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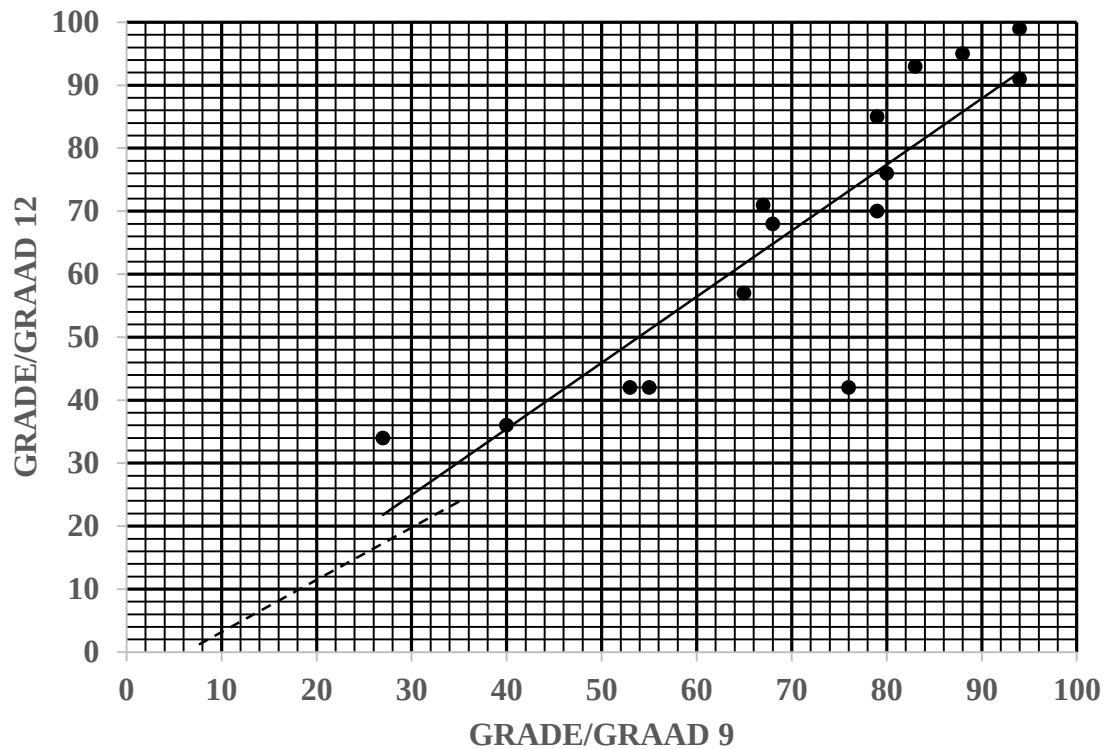
SEPTEMBER 2018

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 15 pages.
Hierdie nasien riglyn bestaan uit 15 bladsye.

