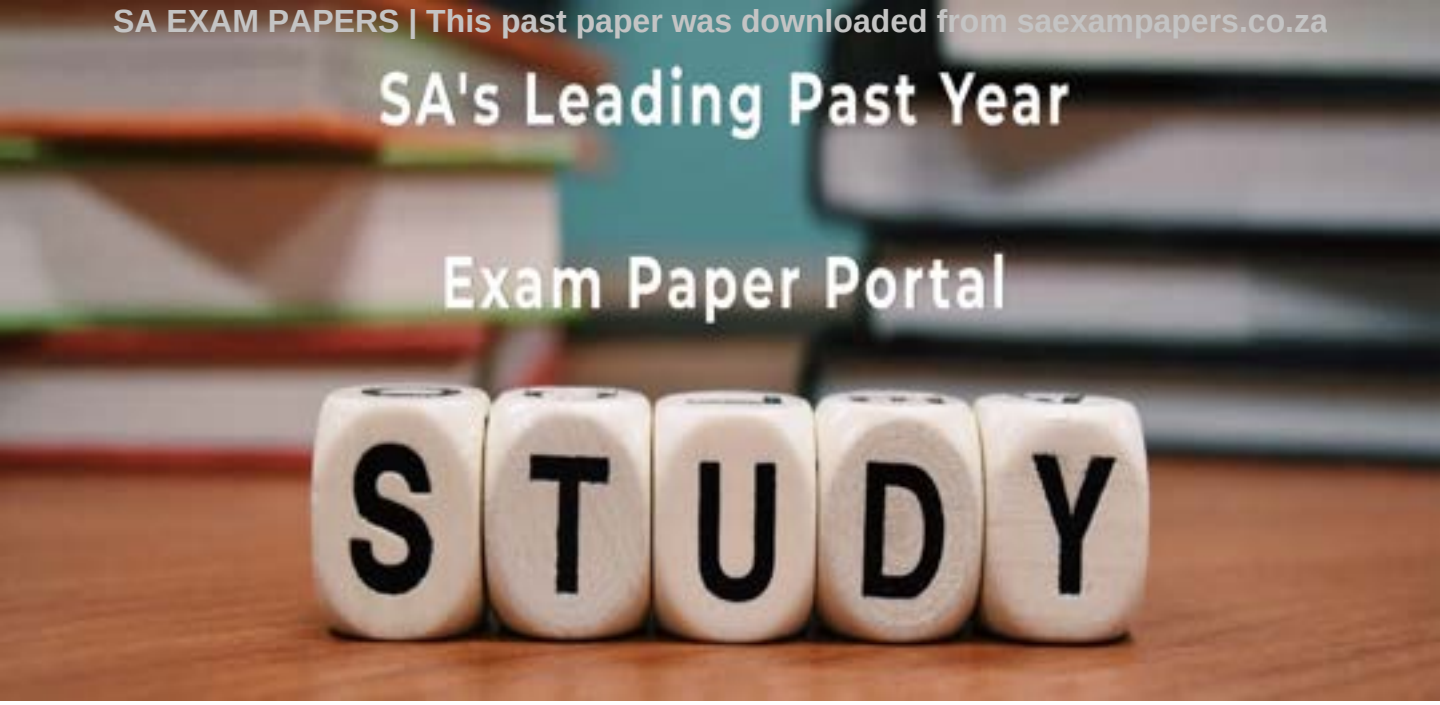

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIOR SERTIFIKAAT

GRADE 12/*GRAAD* 12

TECHNICAL MATHEMATICS P2/*TEGNIESE WISKUNDE V2*

NOVEMBER 2023

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/PUNTE: 150

CODE/ *KODE*	EXPLANATION/*VERDUIDELIKING*
A	Accuracy/*Akkuraatheid*
AO	Answer only/*Slegs antwoord*
CA	Consistent accuracy/*Volgehoue akkuraatheid*
I	Identity/*Identiteit*
M	Method/*Metode*
NPR	No penalty for rounding/*Geen penalisering vir afronding nie*
NPU	No penalty for omitting units/*Geen penalisering vir eenhede weggelaat nie*
R	Rounding/*Afronding*
RE	Reason/*Rede*
S	Simplification/*Vereenvoudiging*
F	Formula/*Formule*
SF	Substitution in correct formula/*Vervanging in korrekte formule*
ST	Statement/*Bewering*
ST/RE	Statement with reason/*Bewering met rede*

These marking guidelines consist of 19 pages.
Hierdie nasienriglyne bestaan uit 19 bladsye.

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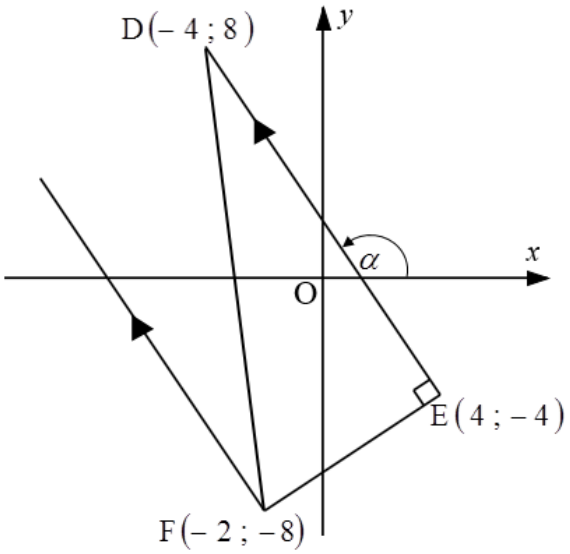
NOTE:

- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- The method of Consistent Accuracy marking must be applied in all aspects of the marking guideline where applicable as ndicated with the marking code **CA.**

LET WEL:

- *Indien 'n kandidaat 'n vraag **TWEE** keer beantwoord, sien slegs die **EERSTE** poging na.*
- *Die metode van Volgehoue akkuraatheid-nasien moet waar moontlik tot alle aspekte van die nasienriglyne toegepas word soos aangedui deur die nasienkode* **CA.**

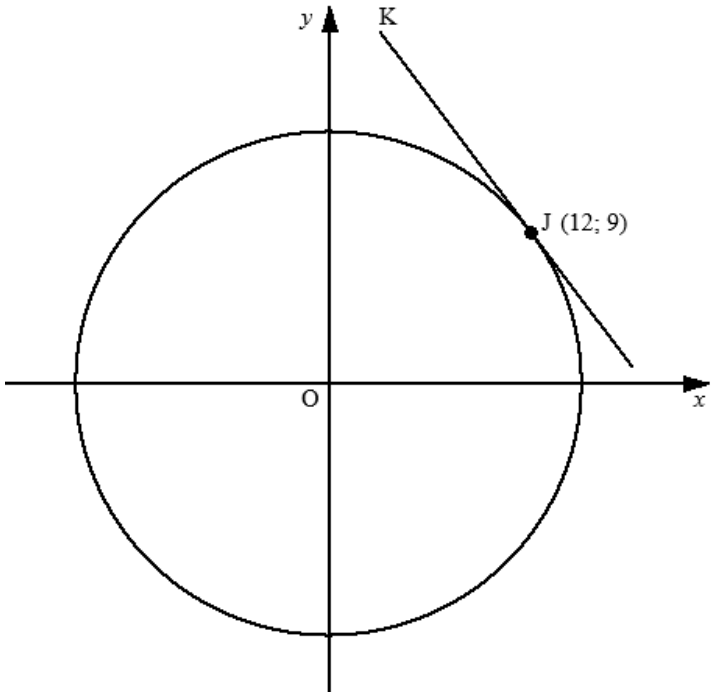
QUESTION/*VRAAG* 1

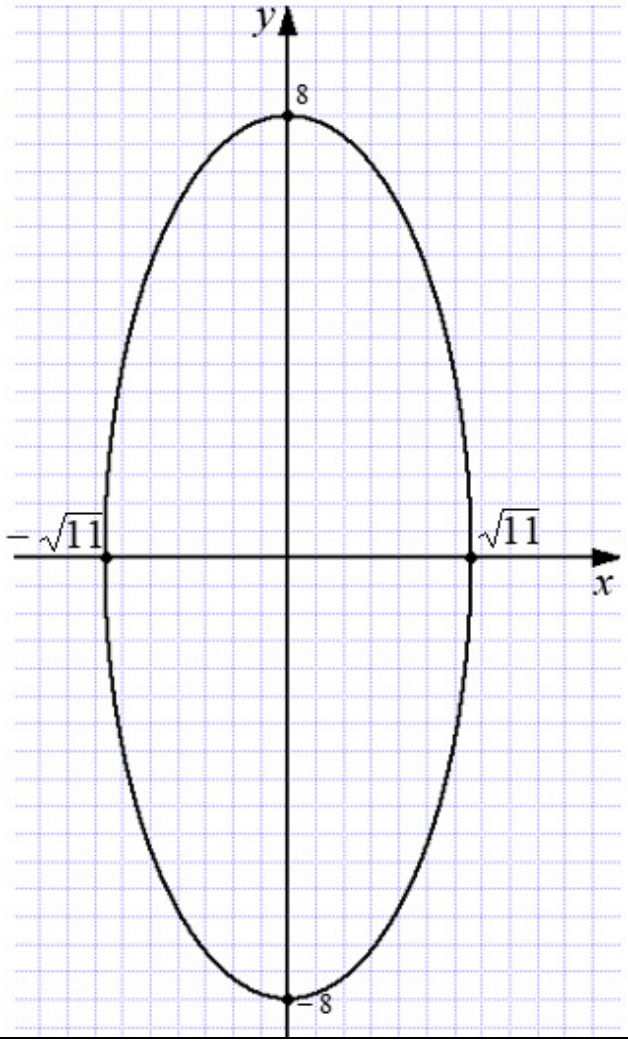


1.1	$m_{DE} = \frac{y_D - y_E}{x_D - x_E}$ $= \frac{8-(-4)}{-4-4}$ $= -\frac{3}{2}$	✓ **SF** **A** ✓gradient / *gradiënt* **CA** (2)
1.2	$\tan\alpha = m_{DE}$ $\alpha = \tan^{-1}\left(-\frac{3}{2}\right)$ ref./*verwys*$\angle \approx 56{,}31°$ $\therefore\ \alpha = 123{,}69°$	✓ **SF** **CA** ✓ ref./ *verwys* $\angle$ **CA** ✓ value of / *waarde van* α **CA** (3)

