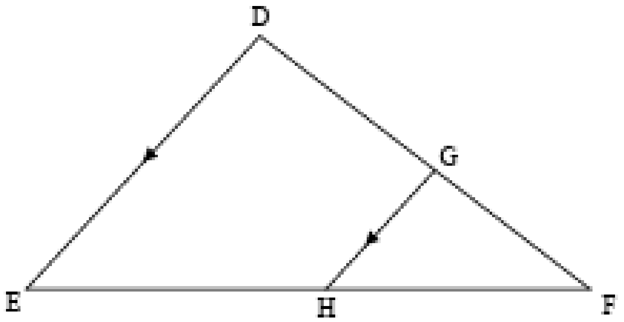
SIMILARITY AND PROPORTIONALITY 2026 MEMO

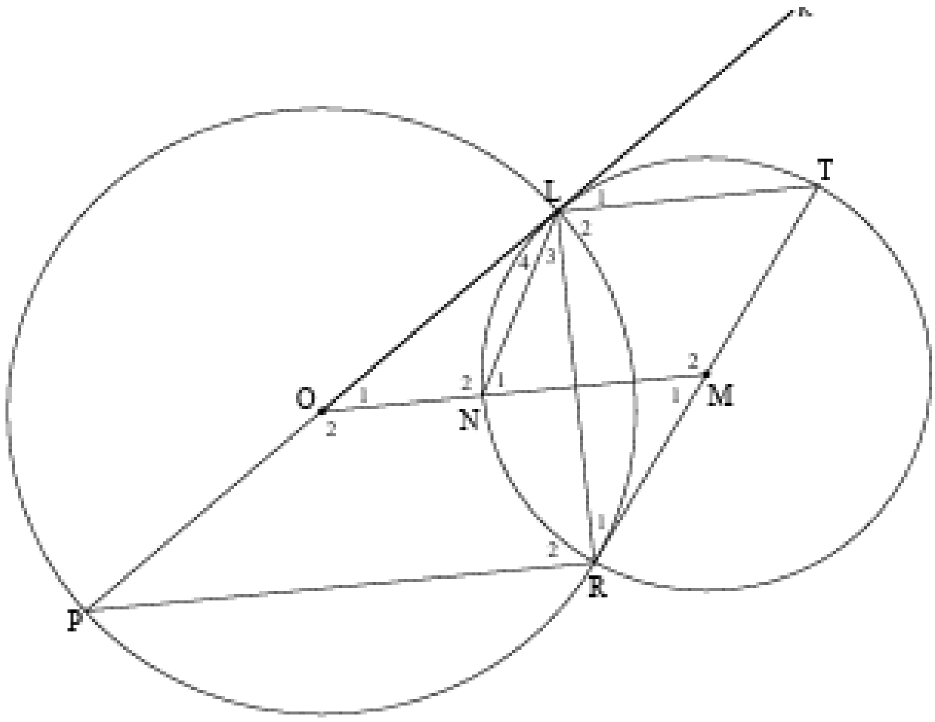
QUESTION/*VRAAG* 9

9.1



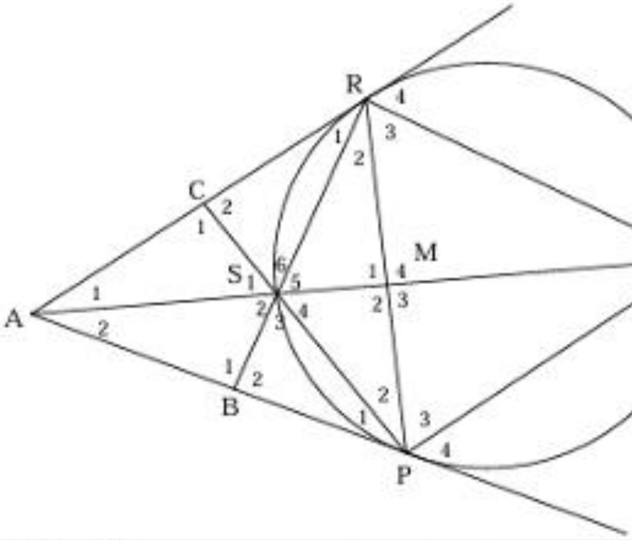
9.1.1	$\frac{HF}{EH}=\frac{GF}{GD}=\frac{2}{5}$ [line ∥ to one side of Δ/*lyn* ∥ *een sy van* Δ] **OR** [prop theorem; GH∥DE/*eweredigheidst.; GH* ∥ *DE*]	✓ S ✓ R (2)
9.1.2	$\frac{EH}{EF}=\frac{DG}{DF}=\frac{5}{7}$ [line ∥ to one side of Δ/*lyn* ∥ *een sy van* Δ] **OR** [prop theorem; GH∥DE/*eweredigheidst.; GH* ∥ *DE*] $\frac{EH}{21}=\frac{5}{7}$ EH = 15cm **OR/*OF*** $\frac{HF}{EF}=\frac{2}{7}$ [line ∥ to one side of Δ/*lyn* ∥ *een sy van* Δ] **OR** [prop theorem; GH∥DE/*eweredigheidst.; GH* ∥ *DE*] $\frac{HF}{21}=\frac{2}{7}$ HF = 6cm EH = 21 − 6 EH = 15cm	✓ S ✓ answer (2) ✓ S ✓ answer (2)
