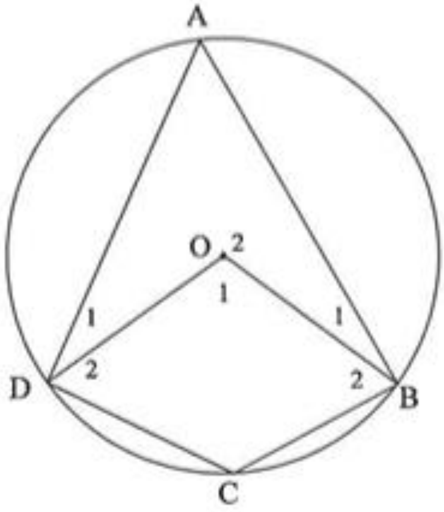
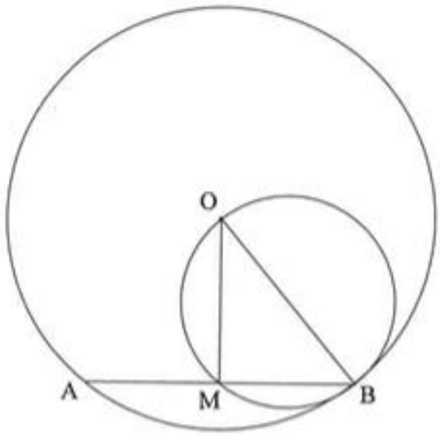
8.2 In the diagram, O is the centre of the circle and ABCD is a cyclic quadrilateral. OB and OD are drawn.



If $\hat{O}_1 = 4x + 100°$ and $\hat{C} = x + 34°$, calculate, giving reasons, the size of x. (5)

8.3 In the diagram, O is the centre of the larger circle. OB is a diameter of the smaller circle. Chord AB of the larger circle intersects the smaller circle at M and B.



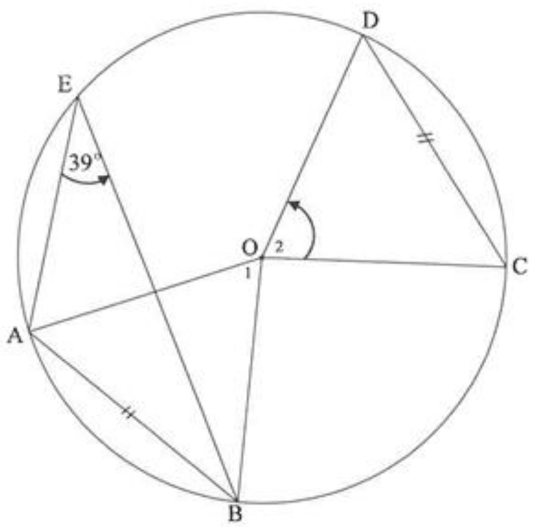
8.3.1 Write down the size of $O\hat{M}B$. Provide a reason. (2)

8.3.2 If $AB = \sqrt{300}$ units and $OM = 5$ units, calculate, giving reasons, the length of OB. (4)

[16]

QUESTION 9

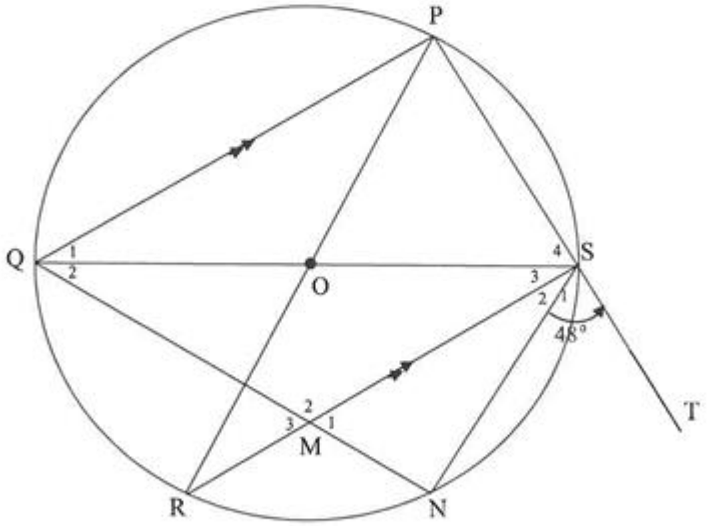
9.1 In the figure, O is the centre of the circle. A, B, C, D and E lie on the circle such that chord AB and chord DC are equal in length and $A\hat{E}B = 39°$.