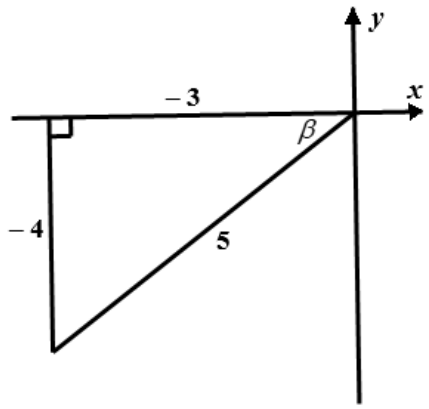
1.3	$m_{\text{parallel/}ewewydig} = -\frac{3}{2}$ $y-(-8)=-\frac{3}{2}(x-(-2))$ OR/*OF* $-8=-\frac{3}{2}(-2)+c$ $y=-\frac{3}{2}x-3-8$ $\quad c=-8-3$ $\therefore y=-\frac{3}{2}x-11$ Subst/ *Vervang* (–10; 5): LHS / *LK* = 5 RHS / *RK* $=-\frac{3}{2}\times(-10)-11=4$ ∴ the point (–10; 5) does not lie on the line ∴ *die punt* (–10; 5) *lê dus nie op die lyn nie* **OR/*OF*** $m_{\text{parallel/}ewewydig} = -\frac{3}{2}$ $m_{point/\,punt\&F}=\frac{-8-5}{--(-10)}$ $=\frac{-13}{8}$ $\therefore m_{\text{point/ }punt\&\text{ F}} \neq m_{\text{parallel/}ewewydig}$ ∴ the point (–10; 5) does not lie on the line ∴ *die punt* (–10; 5) *lê dus nie op die lyn nie*	✓ gradient /*gradiënt* **CA** ✓ equation / *vergelyking* **CA** ✓ Subst/ *Vervang* (–10; 5) **CA** ✓ conclusion / *gevolgtrekking* **CA** **OR/*OF*** ✓ gradient /*gradiënt* **CA** ✓ **SF** **A** ✓ gradient point & F / *gradiënt punt & F* **CA** ✓ conclusion /*gevolgtrekking* **CA** (4)
1.4	$EF=\sqrt{(x_F-x_E)^2+(y_F-y_E)^2}$ $=\sqrt{(-2-4)^2+(-8-(-4))^2}$ $=\sqrt{52}=2\sqrt{13}$ $DE=\sqrt{(-4-4)^2+(8-(-4))^2}$ $=4\sqrt{13}$ Area of $\Delta DEF=\frac{1}{2}\times 2\sqrt{13}\times 4\sqrt{13}$ $=52$ square units /vierkante eenhede	✓**SF** **A** ✓ length/ *lengte* **EF** **CA** ✓ length/ *lengte* **DE** **A** ✓**SF** **CA** ✓area **CA** (5)
		[14]

QUESTION/*VRAAG* 2

2.1		
2.1.1	$x^2 + y^2 = r^2$ $12^2 + 9^2 = r^2$ $r^2 = 225$ $\therefore x^2 + y^2 = 225$ **OR/*OF*** $x^2 + y^2 = 12^2 + 9^2$ $= 225$	✓ **SF** **A** ✓ equation/*vergelyking* **CA** **OR/*OF*** ✓ **SF** **A** ✓ equation/*vergelyking* **CA** **(2)**
2.1.2	-1	✓ **ST** **A** (1)
2.1.3	$m_{OJ} = \frac{9}{12} = \frac{3}{4}$ $m_{JK} = -\frac{4}{3}$ $y - 9 = -\frac{4}{3}(x - 12)$ **OR/*OF*** $9 = -\frac{4}{3}(12) + c$ $y = -\frac{4}{3}x + 16 + 9$ $c = 9 + 16 = 25$ $\therefore y = -\frac{4}{3}x + 25$	✓ gradient/*gradiënt* of/*van* OJ **A** ✓gradient/*gradiënt* of/*van* JK **CA** ✓ substitution / *vervanging* **CA** ✓equation/ *vergelyking* **CA**

	OR/*OF* $x \cdot x_1 + y \cdot y_1 = r^2$ $12x + 9y = 225$ $9y = -12x + 225$ $y = -\frac{4}{3}x + 25$	**OR/*OF*** ✓ **F** **A** ✓ subst / *vervang* (12; 9) **A** ✓ subst / *vervang* **CA** ✓ equation /*vergelyking* **CA** (4)
2.2.1	$\frac{x^2}{\left(\sqrt{11}\right)^2} + \frac{y^2}{8^2} = 1$	✓ standard form/ *standaardvorm* **A** (1)
2.2.2		✓*x* and *y* –intercepts/ *afsnitte* **A** ✓elliptical shape/ *elliptiese vorm* **CA** (2)
		[10]