9.1.3	ΔFGH ||| **ΔFDE** [∠∠∠]	✓ S (1)
9.1.4	$\frac{GH}{DE}=\frac{FH}{FE}$ [|||Δ's] **OR/*OF*** $\frac{GH}{DE}=\frac{FG}{FD}$ [|||Δ's] $\frac{GH}{DE}=\frac{2}{7}$	✓ S ✓ S (2)

9.2



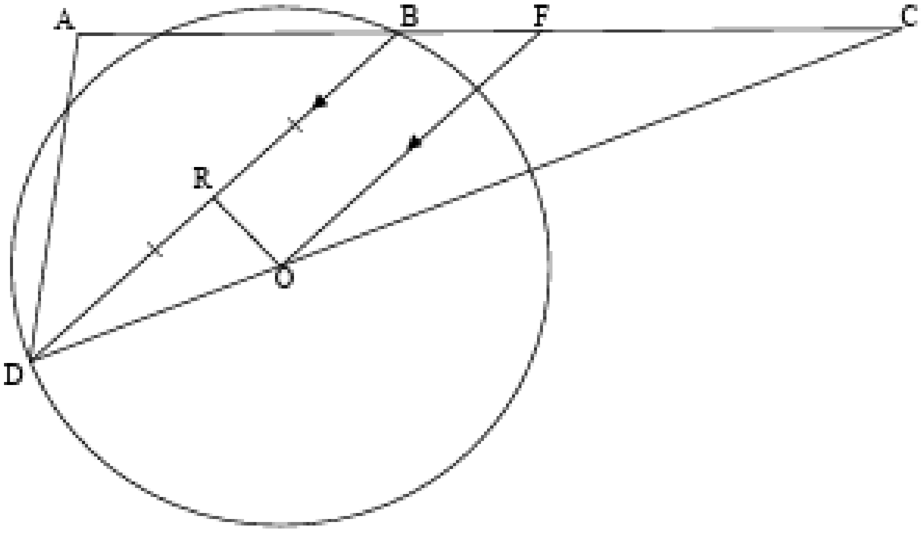
9.2.1	$\hat{L}_2 = 90°$ [∠ in semi-circle/ ∠ *in halwe sirkel*] **OR** $\hat{L}_1 = \hat{R}_1$ [tan chord theorem/ *raaklyn-koordst.*] $\hat{R}_2 = 90°$ [∠ in semi-circle] ∠ *in halwe sirkel*] $\hat{R}_1 = \hat{P}$ [tan chord theorem] *raaklyn-koordst.*] $\therefore \hat{L}_2 = \hat{R}_2$ $\therefore \hat{L}_1 = \hat{P}$ $\therefore$ 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]