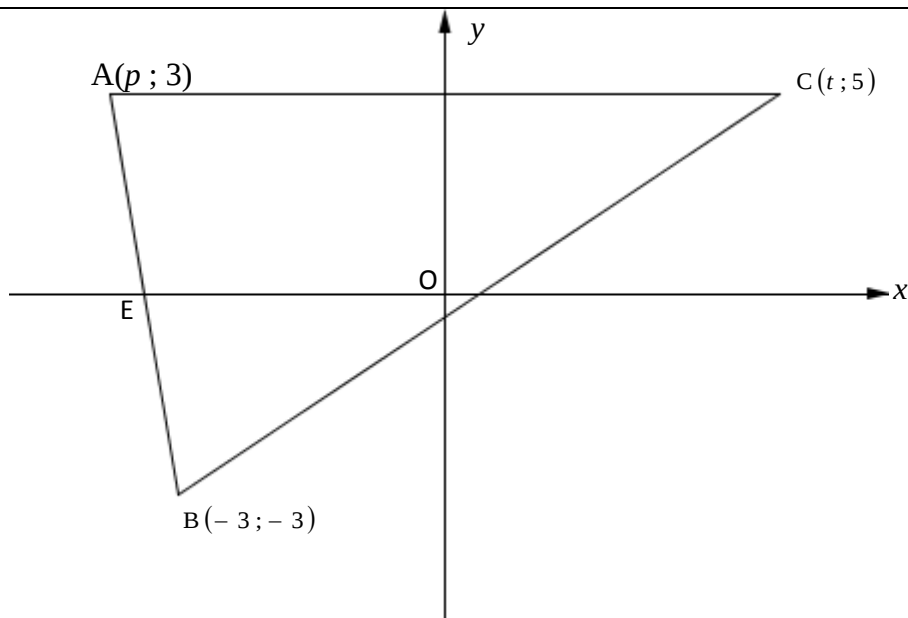
QUESTION 1/VRAAG 1



1.1	$a = -6,54$ $b = 1,05$ $\hat{y} = 1,05x - 6,54$	✓ value of a / waarde van a ✓ value of b / waarde van b ✓ equation / vergelyking	(3)
1.2	$y = -6,54 + 1,05(41)$ $= 36,51 \approx 37$	✓ substitution / vervanging ✓ answer / antwoord	(2)
1.3	On the scatter plot / Op spreidiagram	✓✓ x -intercept / x -afsnit $6 < x < 8$ and / en (45;41) both correct / beide korrek OR/OF ✓✓ (69,87;66,73) and/en (45;41) both correct / beide korrek	(2)
1.4	$r = 0,88$	✓✓ answer / antwoord	(2)
1.5	Yes. The strong positive correlation Ja. Die sterk positiewe korrelasie	✓ Yes / Ja ✓ strong positive / sterk positief	(2)
			[11]

QUESTION 2/VRAAG 2

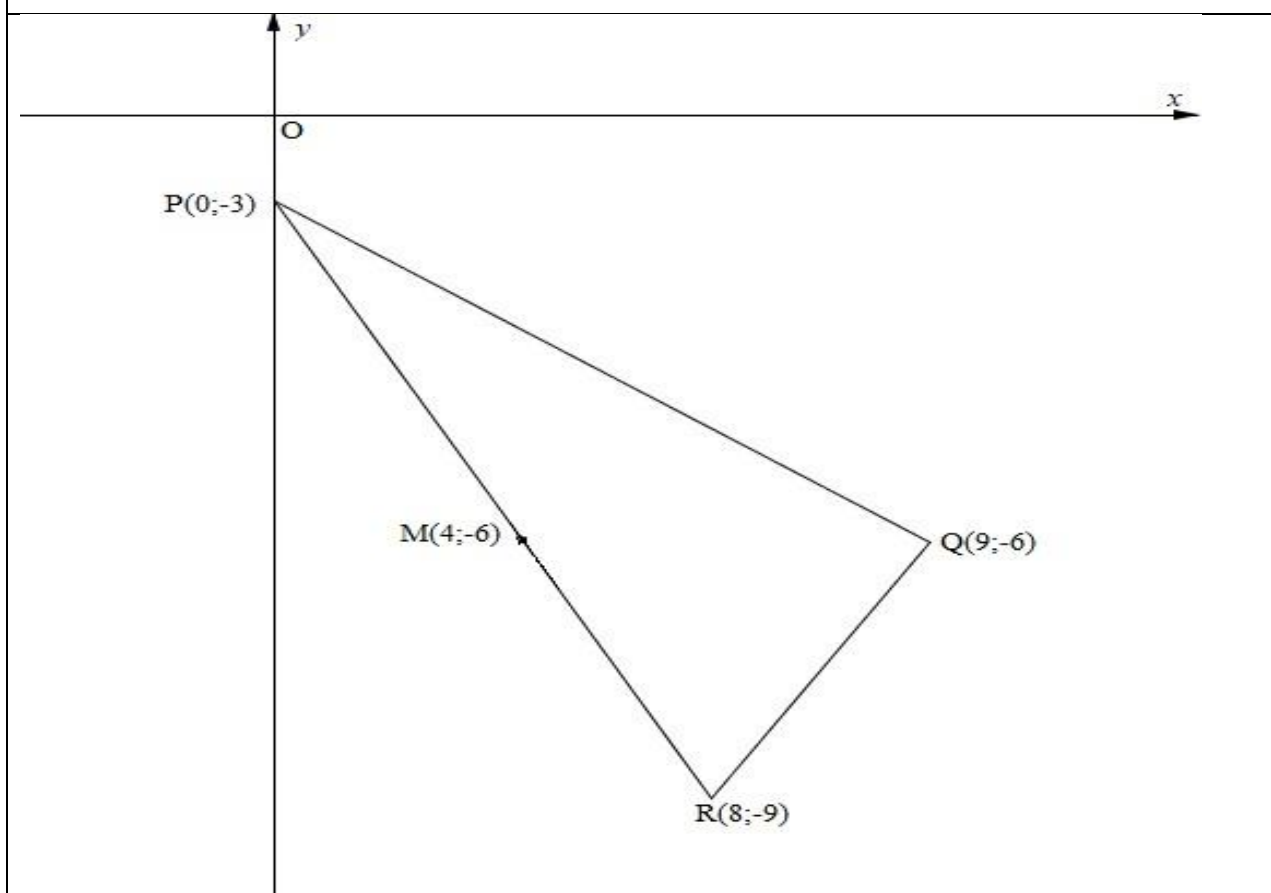
2.1	$\text{Range/Omvang} = 29 - 10$ $= 19$	✓ answer / antwoord	(1)
2.2	$\bar{x} = \frac{15 + 23 + 17 + 24 + 26 + 18 + 28 + 13 + 10 + 28 + 29}{11}$ $= \frac{231}{11}$ $= 21$ Answer ONLY full marks Slegs antwoord - volpunte	✓✓ answer / antwoord	(2)
2.3	$\sigma = 6,37$	✓ min ✓ max/maks ✓ answer / antwoord	(3)
2.4	$(21 - 6,37; 21 + 6,37) = (14,63; 27,37)$ 5 weeks/weke	✓ 231 ✓ answer / antwoord	(2)
			[8]

