.1	LHS: $\sin 3\theta = \sin(2\theta + \theta)$ ✓M $= \sin2\theta\cos\theta + \cos2\theta\sin\theta$ ✓M ✓A ✓A $= 2\sin\theta\cos\theta.\cos\theta + (1 - 2\sin^2\theta)\sin\theta$ ✓A $= 2\sin\theta(1 - \sin^2\theta) + \sin\theta - 2\sin^3\theta$ $= 2\sin\theta - 2\sin^3\theta + \sin\theta - 2\sin^3\theta$ $= 3\sin\theta - 4\sin^3\theta$ = RHS **OR** LHS: $\sin 3\theta = \sin(2\theta + \theta)$ ✓M $= \sin2\theta\cos\theta + \cos2\theta\sin\theta$ ✓M ✓A $= 2\sin\theta\cos^2\theta + \cos2\theta\sin\theta$ $= \sin\theta(2\cos^2\theta + \cos2\theta)$ ✓A $= \sin\theta(2\cos^2\theta + 2\cos^2\theta - 1)$ $= \sin\theta(4\cos^2\theta - 1)$ ✓A $= \sin\theta(4(1 - \sin^2\theta) - 1)$ $= \sin\theta(4 - 4\sin^2\theta - 1)$ $= 3\sin\theta - 4\sin^3\theta$ = RHS (5)	Expanding 3 θ Expansion of $\sin(2\theta + \theta)$ Expansion of $\sin2\theta$ & $\cos2\theta$ Expansion of $\cos^2\theta$
5.3.2	$3\sin\theta - 4\sin^3\theta = -\text{cosec}\,\theta$ $3\sin\theta - 4\sin^3\theta + \text{cosec}\theta = 0$ ✓M $3\sin^2\theta - 4\sin^4\theta + 1 = 0$ ✓M $4\sin^4\theta - 3\sin^2\theta - 1 = 0$ $(4\sin^2\theta + 1)(\sin^2\theta - 1) = 0$ ✓A $\sin^2\theta = \frac{1}{4}$ or $\sin^2\theta = 1$ ✓A	Substitution Substitution Factorizing Values of sin θ

	✓A $\sin\theta = \pm\frac{1}{2}$ or $\sin\theta = \pm 1$ ✓CA ✓CA $\theta = 30^\circ$ or $\theta = 90^\circ$ ref $\angle$s $\theta = -30^\circ ; -90^\circ ; -150^\circ$ ✓CA (8)	Ref $\angle$ Values of θ

5.4	$2\cot 2\theta \,.\, \tan\theta = 2 - \sec^2\theta$	
	LHS : $2\cot 2\theta \,.\, \tan\theta = \overset{\checkmark A}{\frac{2\cos 2\theta}{\sin 2\theta}} \,.\, \frac{\sin\theta}{\cos\theta}$ ✓A	2 Identities
	$= \frac{2(2\cos^2\theta - 1).\sin\theta}{2\sin\theta.\cos\theta.\cos\theta}$ ✓A ✓A	2 Identities
	$= \frac{(2\cos^2\theta - 1)}{\cos^2\theta}$ ✓CA	
	$= 2 - \frac{1}{\cos^2\theta}$ ✓A	Simplification
	$= 2 - \sec^2\theta$ $=$ RHS	
	OR	
	LHS : $2\cot 2\theta \,.\, \tan\theta = \frac{2}{\tan 2\theta}.\tan\theta$ ✓A	Identity
	$= \frac{2}{\frac{2\tan\theta}{1-\tan^2\theta}}.\tan\theta$ ✓A	Identity
	$= \frac{2(1-\tan^2\theta).\tan\theta}{2\tan\theta}$ ✓A	Simplification
	$= 1 - \tan^2\theta$ ✓A	Simplification
	RHS : $2 - \sec^2\theta = 2 - (1 + \tan^2\theta)$ ✓A $= 1 - \tan^2\theta$ ✓A $\therefore$ LHS $=$ RHS (6)	Identity Simplification **Penalty 1 no conclusion.**