9.1.1 Determine the size of $\hat{O}_1$. (2)

9.1.2 Determine the size of $\hat{O}_2$. (2)

10.2 In the figure, QS and PR are diameters of the circle with centre O such that PQ || SR. PS is produced to T. N is a point on the circle such that $\hat{Q}_1 = \hat{Q}_2$. SN is drawn.
RS intersects QN at M. $\hat{S}_1 = 48°$



10.2.1 Determine, with reasons, the size of:

(a) $\hat{Q}_1$ (3)

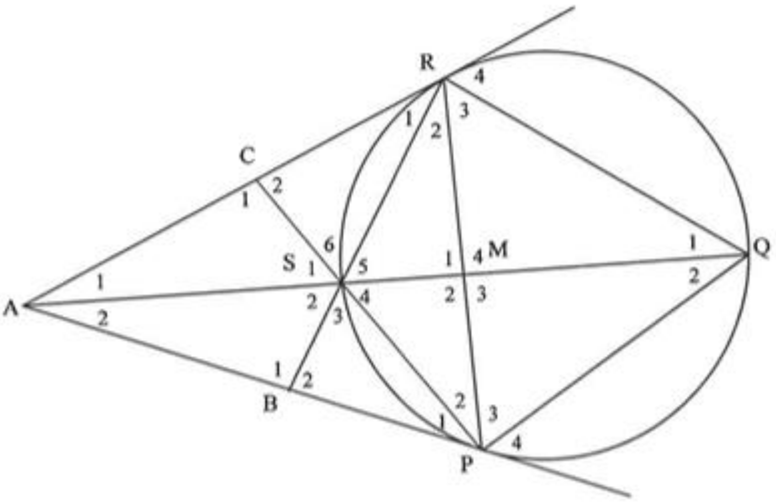
(b) $\hat{R}$ (2)

(c) $\hat{M}_1$ (2)

10.2.2 Prove that ST is a tangent to the circle passing through M, N and S. (2)
[14]

QUESTION 10

In the diagram, PQRS is a cyclic quadrilateral such that PQ = PR. The tangents to the circle through P and R meet QS produced at A. RS is produced to meet tangent AP at B. PS is produced to meet tangent AR at C. PR and QS intersect at M.



Prove, giving reasons, that:

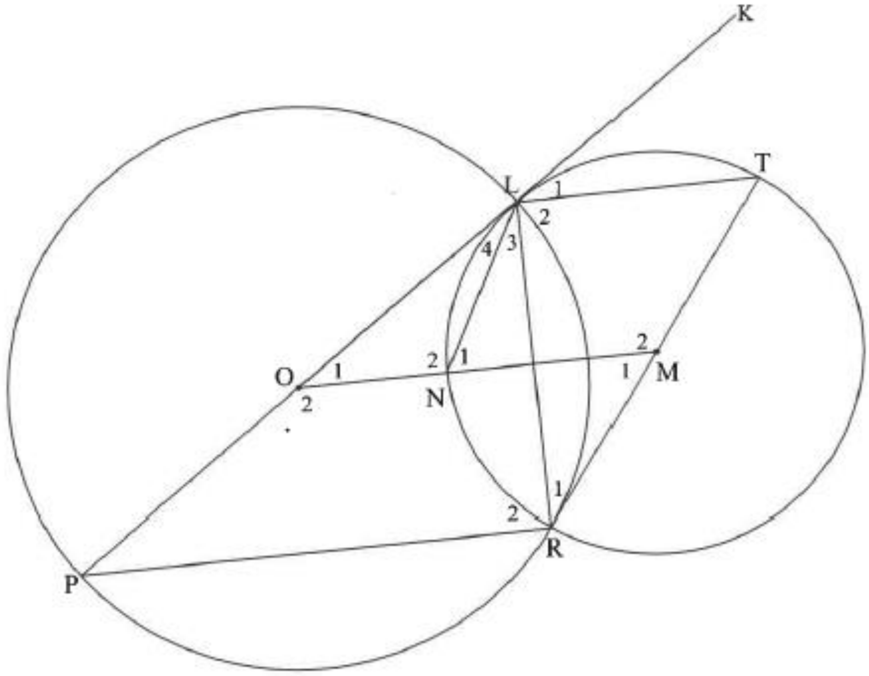
10.1 $\hat{S}_3 = \hat{S}_4$ (5)