QUESTION 3 / VRAAG 3

3.1	$(\sqrt{89})^2 = (-3 - t)^2 + (-3 - 5)^2$ $89 = 9 + 6t + t^2 + 64$ $t^2 + 6t - 16 = 0$ $(t - 2)(t + 8) = 0$ $\therefore t = 2 \text{ or / of } t \neq -8$	✓ substitution / vervanging ✓ simplification / vereenvoudiging ✓ standard form / standaardvorm ✓ factors / faktore ✓ value of t / waarde van t	(5)
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3.2	$m_{AB} = -3$ $\frac{3+3}{p+3} = -3$ $-3p - 9 = 6$ $p = -5$	✓ m_{AB} ✓ m_{AB} in terms of p / in terme van p ✓ equating / gelykstelling ✓ value of p / waarde van p	(4)
3.3	$-3x - 12 = 0$ $x = -4$ $E(-4; 0)$	✓ $y = 0$ ✓ $x = 4$	(2)
3.4	$M = \left(\frac{-5+2}{2}; \frac{3+5}{2} \right)$ $= \left(-\frac{3}{2}; 4 \right)$	✓ x – coordinate/koördinaat ✓ y – coordinate/koördinaat	(2)
3.5	$m_{EM} = \frac{0-4}{-4+\frac{3}{2}}$ $= \frac{8}{5}$ $m_{BC} = \frac{5+3}{2+3}$ $= \frac{8}{5}$ $\therefore EM \parallel BC$ [= gradients/gradiënte]	✓ correct substitution / korrekte vervanging ✓ m_{EM} ✓ m_{BC} ✓ = gradients / = gradiënte	(4)
3.6	$\tan \theta = -3$ $\theta = 108,4349488^\circ$ $\tan \beta = \frac{8}{5}$ $\beta = 57,99461679^\circ$ $\therefore \hat{A}\hat{B}\hat{C} = 50,44^\circ$	✓ size of θ / grootte van θ ✓ size of α / grootte van β ✓ size of $\hat{A}\hat{B}\hat{C}$ / grootte van $\hat{A}\hat{B}\hat{C}$	(4)
			[21]