QUESTION/*VRAAG* 3

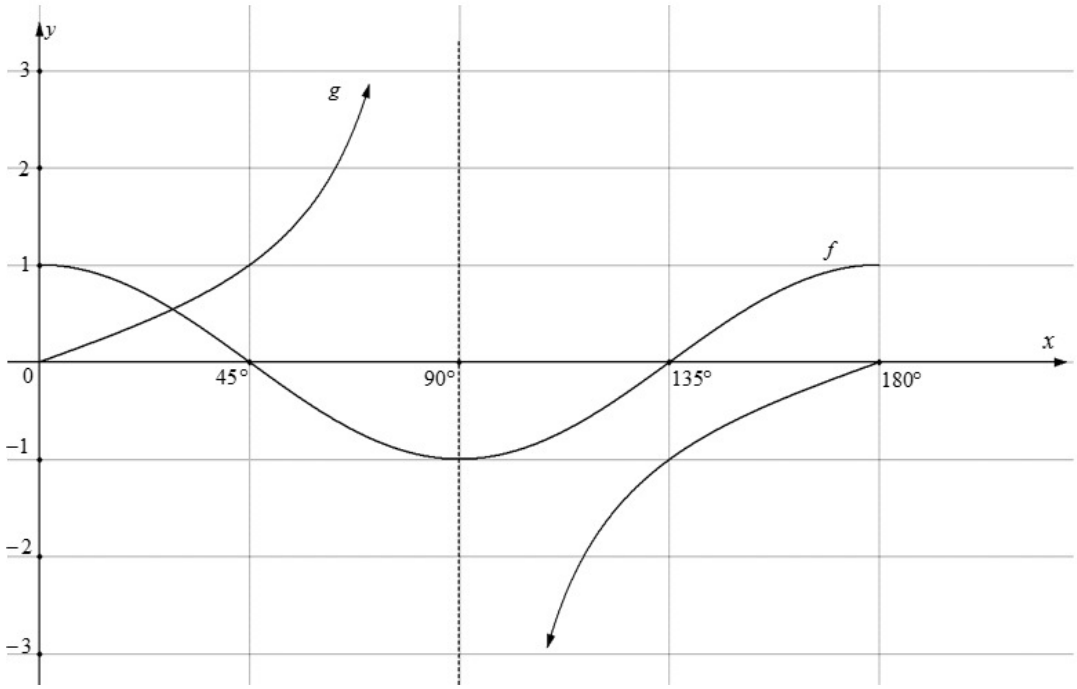
3.1.1	$\sin(x-y)$ $=\sin(152,4°-24,8°)$ $\approx 0,79$	✓ substitution / *vervanging* **A** ✓ **S** **CA** (2)
3.1.2	$\frac{1}{2}\sec\left(\frac{x}{2}+80°\right)$ $=\frac{1}{2}\sec\left(\frac{152,4°}{2}+80°\right)$ $=\frac{1}{2}\sec 156,2°$ $=\frac{1}{2}\times\frac{1}{\cos 156,2°}$ $\approx -0,55$	✓ substitution / *vervanging* **A** ✓ **S** **CA** (2)
3.2.1	$\sin\beta=-\frac{4}{5}$ $\text{cosec}\beta=-\frac{5}{4}$	✓ ratio / *verhouding* **CA** (1)
3.2.2	 $x^2+y^2=r^2$ $x^2+(-4)^2=(5)^2$ $x^2=9$ $x=-3$ $\tan\beta+\cos\beta=\frac{-4}{-3}+\left(-\frac{3}{5}\right)$ $=\frac{11}{15}$	✓ **SF** A ✓ value of/*waarde van* x **CA** ✓ tan ratio / *verh* **CA** ✓ cos ratio /*verh* **CA** ✓ **S** **CA** (5)

3.3	$\cos x = -\sin 56{,}7°$ $\cos x = -0{,}835807361$ Ref. angle /*verw hoek* $= 33{,}30°$ $x = 180° - 33{,}30°$ or/*of* $x = 180° + 33{,}30°$ $\therefore x = 146{,}7°$ or/*of* $x = 213{,}3°$	✓ **S** **A** ✓ Ref. angle /*verw hoek* **CA** ✓ $146{,}7°$ **CA** ✓ $213{,}3°$ **CA** (4)
		[14]

QUESTION/*VRAAG* 4

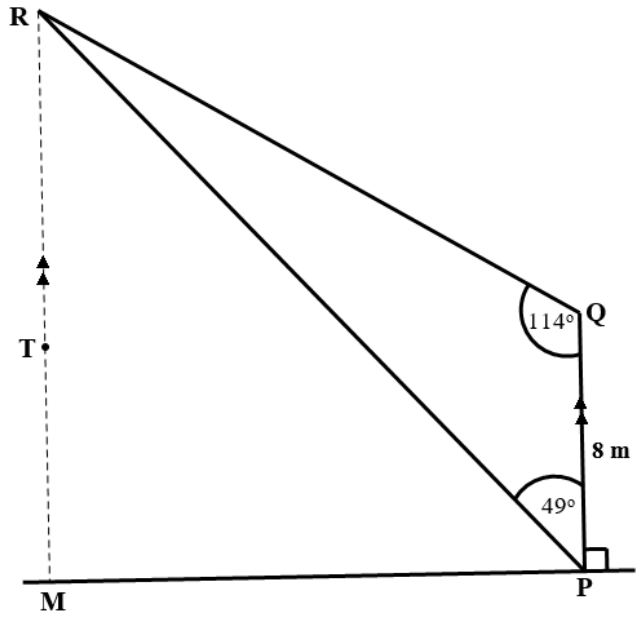
4.1.1	$\frac{1}{\sin A}$	✓ **I** **A** (1)
4.1.2	$\cos A$	✓ reduction /*reduksie* **A** (1)
4.1.3	$-\text{cosec } A$	✓ reduction /*reduksie* **A** (1)
4.2.	$\sin(180° + A)\cdot\cot(360° - A)\cdot\cos(2\pi - A) + \sin^2(360° - A)$ $= (-\sin A)\cdot(-\cot A)\cdot\cos A + (-\sin A)^2$ $= \sin A\cdot\frac{\cos A}{\sin A}\cdot\cos A + \sin^2 A$ $= \cos^2 A + \sin^2 A$ $= 1$	✓ $-\sin A$ **A** ✓ $-\cot A$ **A** ✓ $-\sin A$ or $\sin^2 A$ **A** ✓ $\cos A$ **A** ✓ cot identity/*identiteit* **A** ✓ **S** **CA** ✓ answer/*antwoord* **CA** (7)
4.3.1	$\sec x(1 - \sec x)$	✓ **I** **A** (1)
4.3.2	$\frac{\text{cosec } x - \text{cosec } x\cdot\sec x}{\sec x - (\tan^2 x + 1)} = \cot x$ LHS $= \frac{\text{cosec } x - \text{cosec } x\cdot\sec x}{\sec x - (\tan^2 x + 1)}$ $= \frac{\text{cosec } x(1 - \sec x)}{\sec x - \sec^2 x}$ $= \frac{\text{cosec } x(1 - \sec x)}{\sec x(1 - \sec x)}$ $= \frac{1}{\sin x} \times \cos x$ $= \cot x \quad OR/OF \quad \frac{1}{\tan x}$ $\therefore$ LHS = RHS	✓ factor/*faktor* (cosec x) **A** ✓ **I** **A** ✓ **S** **CA** ✓ **I** **A** (4)
		[15]