10.2 SMRC is a cyclic quadrilateral (4)

10.3 RP is a tangent to the circle passing through P, S and A at P (6)

[15]

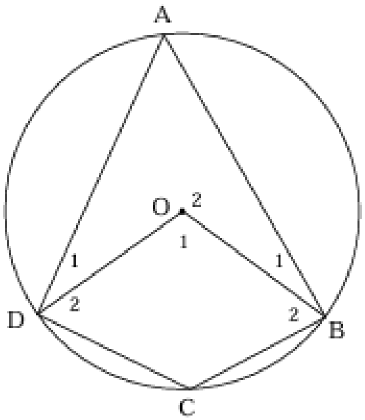
9.2 In the diagram, POL is a diameter of the larger circle with centre O. TMR is a diameter of the smaller circle with centre M. The two circles intersect at L and R. PLK is a tangent to the smaller circle at L and TR is a tangent to the larger circle at R. OM intersects the smaller circle at N. Straight lines LT, LR, LN and PR are drawn.



Prove, giving reasons, that:

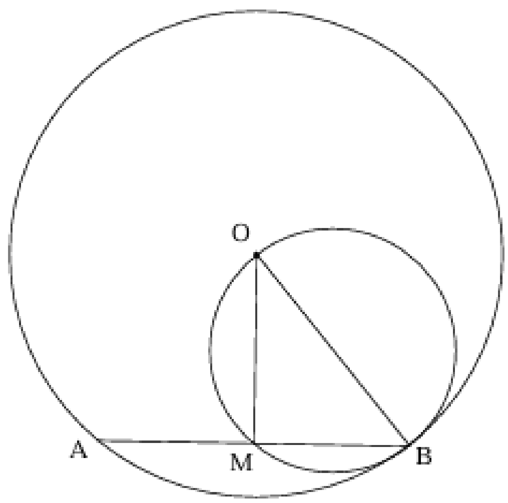
9.2.1	LT ∥ PR	(4)
9.2.2	LORM is a cyclic quadrilateral, if it is also given that LT ∥ OM	(5)
9.2.3	LN bisects $O\hat{L}R$	(4)
		[20]