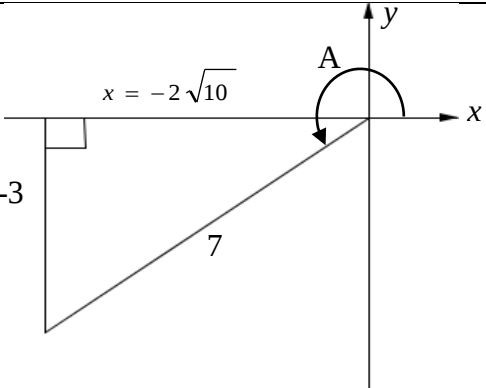
QUESTION 4 / VRAAG 4

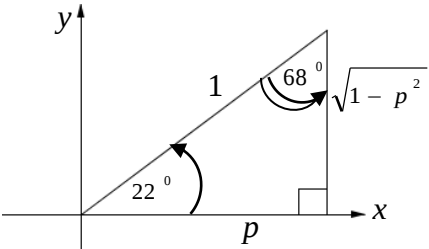


4.1	$PR = \sqrt{(0 - 8)^2 + (-3 + 9)^2}$ $= 10$	✓ correct substitution / <i>korrekte vervanging</i> ✓ answer / <i>antwoord</i> (2)
4.2	$M = \left(\frac{0 + 8}{2}; \frac{-3 + 9}{2} \right)$ $= (4; -6)$	✓ x-coordinate/ <i>koördinaat</i> ✓ y-coordinate/ <i>koördinaat</i> (2)
4.3	$m_{PQ} = \frac{-3 + 6}{0 - 9}$ $= -\frac{1}{3}$ $m_{QR} = \frac{-6 + 9}{9 - 8}$ $= 3$ $\therefore \hat{PQR} = 90^\circ \quad [m_{PQ} \times m_{QR} = -\frac{1}{3} \times 3 = -1]$	✓ correct substitution <i>korrekte vervanging</i> ✓ m_{PQ} ✓ m_{QR} ✓ $m_{PQ} \times m_{QR} = -\frac{1}{3} \times 3 = -1$ (4)
4.4	$(x - 4)^2 + (y + 6)^2 = 25$	✓ $r^2 = 25$ ✓ equation / <i>vergelyking</i> (2)

4.5	$m_{rad} = \frac{-6 + 3}{4 - 0}$ $= -\frac{3}{4}$ $m_{tan} = \frac{4}{3}$ $y = \frac{4}{3}x - 3$	✓ correct subst. / korrekte verv. ✓ $m_{rad} = -\frac{3}{4}$ ✓ $m_{tan} = \frac{4}{3}$ ✓ Subst / Verv. (0 ; -3) & m ✓ equation / vergelyking (5)
4.6	$(\sqrt{146})^2 = (\cos \theta - 8)^2 + (\sin \theta + 9)^2$ $146 = \cos^2 \theta - 16 \cos \theta + 64 + \sin^2 \theta + 18 \sin \theta + 81$ $0 = -16 \cos \theta + 18 \sin \theta$ $0 = -16 \cos \theta + 18 \sin \theta$ $\frac{\sin \theta}{\cos \theta} = \frac{16}{18}$ $\tan \theta = \frac{8}{9}$	✓ correct substitution korrekte vervanging ✓ simplification/vereenvoudiging ✓ $\sin^2 \theta + \cos^2 \theta = 1$ ✓ equation/vergelijking ✓ $\tan \theta = \frac{8}{9}$ (5)
		[20]