QUESTION/*VRAAG* 5



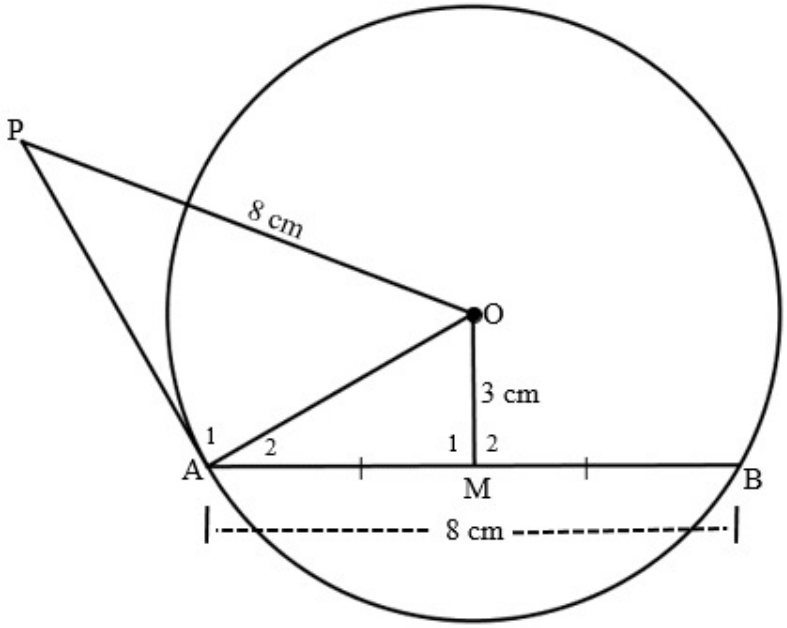
5.1.1	2	✓ value of/*waarde van a* **A** (1)
5.1.2	$180°$	✓ period /*periode* **A** (1)
5.1.3	$\tan x = 1$ $x = 45°$	✓**S** **A** ✓ value of /*waarde van x* **A** **AO: full marks/ *volpunte*** (2)
5.1.4	$y \in \mathbb{R}$ **OR/*OF*** $y \in (-\infty;\infty)$	✓ range /*waardevers* **A** (1)
5.1.5	$x \in (45°;135°)$ **OR/*OF*** $45° < x < 135°$	✓ critical values / *kritiese waardes* **A** ✓ correct notation / *korrekte notasie* **A** (2)
5.2	$g(180°) - f(180°)$ $= 0 - 1$ $= -1$ **OR/*OF*** $\tan 180° - \cos 2(180°)$ $= 0 - 1$ $= -1$	✓ substitution / *vervanging* **A** ✓ **S** **CA** (2)
5.3	$x \in (0°;90°)$ **OR/*OF*** $0° < x < 90°$	✓ critical values / *kritiese waardes* **A** ✓ correct notation / *korrekte notasie* **A** (2)
		[11]

QUESTION/*VRAAG* 6



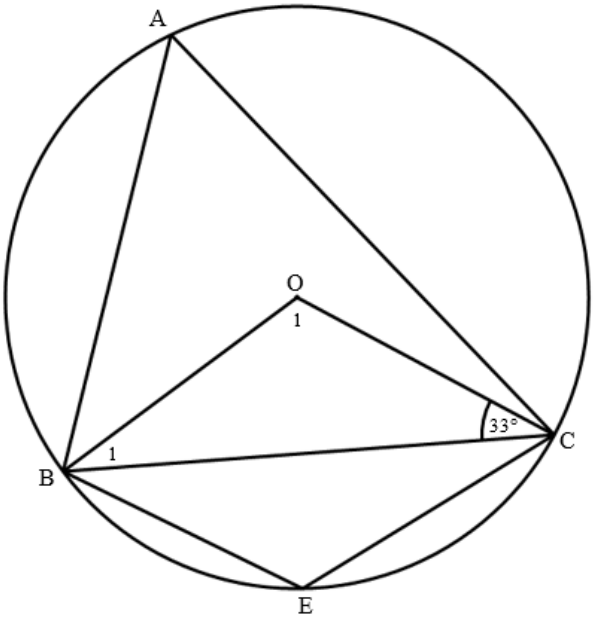
6.1	$\hat{QRP} = 17°$ $\frac{PR}{\sin 114°} = \frac{8}{\sin 17°}$ $PR = \frac{8\sin 114°}{\sin 17°}$ $\approx 25\,m$	✓angle size /*hoek grootte* **A** ✓ substitution /*vervanging* **A** ✓ **S** **CA** ✓ length / *lengte* **CA** (4)
6.2	$\hat{RPM} = 41°$	✓ size /*grootte* **A** (1)
6.3	$\sin \hat{RPM} = \frac{MR}{PR}$	✓ sin ratio /*verh* **A** (1)
6.4	$\sin 41° = \frac{MR}{25}$ $MR = 25\sin 41°$ $= 16,4$ $MT = 16,4 - 5$ $= 11,4\,m$	✓ substitution /*vervanging* **CA** ✓ length/*lengte* of/*van* MR **CA** ✓ length/*lengte* of/*van* MT **CA** (3)
		[9]