8.2



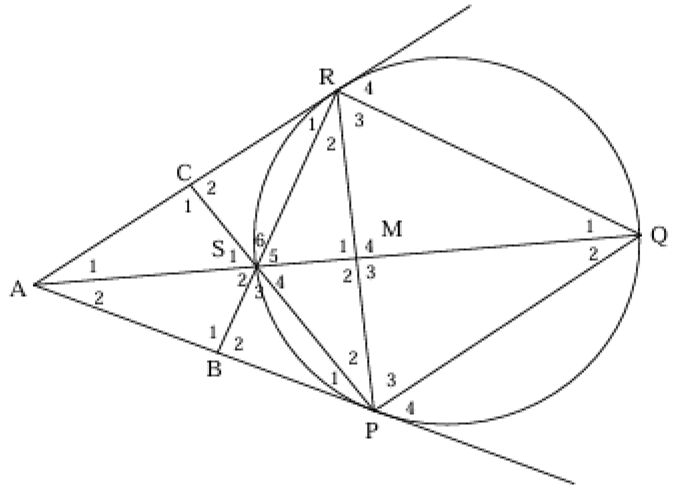
8.2	$\hat{O}_1 = 4x + 100°$ [given] $\therefore \hat{A} = 2x + 50°$ [∠ at centre = 2 ×∠ at circumference] $x + 34° + 2x + 50° = 180°$ [opp ∠s of cyclic quad] $3x = 96°$ $x = 32°$ **OR** $\hat{O}_2 = 2x + 68°$ [∠ at centre = 2 ×∠ at circumference] $4x + 100° + 2x + 68° = 360°$ [∠s round a pt] $6x = 192°$ $x = 32°$ **OR** $\hat{O}_2 = -4x + 260°$ [∠s round a pt] $2\hat{C} = -4x + 260°$ [∠ at centre = 2 ×∠ at circumference] $\hat{C} = -2x + 130°$ $x + 34° = -2x + 130°$ $3x = 96°$ $x = 32°$	 ✓ S ✓ R ✓ S ✓ R ✓ answer (5) ✓ S ✓ R ✓ S ✓ R ✓ answer (5) ✓ S ✓ R ✓ S ✓ R ✓ answer (5)

8.3



8.3.1	$\hat{OMB} = 90°$ [∠ in semi circle]	✓ S ✓ R (2)
8.3.2	$AB = \sqrt{300} = 10\sqrt{3}$ $\therefore MB = 5\sqrt{3}$ [line from centre ⊥ to chord] $OB^2 = OM^2 + MB^2$ [Pythagoras] $OB^2 = 5^2 + (5\sqrt{3})^2$ $OB = 10$ units	✓ S ✓ R ✓ S ✓ answer (4)
		[16]