QUESTION 5/VRAAG 5

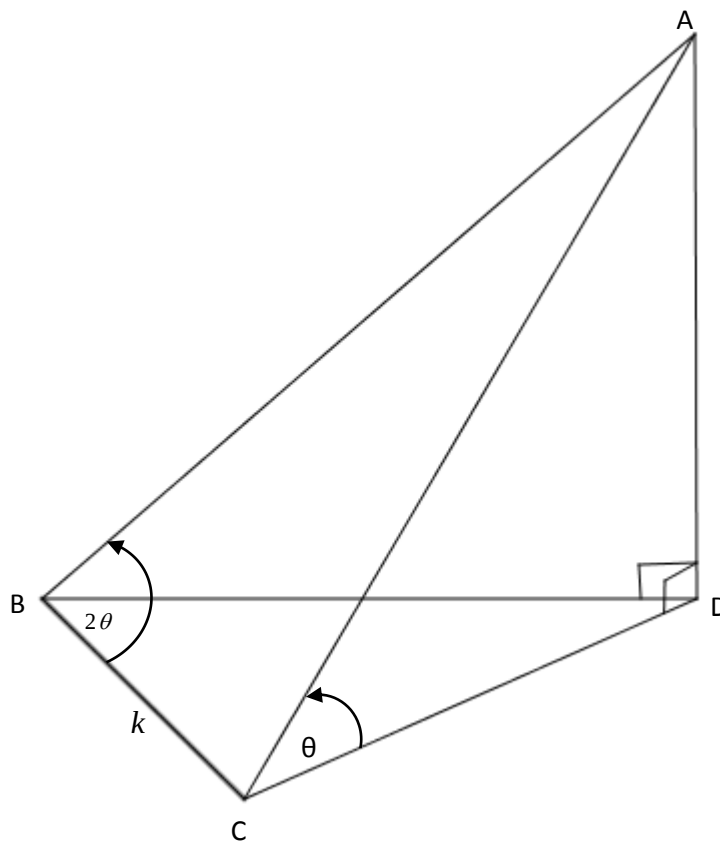
5.1	 $\sin(A + 30^\circ) = \sin A \cos 30^\circ + \cos A \sin 30^\circ$ $= \left(-\frac{3}{7}\right)\left(\frac{\sqrt{3}}{2}\right) + \left(\frac{-2\sqrt{10}}{7}\right)\left(\frac{1}{2}\right)$ $= -\frac{3\sqrt{3} - 2\sqrt{10}}{14}$	✓ $x = -2\sqrt{10}$ ✓ Expansion/Uitbreiding ✓ Both/Beide $\frac{\sqrt{3}}{2}$ & $\frac{1}{2}$ ✓ $-\frac{2\sqrt{10}}{7}$ (4)
5.2	$-\sin^2(90^\circ - x) - \tan \cos(-x) \cdot \sin(-x - 360^\circ)$ $= -(\cos x)^2 - \frac{\sin x}{\cos x}(\cos x)(-\sin x)$ $= -\cos^2 x + \sin^2 x$ $= -(\cos^2 x - \sin^2 x)$ $= -\cos 2x$	✓ $(\cos x)^2$ ✓ $\frac{\sin x}{\cos x}$ ✓ $\cos x$ ✓ $(-\sin x)$ ✓ $-(\cos^2 x - \sin^2 x)$ ✓ $-\cos 2x$ (6)
5.3	$x^2 - 2x \sin A = \cos^2 A$ $\cos^2 A + 2x \sin A - x^2 = 0$ $\Delta = (2 \sin A)^2 - 4(-1)(\cos^2 A)$ $= 4(\sin^2 A + \cos^2 A)$ $= 4$	✓ standard form/standaardvorm ✓ correct substitution/korrekte vervanging ✓ $\Delta = 4$ (3)

5.4	$\begin{aligned} \text{LHS/LK} &= \frac{\cos 3x}{\sin x} + \frac{\sin 3x}{\cos x} \\ &= \frac{\cos 3x \cos x + \sin 3x \sin x}{\sin x \cos x} \\ &= \frac{\cos(3x - x)}{\sin x \cos x} \\ &= \frac{\cos 2x}{\frac{1}{2} \sin 2x} \\ &= \frac{2}{\tan 2x} \end{aligned}$	✓ Simplification Vereenvoudiging ✓ $\cos 2x$ ✓ $\frac{1}{2} \sin 2x$ (3)
5.5.1	$\sin 68^\circ = \cos 22^\circ$ $= p$ OR/OF  $\sin 68^\circ = p$	✓ $\cos 22^\circ$ ✓ p OR/OF ✓ $y = \sqrt{1 - p^2}$ ✓ $\sin 68^\circ = p$ (2)
5.5.2	$\begin{aligned} \cos 16^\circ &= \cos(38^\circ - 22^\circ) \\ &= \cos 38^\circ \cdot \cos 22^\circ + \sin 38^\circ \cdot \sin 22^\circ \\ &= \sqrt{1 - q^2} \cdot p + q \cdot \sqrt{1 - p^2} \\ &= p \sqrt{1 - q^2} + q \sqrt{1 - p^2} \end{aligned}$	✓ $\cos(38^\circ - 22^\circ)$ ✓ Expansion / Uitbreiding ✓ $\cos 38^\circ$ i.t.o / i.t.v q ✓ $\sin 22^\circ$ i.t.o / i.t.v p (4)
		[22]