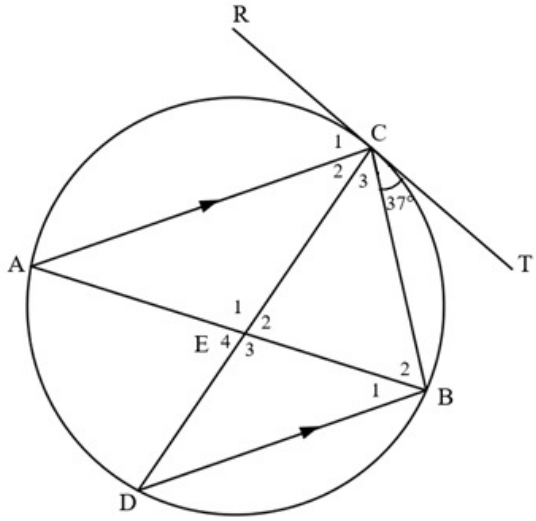
QUESTION/*VRAAG* 7

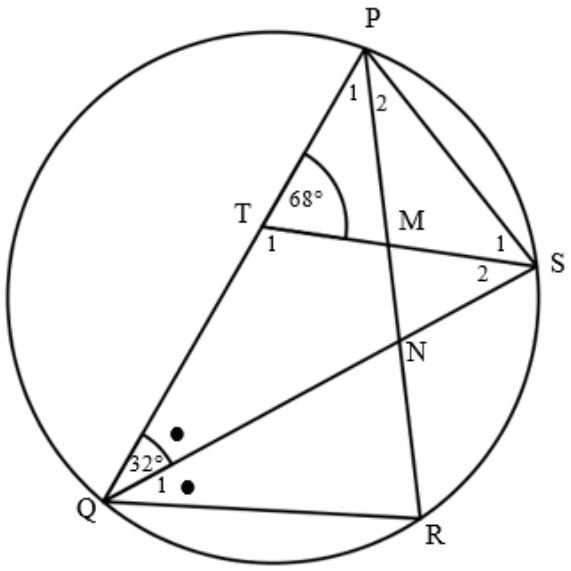


7.1	$\hat{M}_1 = 90°$ (line from centre to midpoint of chord / *lyn vanaf midpt na mdpt van koord*)	✓ **ST** ✓ **RE**	**A** **A** (2)
7.2	(tan ⊥ rad / *raaklyn ⊥ radius*)	✓ **RE**	**A** (1)
7.3	$AM = 4$ cm Midpoint /*Middelpunt* $AO = 5$ cm (Pythagoras) $AP^2 + AO^2 = PO^2$ (Pythagoras) $AP^2 + 5^2 = 8^2$ $\therefore AP^2 = 64 - 25 = 39$ $\therefore AP \approx 6{,}24$ cm	✓ **ST** ✓ **ST** ✓ **ST**	**A** **CA** **CA** (3)
			[6]

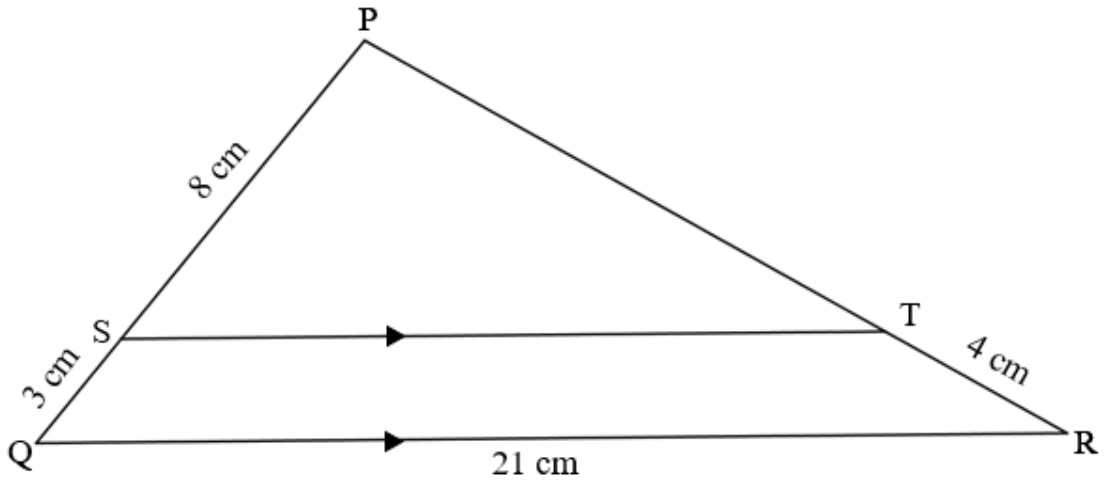
QUESTION/*VRAAG* 8

8.1		
8.1.1	$\hat{B}_1 = 33°$ $\begin{pmatrix}\angle s\ opp = sides\ /\\ \angle e\ teenoor\ gelyke\ sye\end{pmatrix}$	✓ **ST** **A** ✓ **RE** **A** (2)
8.1.2	$\hat{B}_1 + \hat{O}_1 + 33° = 180°$ $\begin{pmatrix}\text{int } \angle s \text{ of } \Delta\ /\\ binne\ \angle e\ van\ \Delta\end{pmatrix}$ $\therefore \hat{O}_1 = 114°$	✓ **ST** **CA** ✓ **RE** **A** (2)
8.1.3	$\hat{A} = 57°$ $\begin{pmatrix}\angle \text{at centre} = 2 \times \angle \text{at circumf}\ /\\ midpts\ \angle\ =\ 2\ \times\ omtreks\angle\end{pmatrix}$ $\therefore \hat{E} = 123°$ $\begin{pmatrix}\text{opp} \angle s \text{ of a cylcic quad}\ /\\ teenoorst\ \angle e\ vankdvh\end{pmatrix}$	✓ **ST** **CA** ✓ **RE** **A** ✓ **ST** **CA** ✓ **RE** **A** (4)