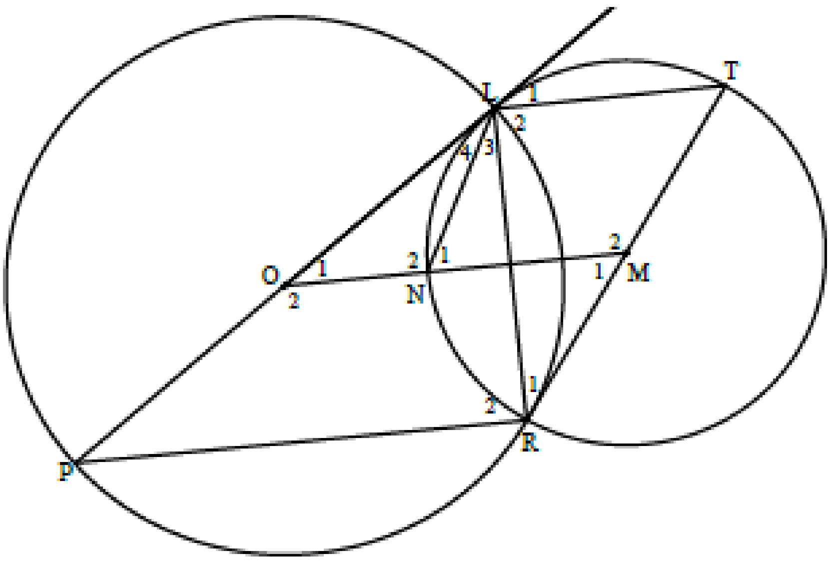
QUESTION/*VRAAG 10*



10.1	$\hat{S}_3 = P\hat{Q}R$ $\hat{R}_3 = P\hat{Q}R$ $\therefore \hat{S}_3 = \hat{R}_3$ But $\hat{S}_4 = \hat{R}_3$ $\therefore \hat{S}_3 = \hat{S}_4$	[ext ∠ of cyclic quad] [∠s opp equal sides] [∠s in the same seg]	✓ S ✓ R ✓ S / R ✓ S ✓ R (5)
10.2	$\hat{R}_1 + \hat{R}_2 = P\hat{Q}R$ $\hat{S}_4 = P\hat{Q}R$ $\therefore \hat{S}_4 = \hat{R}_1 + \hat{R}_2$ SMRC is a cyclic quad	[tan chord theorem] [proved in 10.1] [converse ext ∠ of cyclic quad]	✓ S ✓ R ✓ S ✓ R (4)
10.3	$\hat{S}_3 = \hat{R}_2 + \hat{P}_2$ $\hat{S}_4 = \hat{P}_1 + \hat{A}_2$ $\therefore \hat{R}_2 + \hat{P}_2 = \hat{A}_2 + \hat{P}_1$ But $\hat{P}_1 = \hat{R}_2$ $\therefore \hat{P}_2 = \hat{A}_2$ RP is a tangent to the circle	[ext ∠ of Δ] [ext ∠ of Δ] [tan chord theorem] [converse tan chord theorem] **OR** [∠ between line and chord] **OR** [converse alt seg theorem]	✓ S ✓ R ✓ S ✓ S ✓ R ✓ R (6)

	In ΔMSP and ΔMPA	
	$\hat{M}_2$ is common	✓ S
	AR = AP [tans from same point]	✓ S / R
	$\hat{R}_1 + \hat{R}_2 = \hat{P}_1 + \hat{P}_2$ [$\angle$s opp equal sides]	✓ S
	$\hat{S}_4 = \hat{R}_1 + \hat{R}_2$ [proved in 10.2]	
	$\therefore \hat{S}_4 = \hat{P}_1 + \hat{P}_2$	✓ S
	$\therefore \hat{P}_2 = \hat{A}_2$ [sum of $\angle$s in Δ]	✓ S
	RP is a tangent to the circle [converse tan chord theorem]	✓ R (6)
		[15]

TOTAL/TOTAAL: 150



9.2.1	$\hat{L}_3 = 90°$ [∠ in semi-circle/ *∠ in halwe sirkel*] OR $\hat{L}_1 = \hat{R}_1$ [tan chord theorem/ *raaklyn-koordst.*] $\hat{R}_3 = 90°$ [∠ in semi-circle] *∠ in halwe sirkel*] $\hat{R}_1 = \hat{P}$ [tan chord theorem] *raaklyn-koordst.*] $\therefore \hat{L}_3 = \hat{R}_3$ $\therefore \hat{L}_1 = \hat{P}$ $\therefore$ LT ∥ PR [alt ∠s =/*verw. ∠e =*] $\therefore$ LT ∥ PR [corresp. ∠s =/ *ooreenk. ∠e =*]	✓ S ✓ R ✓ S/R ✓ R (4)
9.2.2	$\hat{L}_1 = \hat{R}_1$ [tan chord theorem/*raaklyn-koordst.*] $\hat{L}_1 = \hat{O}_1$ [corresp. ∠s; LT ∥ OM/*ooreenk. ∠e; LT ∥OM*] $\therefore \hat{R}_1 = \hat{O}_1$ $\therefore$ L, O, R and M are concyclic. $\therefore$ LORM is a cyclic quadrilateral [converse ∠s in the same seg/ *omgekeerde ∠e in dies. sirkel segm*]	✓ S ✓ R ✓ S/R ✓ S ✓ R (5)
9.2.3	$O\hat{L}R = \hat{M}_1$ [∠s in the same seg/*∠e in dieselfde segment*] $2\hat{L}_3 = \hat{M}_1$ [∠ at centre = 2 × ∠ at circumference/ *midpt. ∠ = 2 × omtreks ∠*] $\therefore O\hat{L}R = 2\hat{L}_3$ $\therefore \hat{L}_4 = \hat{L}_3$ $\therefore$ LN bisects $O\hat{L}R$	✓ S/R ✓ S ✓ R ✓ S (4)
		[20]