QUESTION 6 / VRAAG 6

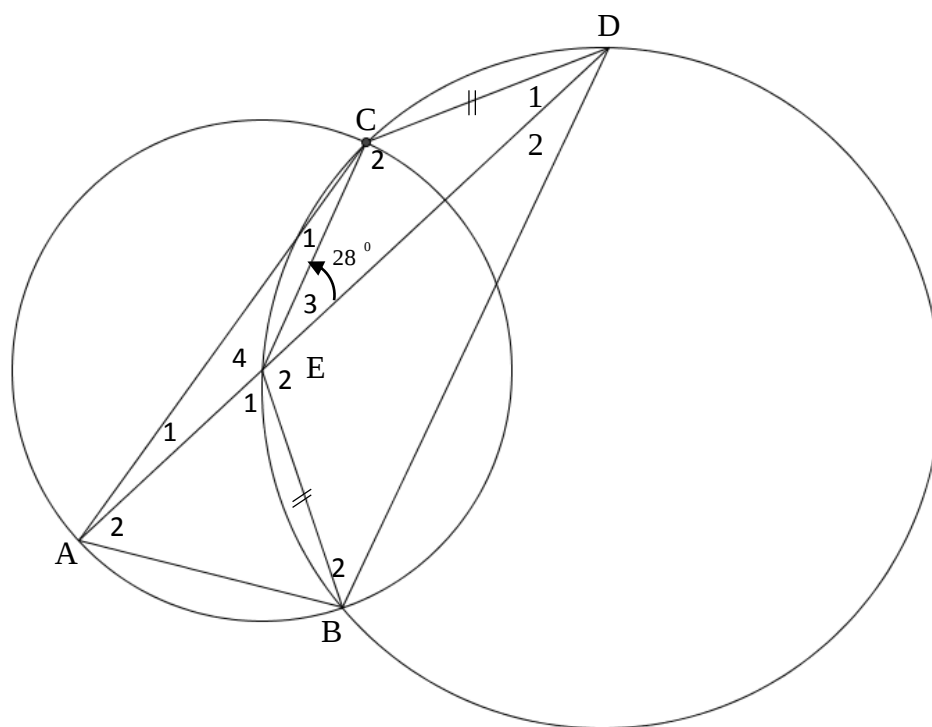
6.1	$a = -2$ $p = 30^\circ$	$\checkmark a = -2$ $\checkmark p = 30^\circ$	(2)
6.2			
6.2.1	$x = 60^\circ$	$\checkmark$	(1)
6.2.2	$\cos(x - 60) = \sin 3x$ $\cos(x - 60) = \cos(90^\circ - 3x)$ $x - 60 = \pm(90^\circ - 3x) + 360^\circ \cdot k \quad k \in \mathbb{Z}$ $\therefore 4x = 150^\circ + 360^\circ \cdot k$ OR $-2x = -30^\circ + 360^\circ \cdot k \quad k \in \mathbb{Z}$ $\therefore x = 37,50^\circ + 90^\circ \cdot k \quad \text{or} \quad x = 15^\circ - 180^\circ \cdot k$ $\therefore x = -52,50^\circ \text{ and } x = 15^\circ$	$\checkmark$ co-function <i>ko-funksie</i> $\checkmark$ ref $\angle$ $\checkmark 4x = 150^\circ + 360^\circ \cdot k$ $\checkmark$ & $-2x = -30^\circ + 360^\circ \cdot k$ $\checkmark x = 15^\circ$ $\checkmark x = -52,50^\circ$	(6)
6.2.3	$-52,50^\circ < x < 15^\circ$	$\checkmark$ both critical values <i>beide kritiese waardes</i> $\checkmark$ notation / <i>notasie</i>	(2)
			[11]

QUESTION 7 / VRAAG 7



7.1	$AB = k$ $AC = \sqrt{(2k)^2 + k^2 - 2 \cdot 2k \cdot k \cdot \cos 2\theta}$ $= \sqrt{5k^2 - 4k^2 \cos 2\theta}$ $= \sqrt{k^2 (5 - 4(1 - 2\sin^2 \theta))}$ $= \sqrt{k^2 (5 - 4 + 8\sin^2 \theta)}$ $= k \sqrt{1 + 8\sin^2 \theta}$	✓ AB i.t.o / i.t.v k ✓ cosine rule formula in $\triangle ABC$ <i>kosinusreël formule in $\triangle ABC$</i> ✓ correct subst. / korrekte vervanging ✓ $\cos 2\theta = 1 - 2\sin^2 \theta$ ✓ simplification / vereenvoudiging	(5)
7.2	$AC = 139,5 \sqrt{1 + 8\sin^2 (42^\circ)}$ $\approx 299 \text{ m}$	✓ correct substitution/korrekte vervanging ✓ answer/antwoord	(2)
			[7]