8.2		
8.2.1	$\hat{D} = 37°$ (tan - chord / *raaklyn – koord*) $\hat{A} = 37°$ (tan - chord / *raaklyn – koord*) / (∠s in same segment / *∠e in dies segment*) $\hat{C}_2 = 37°$ (alt ∠s; AC ‖ DB / *verw ∠e; AC ‖ DB*) $\hat{B}_1 = 37°$ (alt ∠s; AC ‖ DB / *verw ∠e; AC ‖ DB*) / (∠s in same segment / *∠e in dies segment*)	✓ **ST** **A** ✓ **RE** **A** ✓ **ST/RE** **A** ✓ **ST** **A** ✓ **RE** **A** ✓ **ST/RE** **A** (6)
8.2.2	In ΔAEC and/*en* ΔBED: $\hat{A} = \hat{B} = 37°$ from/*vanaf* 8.2.1 $\hat{C} = \hat{D} = 37°$ from/*vanaf* 8.2.1 ∴ ΔAEC ||| ΔBED (∠∠∠) **OR/*OF*** $\hat{E}_1 = \hat{E}_3$ (Vert opp ∠s / *regoorst ∠e*) **OR/*OF*** In ΔAEC and/*en* ΔDEB: $\hat{A} = \hat{D} = 37°$ from/*vanaf* 8.2.1 $\hat{C}_2 = \hat{B}_1 = 37°$ from/*vanaf* 8.2.1 ∴ ΔAEC ||| ΔBED (∠∠∠) **OR/*OF*** $\hat{E}_1 = \hat{E}_3$ (Vert opp ∠s / *regoorst ∠e*)	✓ both **ST** **CA** ✓ Concl/*Gevlgtr* **OR/*OF*** Indicating 3rd pair / *dui 3de paar* **A** **OR/*OF*** ✓ both **ST** **CA** ✓ Concl/ *Gevlgtr* **OR/*OF*** Indicating 3rd pair / *dui 3de paar* **A** (2)

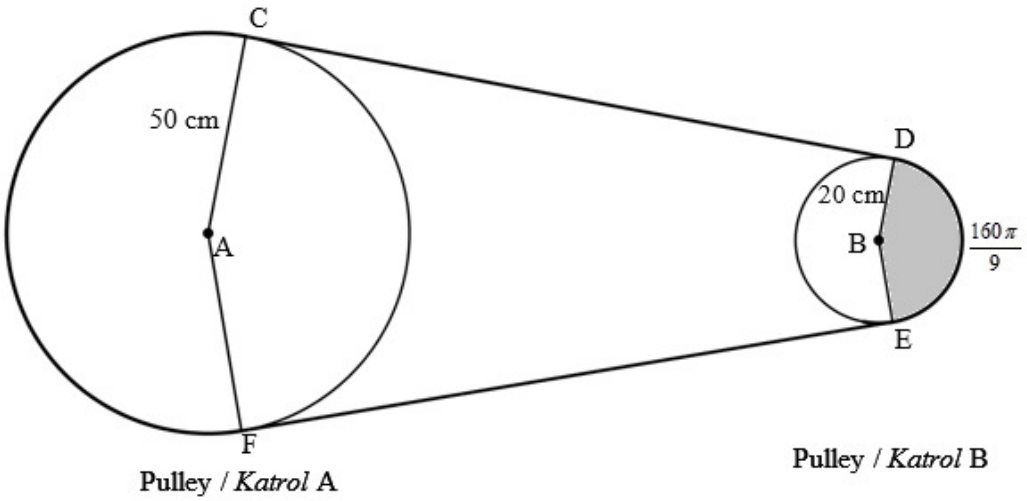
8.2.3.	$\therefore \frac{AE}{BE} = \frac{EC}{ED}$ $\therefore AE \times ED = EC \times BE$	✓ **ST** ✓ **ST**	**A** **A** (2)
8.3			
8.3.1 a)	$\hat{Q}_1 = 32°$ (SQ bisect ∠/ SQ *halveer* ∠)	✓ **ST**	**A** (1)
8.3.1 b)	$\hat{P}_2 = 32°$ (∠s in same segment / ∠e *in dies segment*)	✓ **ST** ✓ **RE**	**A** **A** (2)
8.3.2	$\hat{P} = 68°$ (∠s opp = sides / ∠e *teenoor = sye*) $\therefore \hat{P}_1 = 36°$ $\hat{S}_2 = 68° - 32° = 36°$ (ext ∠ of ΔTQS / *buite ∠ van* ΔTQS) $\therefore \hat{P}_1 = \hat{S}_2$	✓ **ST** ✓ **RE** ✓ **ST** ✓ **ST** ✓ **RE**	**A** **A** **CA** **A** **A** (5)
			[26]