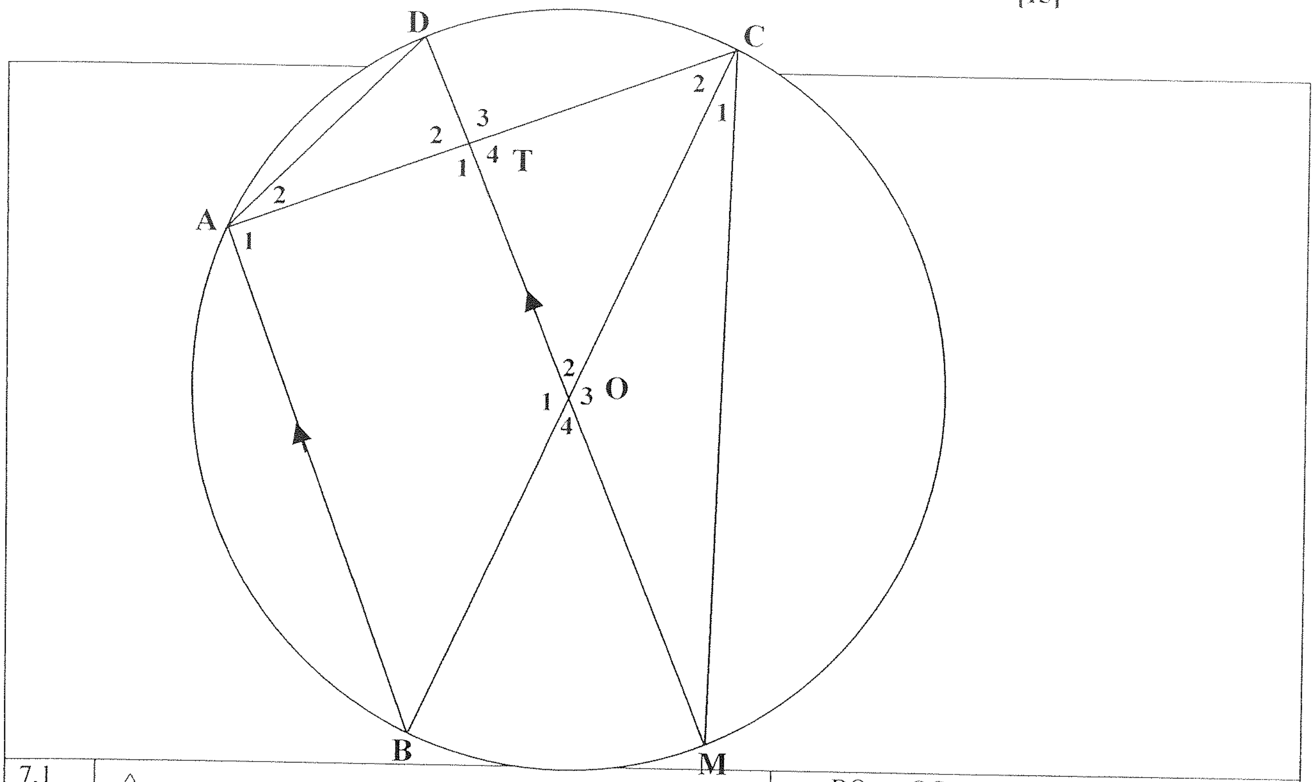
QUESTION 6	[25]	
6.1		Construction
	$b^2 = AD^2 + DC^2$ ✓ M	Pythagoras
	$= c^2 - DB^2 + (DB + a)^2$ ✓ A	expansion
	$= c^2 - DB^2 + DB^2 + 2aDB + a^2$	
	$= a^2 + c^2 + 2aDB$ ✓ CA	Simplification
	But $\cos B_2 = -\cos B_1$ ✓ M	cos in 2nd quad
	$= -\frac{DB}{c}$ ✓ A	cos ratio
	$DB = (-c)\cos B$	
	$\therefore b^2 = a^2 + c^2 - 2(a)(c)\cos B$	
	OR	
		Coordinates of A and C
	$b^2 = AC^2$	
	$= (a - c.\cos B)^2 + (0 - c.\sin B)^2$ ✓ M	Distance formula
	$= a^2 - 2.a.c.\cos B + c^2.\cos^2 B + c^2\sin^2 B$ ✓ A	Expansion
	$= a^2 + c^2(\cos^2 B + \sin^2 B) - 2.a.c.\cos B$ ✓ A	Grouping
	$= a^2 + c^2 - 2.a.c.\cos B$ ✓ A (6)	$\cos^2 B + \sin^2 B = 1$