QUESTION/*VRAAG 10*



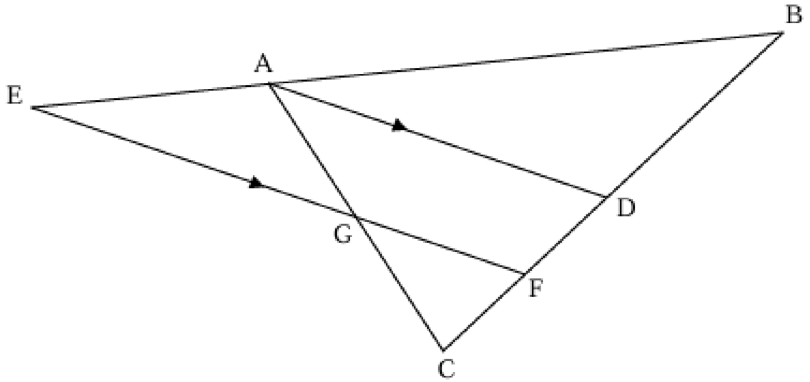
10.1	$\hat{S}_3 = P\hat{Q}R$	[ext ∠ of cyclic quad]	✓ S ✓ R
	$\hat{R}_3 = P\hat{Q}R$	[∠s opp equal sides]	✓ S / R
	$\therefore \hat{S}_3 = \hat{R}_3$		
	But $\hat{S}_4 = \hat{R}_3$	[∠s in the same seg]	✓ S ✓ R
	$\therefore \hat{S}_3 = \hat{S}_4$		(5)
10.2	$\hat{R}_1 + \hat{R}_2 = P\hat{Q}R$	[tan chord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

10.2



10.2.1	In ΔCFO and ΔCBD $\hat{C} = \hat{C}$ [common] $C\hat{F}O = C\hat{B}D$ [corresp $\angle$s; BD||FO/*ooreenk. $\angle$e; BD||FO*] $C\hat{O}F = C\hat{D}B$ [sum of $\angle$s in Δ/*binne $\angle$e v Δ*] **OR** [corresp $\angle$s; BD||FO/ *ooreenk. $\angle$e; BD||FO*] ΔCFO ||| ΔCBD [$\angle\angle\angle$]	✓ S ✓ S/R ✓ S/R **OR** R (3)
10.2.2	$\frac{FO}{BD} = \frac{CO}{CD}$ [||| Δs] FO.CD = CO.BD But $R\hat{D}O = F\hat{C}O$ [given] $\therefore$ BD = BC [sides opp equal $\angle$s/*sye teenoor gelyke $\angle$e*] $\therefore$ FO.CD = CO.BC	✓ S/R ✓ S/R (2)