QUESTION 8 / VRAAG 8



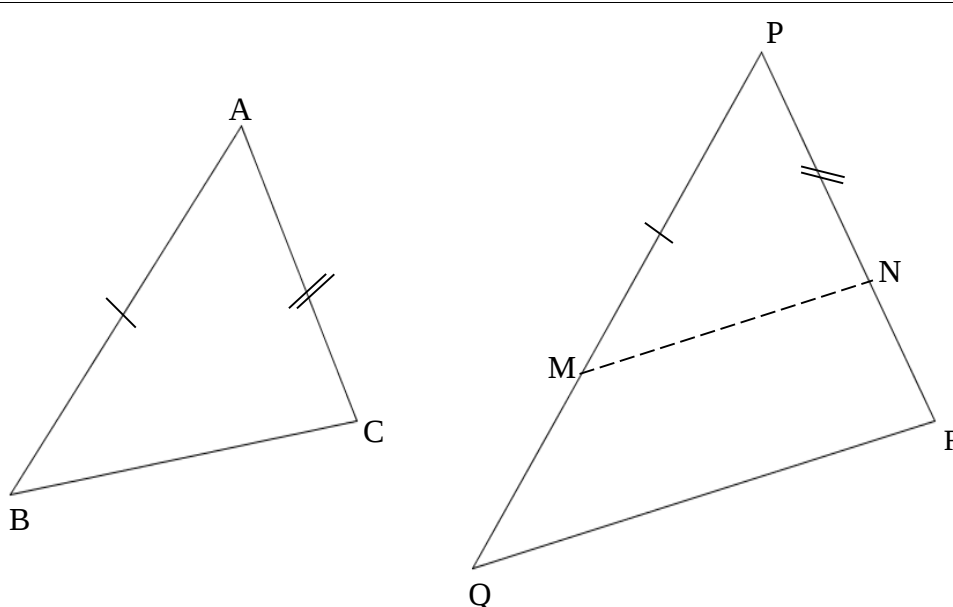
8.1	$\hat{D}_2 = 28^\circ$ [∠s subt by = chords] / [∠e onderspan deur = koorde]	✓ S ✓ R	(2)
8.2	Alternate ∠s = / Verwisselende ∠e	✓ R	(1)
8.3	EB = EC [radii / radiusse] but/maar EB = CD [given / gegee] ∴ EC = CD	✓ S ✓ R	(2)
8.3.1	$\hat{D}_1 = 28^\circ$ [∠s opp = sides] / [∠e teenoor = sye] $\hat{C}_2 = 124^\circ$ [∠s of a Δ] / [∠e van 'n Δ] ∴ $\hat{B}_2 = 56^\circ$ [opp. ∠s of a cyclic quad] / [teenoorst. ∠e van koordevierhoek]	✓ S/R ✓ S ✓ S ✓ R	(4)
8.3.2	$\hat{E}_2 = 96^\circ$ [∠s of a Δ] / [∠e van 'n Δ] ∴ $\hat{BAC} = \frac{1}{2}(96^\circ + 28^\circ)$ [∠ at centre = 2 × ∠ at circumf] = 62° [Middelpunts ∠ = 2 × Omtrekshoek]	✓ S ✓ S ✓ R	(3)
			[12]