6.2.1	In Δ WVR WR ⊥ VR ✓A VR = VP = 2 ✓A WV = WP + PV ✓M = a + 2 ✓A  $\cos V = \frac{VR}{VW}$ ✓M $= \frac{2}{2 + a}$ ✓A **OR** $WT^2 = WV^2 + VT^2 - 2WV.VT\cos V$ ✓M ✓A ✓M $(2 + a)^2 = (2 + a)^2 + 4^2 - 2(2 + a).4\cos V$ ✓A $-8(2 + a)\cos V = -16$ ✓A $\cos V = \frac{2}{2 + a}$ ✓A  (7)	Recognizing WR ⊥ VR Value of WP Value of VR Value of WV Substitution Definition of cos substitution Using cos formula Correct substitution Correct lengths on diagram Simplification Simplification Solution
6.2.2	$\cos V = \frac{2}{3} = 0{,}66$ ✓M $\hat{V} = 48{,}189°$ ✓A $\frac{\hat{V}}{2} = 24{,}0945°$ In ΔVOR $\frac{OR}{VR} = \tan\frac{V}{2}$ ✓CA $OR = 2\tan 24{,}09°$ ✓CA $= 0{,}9$ units ✓CA (5)	cosine expression value of $\hat{V}$ simplification Identity substitution Simplification

6.3.1	$\frac{h}{PN} = \tan w$ ✓M ✓A $PN = \frac{h}{\tan w}$ $\frac{PN}{\sin y} = \frac{PD}{\sin P\hat{N}D}$ ✓M  $\frac{PN}{\sin y} = \frac{PD}{\sin(180° - (x+y))}$ ✓A ✓A $PD = \frac{PN \sin(x+y)}{\sin y}$ $\therefore PD = \frac{h.\sin(x+y)}{\sin y.\tan w}$ (5)	Correct tan ratio Application of sine formula Substitution & value for $P\hat{N}D$ Reduction and substitution
6.3.2	$h = \frac{70.\sin 50°.\tan 64°}{\sin 110°}$ ✓A $= 117$ m ✓CA (2)	Making h subject Correct substitution simplification