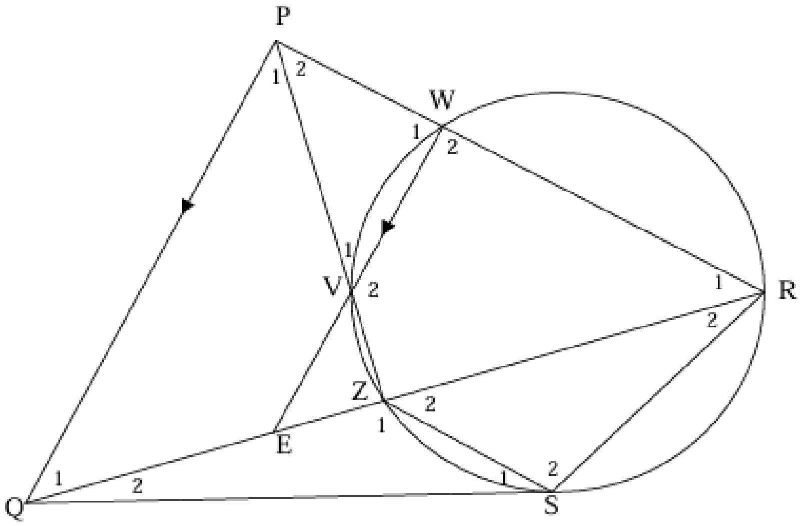
QUESTION/*VRAAG* 11



11.1.1	$\frac{FD}{CF}=\frac{GA}{CG}$ [prop theorem; AD ∥ EF/line ∥ one side of Δ/ *eweredigheidst.; AD // EF / lyn // een sy v* Δ] $\frac{FD}{CF}=\frac{2}{3}$	✓ S ✓ answer (2)
11.1.2	$FD=\frac{2}{3}CF$ $FD=\frac{2}{3}(2x)\quad=\frac{4}{3}x$ $\frac{BA}{EA}=\frac{BD}{FD}$ [prop theorem; AD ∥ EF/line ∥ one side of Δ/ *eweredigheidst.; AD // EF / lyn // een sy v* Δ] $\frac{BA}{EA}=\frac{5x-\frac{4}{3}x}{\frac{4}{3}x}$ $=\frac{11}{3}\times\frac{3}{4}$ $=\frac{11}{4}$	✓ $\frac{4}{3}x$ ✓ S ✓ substitution ✓ answer (4)

11.1.3	$\frac{\text{Area of }\Delta GCF}{\text{Area of GFDA}}=\frac{\text{Area }\Delta GCF}{\text{Area }\Delta CDA-\text{Area }\Delta GCF}$ $=\frac{\frac{1}{2}GC.CF\sin\hat{C}}{\frac{1}{2}AC.CD\sin\hat{C}-\frac{1}{2}GC.CF\sin\hat{C}}$ $=\frac{\frac{1}{2}(3k)(3p)(\sin\hat{C})}{\frac{1}{2}(5k)(5p)(\sin\hat{C})-\frac{1}{2}(3k)(3p)(\sin\hat{C})}$ $=\frac{\frac{1}{2}(9kp)(\sin\hat{C})}{\frac{1}{2}\sin\hat{C}(25kp-9kp)}$ $=\frac{9}{16}$	✓ GFDA = ΔCDA − ΔCGF ✓ $\frac{1}{2}(GC)(FC)\sin\hat{C}$ ✓ $\frac{1}{2}AC.CD\sin\hat{C}-\frac{1}{2}GC.CF\sin\hat{C}$ ✓ answer (4)

11.2



11.2.1	$\frac{QE}{QR}=\frac{PW}{PR}$ [prop theorem; PQ ∥ WE/line ∥ one side of Δ / *eweredigheidst.; PQ ∥ WE / lyn ∥ een sy v Δ*] $PR=\frac{PW.QR}{QE}$	✓ S ✓ R (2)
11.2.2	$\frac{PQ}{RQ}=\frac{QZ}{QP}$ [Δ PQZ ||| Δ RQP] $\therefore PQ^2 = RQ.QZ$	✓ $\frac{PQ}{RQ}=\frac{QZ}{QP}$ (1)
11.2.3	In Δ QSZ and Δ QRS $\hat{Q}_2=\hat{Q}_2$ [common ∠ / *gemeenskaplike∠*] $\hat{S}_1=\hat{R}_2$ [tan chord theorem/*raaklyn koord stelling*] $\hat{Z}_1=Q\hat{S}R$ [3rd ∠ of Δ] ∴ Δ QSZ ||| Δ QRS [∠∠∠]	✓ S ✓ S/R ✓ S **OR** R (3)
11.2.4	$\frac{QS}{QR}=\frac{QZ}{QS}$ [ΔQSZ ||| Δ QRS] $\therefore QS^2 = QZ.QR$ But $PQ^2 = RQ.QZ$ [proved in 11.2.2] $\therefore PQ = QS$	✓ S / R ✓ S ✓ S (3)

11.2.5	$\frac{PQ}{RQ} = \frac{PZ}{PR}$ [$\Delta PQZ \mid\mid\mid \Delta RQP$] $PR = \frac{QR.PZ}{PQ}$ $PR = \frac{PW.QR}{QE}$ [proved in 11.2.1] $\therefore \frac{PW.QR}{QE} = \frac{QR.PZ}{PQ}$ $PW = \frac{QE.PZ}{PQ}$ But $PQ^2 = RQ.QZ$ [proved in 11.2.2] $\therefore PQ = \sqrt{RQ.QZ}$ $\therefore PW = \frac{QE.PZ}{\sqrt{QR.QZ}}$	✓ $PR = \frac{QR.PZ}{PQ}$ ✓ S ✓ $PW = \frac{QE.PZ}{PQ}$ ✓ $PQ = \sqrt{RQ.QZ}$ (4)
		[23]