QUESTION 9 / VRAAG 9

9.1	$\frac{YU}{UZ} = \frac{XV}{VZ} \quad [\text{prop theo, } UV \parallel YX \text{ or line } \parallel \text{ to one side of a } \Delta]$ [Eweredigh. Stelling, $UV \parallel YX$ of lyn $\parallel$ aan een sy van 'n Δ] $= \frac{YV}{VW} \quad [\text{prop theo, } UV \parallel ZW \text{ or line } \parallel \text{ to one side of a } \Delta]$ [Eweredigh. Stelling, $UV \parallel ZW$ of lyn $\parallel$ aan een sy van 'n Δ] $\therefore \frac{XV}{VZ} = \frac{YV}{VW}$	✓ S ✓ R ✓ S	(3)
9.2	$\frac{\text{Area of/van } \Delta XYV}{\text{Area of/van } \Delta WVZ} = \frac{\frac{1}{2} \times 3r \times 3s \times \sin \hat{V}_2}{\frac{1}{2} \times 4r \times 4s \times \sin \hat{V}_5}$ but/maar $\hat{V}_2$ [vert. opp. $\angle$s] / [regoorst. $\angle$e] $= \frac{9}{16}$	✓ substitution / vervanging ✓ substitution / vervanging ✓ S/R ✓ answer / antwoord	(4)
9.3	$\hat{X}_1 = \hat{V}_4 \quad [\text{alt. } \angle \text{s, } XY \parallel WX] / [\text{verw. } \angle \text{e, } XY \parallel WX]$ $\hat{V}_3 = \hat{V}_4 \quad [\text{given}]/[\text{gegee}]$ $\hat{V}_3 = \hat{W}_2 \quad [\text{corresp } \angle \text{s, } WZ \parallel UV] / [\text{ooreenk. } \angle \text{e, } WZ \parallel UV]$ $\therefore \hat{X}_1 = \hat{W}_2$ WXYZ is a cyclic quad [converse $\angle$s same segment or line subt = $\angle$s] WXYZ is 'n koordevierhoek [omgekeerde $\angle$e in dieselfde segment of lyn onderspan = $\angle$e]	✓ S/R ✓ S/R ✓ R	(3)

9.4	$\hat{V}_3 = \hat{V}_4 = \hat{X}_1$ $\therefore UV$ is a tangent to circle XYV [converse of tan chord theo.] <i>UV is 'n raaklyn aan die sirkel XYZ</i> <i>[omgekeerde van raaklyn – koord stelling]</i>	✓ S ✓ R	(2)
			[12]

QUESTION 10 / VRAAG 10

10.1			
	Constr: Mark M on PQ and N on PR such that $PM = AB$ and $PN = AC$ Konstr: Merk M op PQ en N op PR sodat $PM = AB$ en $PN = AC$ Proof/Bewys: In $\triangle ABC$ and/en $\triangle PMN$ $AB = PM$ [constr / konstr.] $\hat{A} = \hat{P}$ [given / gegee] $AC = PN$ [constr / konstr.] $\therefore \triangle ABC \equiv \triangle PMN$ [S $\angle$ S] $\therefore \hat{B} = \hat{PMN}$ $= \hat{Q}$ [given / gegee] $\therefore MN \parallel QR$ [corresp $\angle$s = /ooreenk. $\angle$e =] $\frac{PM}{PQ} = \frac{PN}{PR}$ [prop theo/eweredigh. stelling, $MN \parallel QR$] but/maar $AB = PM$ and/en $AC = PN$ [constr / konstr.] $\therefore \frac{AB}{PQ} = \frac{AC}{PR}$	✓ constr konstr. ✓ SSS ✓ R ✓ S/R ✓ S/R ✓ S	(6)

10.2.4	In $\triangle P L R$ and/en $\triangle Q P R$ $\hat{L} P R = \hat{Q}$ [both/beide = 90^0] $\hat{R}_2 = \hat{R}_1$ [proved/alreeds bewys] $\hat{L} = \hat{P}_4$ [$3^{rd/de}$ $\angle$] $\triangle P L R \parallel \triangle Q P R$ [$\angle \angle \angle$] $\therefore \frac{L R}{P R} = \frac{P R}{Q R}$ $L R = \frac{30^2}{15}$ $= 60$	✓ SSS ✓ R ✓ ratios / verhoudings ✓ substitution / vervanging ✓ LR	(5)
10.2.5	$N M \parallel P R$ [co - int $\angle$s supp OR corresp $\angle$s =] [ko - binne $\angle$e suppl. OF ooreenk. $\angle$e =] $\therefore N M = \frac{1}{2} P R$ [midpoint theorem / middelpunt stelling] $\sin x = \frac{30\sqrt{3}}{15}$ $x = 60^0$	✓ R ✓ R ✓ ratio/verhouding ✓ value of x / waarde van x	(4)
			[26]