QUESTION 7

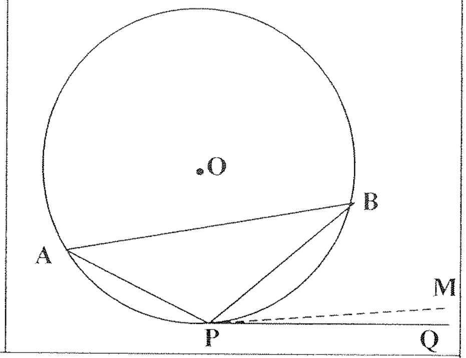
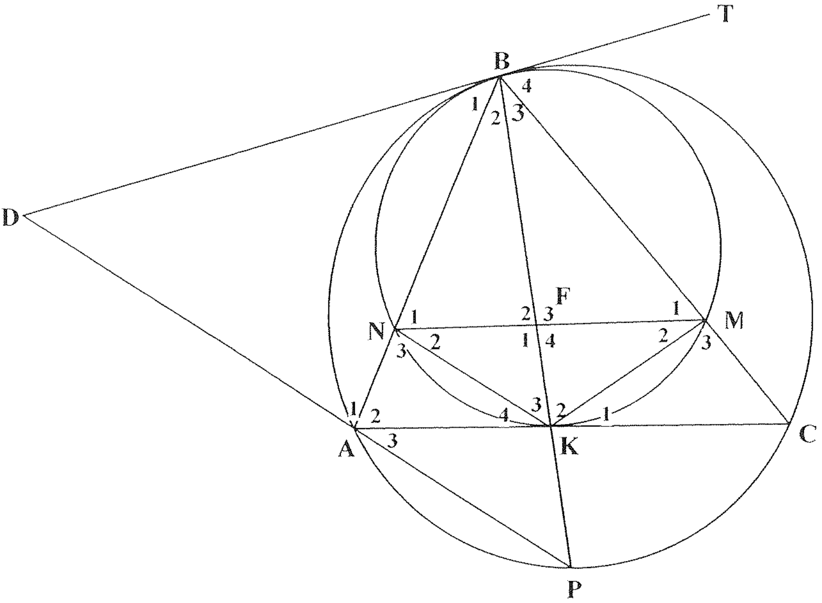
[15]



7.1	$\hat{A}_1 = 90°$ ✓S……(∠ in semi circle) ✓R $\hat{T}_4 = \hat{A}_1$ ………(corr. ∠s) ✓S/R $= 90°$ ∴ T is midpoint of AC …..(line from centre ⊥ to chord bisects chord) ✓R (4) **OR**	BO = OC (radii) ✓S/R In Δ ACB , AB // OT (given) ✓S/R ✓S ∴ AT = TC (line from centre 1 side of Δ, // to 2nd side, bisects 3rd side) ✓R

7.2	$OT = 3DT$ $OC = OT + DT$ ✓S $= 4DT$ $TC = \sqrt{OC^2 - OT^2}$ ✓S $= \sqrt{(4DT)^2 - (3DT)^2}$ $= \sqrt{7}DT$ ✓S $MC^2 = TC^2 + TM^2$ ✓S $= (\sqrt{7}\ DT)^2 + (7DT)^2$ ✓S $= 56DT^2$ ✓S $MC = \sqrt{56}DT$ **OR** $2\sqrt{14}$ DT **OR** 7,48 DT **OR** $AT = TC$; $OT = 3\ DT$ ✓S $OD = 4\ DT$ ✓S ∴ $MT = 7\ DT$ $MC^2 = MT^2 + TC^2$ ✓S $= (7\ DT)^2 + (16\ DT^2 - 9\ DT^2)$ ✓S $= 49\ DT^2 + 7\ DT^2$ ✓S $= 56\ DT^2$ $MC = \sqrt{56\ DT}$ ✓S (6)	**OR** $\Delta\ ABC\ /\!/\!/\ \Delta\ MCT$ ✓S $\therefore \frac{AD}{MC} = \frac{DT}{CT} = \frac{AT}{MT}$ ✓S but $CT = AT$ $\therefore AT^2 = DT.MT$ $= DT(7DT)$ $AT = \sqrt{7}DT$ ✓S $AD^2 = AT^2 + DT^2$ $= 7DT^2 + DT^2$ $= 8DT^2$ $AD = \sqrt{8}\ DT$ ✓S $\therefore \frac{AD}{MC} = \frac{DT}{CT}$ $\frac{\sqrt{8}\ DT}{MC} = \frac{DT}{\sqrt{7}\ DT}$ ✓S $MC = \sqrt{8}\ .\ \sqrt{7}\ DT$ $= \sqrt{56}\ DT$ **OR** $2\sqrt{14}\ DT$ ✓S **OR** 7,48 DT

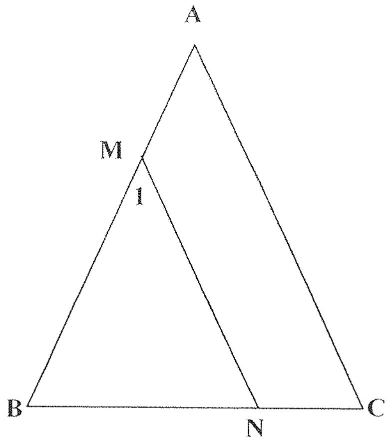
7.3	$\hat{O}_2 = 2\hat{M}$ ✓S ……….(∠ at centre = 2 ∠ at circum.) ✓R $\hat{M} = \frac{1}{2}\hat{O}_2$ $A\hat{C}M = 90° - \hat{M}$ ..(∠s of Δ) ✓S/R $= 90° - \frac{1}{2}\hat{O}_2$ $\hat{D} = A\hat{C}M$ ✓S …….(∠s in same segment) ✓R $= 90° - \frac{1}{2}\hat{O}_2$ (5)	**OR** $\hat{O}_2 = \hat{O}_4 = x$ (vert. opp. ∠'s) ✓S/R $\hat{C}_1 = \frac{x}{2}$ (∠ at centre = 2 ∠ at circum.) ✓S/R $\hat{C}_2 = 90° - x$ (∠s of Δ) ✓S/R $\hat{D} = \hat{C}_1 + \hat{C}_2$ (∠s in same segment) ✓S/R $= \frac{x}{2} + 90° - x = 90° - \frac{1}{2}x$ ✓S

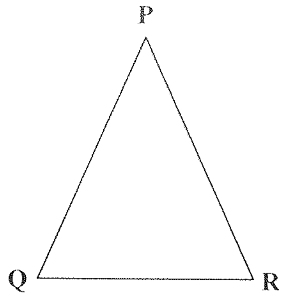
QUESTION 8	[25]	
8.1	✓M Construction : Draw tangent PM to circle O through P Proof : $B\hat{P}M = \hat{A}$ ....✓S.(tan-chord) ✓R But $B\hat{P}Q = \hat{A}$ ....(given) ✓S $\therefore$ $B\hat{P}Q = B\hat{P}M$ ✓S ✓S Which is impossible unless PM and PQ coincides $\therefore$ PQ is a tangent (6)	
8.2		
8.2.1	$\hat{B}_1 = \hat{M}_1$ ..✓S.......... (tan-chord) ✓R $\hat{B}_1 = \hat{C}$ ✓S...............(tan-chord) $\therefore$ $\hat{M}_1 = \hat{C}$ $\therefore$ MN ‖ CA .... (corr. ∠s =) ✓R (4)	
8.2.2	$\hat{K}_1 = \hat{M}_2$ ....(alt. ∠s) ✓S/R $\hat{K}_1 = \hat{N}_2$.✓S................(tan-chord) ✓R $\therefore$ ΔKMN is isosceles ...... (2 equal ∠s) (3)	

8.2.3	$\hat{N}_2 = \hat{K}_4$ ....(alt. $\angle$s) ✓S $\hat{N}_2 = \hat{B}_3$ ✓S ......($\angle$ s in same segment) ✓R $\hat{B}_3 = \hat{A}_3$ ......($\angle$ s in same segment) ✓S/R $\therefore \hat{K}_4 = \hat{A}_3$ $\therefore$ NK || AP ✓S (alt. $\angle$' =) $\therefore \frac{BN}{NA} = \frac{BK}{KP}$ ......(line || to one side of Δ) ✓S/R but $\frac{BN}{NA} = \frac{BM}{MC}$ ......(line || to one side of Δ) ✓S/R $\therefore \frac{BK}{KP} = \frac{BM}{MC}$ (7)	**OR** Join P to C ✓S $\hat{B}_4 = \hat{K}_2$ ✓S (tan–chord theorem) ✓R $\hat{B}_4 = B\hat{P}C$ (tan–chord theorem) ✓S/R $\therefore \hat{K}_2 = B\hat{P}C$ and they are corresp. ✓S/R KM // PC (coresp. $\angle$s =) ✓S/R $\frac{BK}{KP} = \frac{BM}{MC}$ (line || to one side of Δ) ✓S/R
8.2.4	$\hat{A}_3 = \hat{B}_3$ ✓S ....($\angle$s in same segment) ✓R $\hat{B}_3 = \hat{B}_2$ ..✓S.......(equal chords subt equal $\angle$s) ✓R $\therefore \hat{A}_3 = \hat{B}_2$ ✓S $\therefore$ DA is a tangent to the circle through A, B and K **OR** $\hat{A}_3 = \hat{B}_3$ ✓S...............($\angle$s in same segment) ✓R $\hat{K}_1 = \hat{B}_3$ ✓S..............(tan-chord) ✓R $\hat{K}_1 = \hat{M}_2$ ....(alt. $\angle$s, lines //) ✓S/R $\hat{M}_2 = \hat{B}_2$ .... ($\angle$s in same segment) $\therefore \hat{A}_3 = \hat{B}_2$ $\therefore$ DA is a tangent to the circle through A, B and K **OR** $\hat{A}_1 = \hat{B}_2 + \hat{P}$ ....(ext $\angle$ of Δ) ✓S/R $\hat{B}_2 = \hat{M}_2$ ✓S ....($\angle$s in same segment) ✓R . $\hat{M}_2 = \hat{N}_2$ ....(proved) $\hat{N}_2 = \hat{K}_4$ ....(alt. $\angle$' =, lines //) ✓S/R $\therefore \hat{B}_2 = \hat{K}_4$ $\hat{P} = \hat{K}_3$ ....(corresp $\angle$' =, lines //) ✓S/R $\therefore \hat{A}_1 = \hat{K}_3 + \hat{K}_4$ $\therefore$ DA is a tangent to the circle through A, B and K (5)	

QUESTION 9 [27]

9.1





Construction : On AB and BC cut off BM and BN respectively such that BM = QP and BN = QR ✓S

Proof : In ΔBMN and ΔQPR

BM = QP ……………….(constr.)
$\hat{B} = \hat{Q}$ ……………….(given)
BN = QR ……………….(constr.)
✓S

Δ BMN ≡ Δ QPR ……………..(s, ∠,s) ✓R

∴ $\hat{M}_1 = \hat{P}$

$= \hat{A}$ ✓S/R

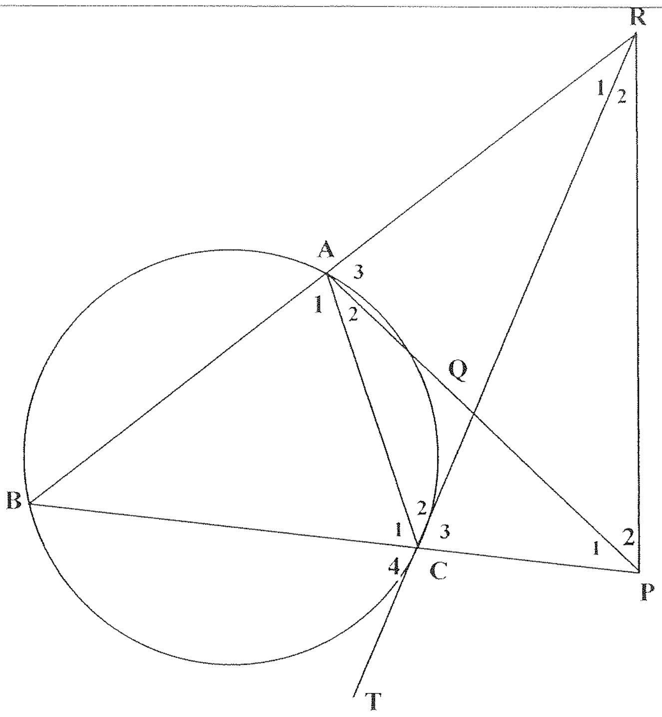
∴ MN || AC …………………(corr. ∠s =, lines //)

$\therefore \frac{AB}{MB} = \frac{BC}{BN}$ ✓S ……….(line || to one side of Δ) ✓R

$\therefore \frac{AB}{PQ} = \frac{BC}{QR}$ ………(MB = PQ and BN = QR) ✓R

(7)

9.2



9.2.1(a)

$\hat{C}_3 = C\hat{P}R$ ......(∠s opp equal sides) ✓S/R

$\hat{C}_3 + \hat{C}_2 = \hat{A}_1 + \hat{B}$ ....(ext ∠ of Δ) ✓S/R

$\hat{C}_2 = \hat{B}$ ..✓S.........(tan-chord) ✓R

∴ $\hat{C}_3 = \hat{A}_1$

∴ $\hat{A}_1 = C\hat{P}R$ ....(both = $\hat{C}_3$) ✓R

∴ ACPR is a cyclic quadrilateral .... (conv. ext ∠ of quad)

OR

$\hat{C}_3 = \hat{C}_4$ ....(vert. opp. ∠s) ✓S/R

$\hat{A}_1 = \hat{C}_4$ ✓S ....(tan-chord) ✓R

∴ $C\hat{P}R = \hat{C}_3$

$= \hat{A}_1$ ✓S

∴ ACPR is a cyclic quadrilateral ....✓R (conv. ext ∠ of quad)

(5)

9.2.1(b)

In Δ CBA and Δ RPA

$\hat{P}_2 = \hat{C}_2$ ✓S ....(∠s in same segment) ✓R

$= \hat{B}$ ✓S (proved in 9.2.1(a))

$\hat{B} = \hat{P}_2$ ....(proved)

$\hat{C}_1 = A\hat{R}P$ ✓S ....(ext ∠ of cyclic quad) ✓R

	$\hat{A}_1 = \hat{A}_3$ ……….(3rd ∠ of Δ) $\therefore \Delta CBA \mid\mid\mid \Delta RPA$ ……..(∠ ∠ ∠) ✓R (6)	
9.2.1(c)	$\frac{RP}{CB} = \frac{RA}{CA}$ (from 9.2.2(b)) ✓S $RP = \frac{CB.RA}{AC}$ but RP = RC given $\therefore RC = \frac{CB.RA}{AC}$ ✓S (2)	
9.2.1(d)	In ΔRAC and ΔRCB ✓S $\hat{C}_2 = \hat{B}$ ………………..(tan-chord) ✓S $\hat{R}_1$ is common $R\hat{C}B = R\hat{A}C$ ……(3rd is ∠) ✓R $\therefore \Delta RAC \mid\mid\mid \Delta RCB$ …………..(∠ ∠ ∠) $\therefore \frac{AC}{CB} = \frac{RC}{RB}$ ✓S (Δ 's $\mid\mid\mid$) RB. AC = RC . CB (4)	
9.2.2	$\frac{CB}{RP} = \frac{CA}{RA}$ …….. from 9.2.1(b) $\frac{CB}{RC} = \frac{CA}{RA}$ …….RC = RP ✓S $AC = \frac{CB.RA}{RC}$ …….(i) from 9.2.2 ✓S $AC = \frac{RC.CB}{RB}$ $\therefore \frac{CB.RA}{RC} = \frac{RC.CB}{RB}$ ✓S $\therefore RC^2 = RA.RB$ **OR** RP = RC $RC = \frac{CB.RA}{CA}$ ✓S $RC = \frac{AC.RB}{CB}$ ✓S $RC^2 = \frac{CB.RA}{CA} . \frac{AC.RB}{CB}$ ✓S $= RA.RB$ (3)	

TOTAL MARKS : 200