QUESTION/*VRAAG* 9

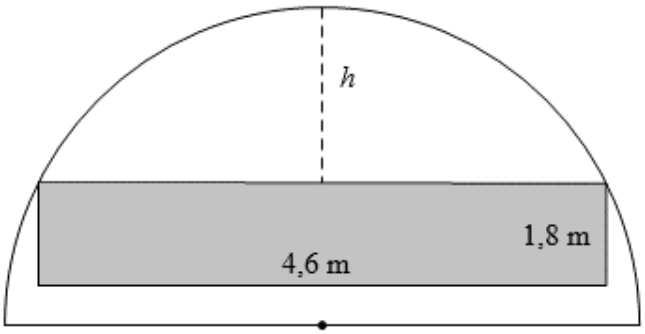


9.1	$\begin{pmatrix}\text{prop th, ST} \parallel \text{QR} /\\ \textit{ewer st, ST} \parallel \text{QR}\end{pmatrix}$ **OR/*OF*** $\begin{pmatrix}\text{line} \parallel \text{one side of } \Delta /\\ \textit{lyn} \parallel \textit{aan een sy van } \Delta\end{pmatrix}$	✓ **RE** **A** (1)
9.2	$\frac{PT}{4}=\frac{8}{3}$ $\therefore PT=\frac{32}{3}\text{cm}$ **OR/*OF*** $\approx 10{,}67\text{ cm}$	✓ Substitution /*vervanging* **A** ✓ **ST** **CA** (2)
9.3	$\frac{ST}{QR}=\frac{PS}{PQ}$ $(\Delta PST \text{ ||| } \Delta PQR)$	✓ PQ **A** ✓ **RE** **A** (2)
9.4	$\therefore \frac{ST}{21}=\frac{8}{11}$ $\therefore ST=\frac{168}{11}\text{cm}$ **OR/*OF*** $\approx 15{,}27\text{ cm}$	✓ Substitution /*vervanging* **A** ✓ **ST** **CA** (2)
		[7]

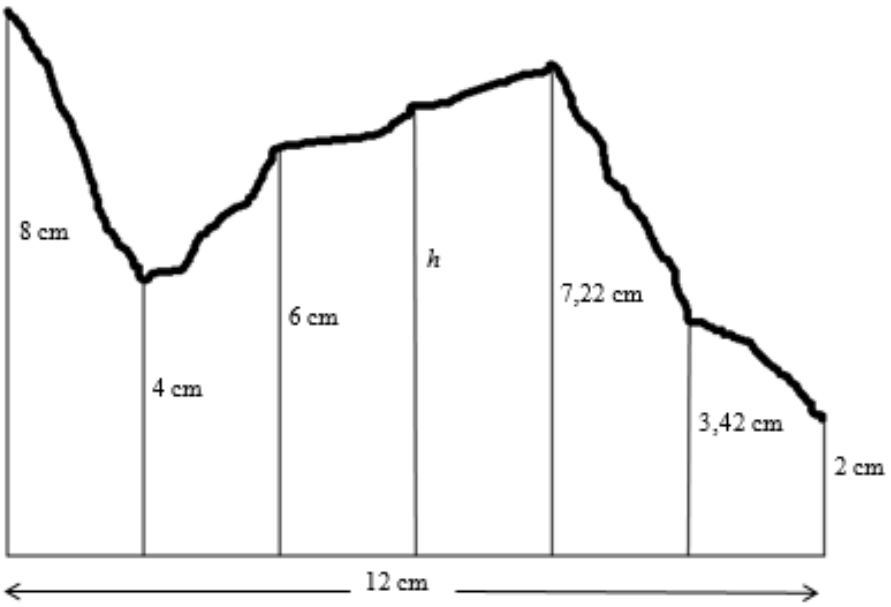
QUESTION/*VRAAG* 10

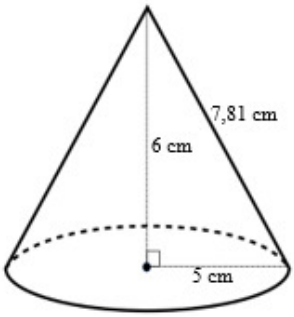
		
10.1.1	Reflex/ *refleks* $C\hat{A}F = \frac{5}{9} \times 360° = 200°$	✓ $\frac{5}{9} \times 360°$ (1)
10.1.2	$200° = 200° \times \frac{\pi}{180°} = \frac{10\pi}{9}$ **OR/*OF*** $\approx 3{,}49$ rad	✓ angle/*hoek* in rad **A** (1)
10.1.3	$s = r\theta$ $= 50 \times \frac{10\pi}{9}$ **OR/*OF*** $s = 50(200) \times \frac{\pi}{180°}$ $= \frac{500\pi}{9}$ **OR/*OF*** $\approx 174{,}53$ cm	✓ **F** **A** ✓ **SF** **CA** ✓ arc length /*booglengte* **CA** (3)
10.1.4 a)	$v = \pi D n$ $= \pi \times 100 \times 500$ $= 50\,000\pi$ **OR/*OF*** $\approx 157\,079{,}63$ cm/min **OR / *OF*** $\omega = 2\pi n$ $= 2\pi \times 500 = 1\,000\pi$ $v = \omega r$ $= 1\,000\pi \times 50$ $= 50\,000\pi$ **OR / *OF*** $\approx 157\,079{,}63$ cm/min	✓ **F** **A** ✓ **SF** **CA** ✓ circm vel /*omtreksnld* **CA** **OR/*OF*** ✓ **F** **A** ✓ **SF** **CA** ✓ circm vel /*omtreksnld* **CA** (3)

10.1.4 b)	$v = \frac{50\,000\,\pi\,\text{cm}}{1\,\text{min}} \times \frac{1\,\text{min}}{60\,\text{sec}} = \frac{2\,500\,\pi}{3}$ cm/s $v_B = v_A$ $\therefore \pi \times 40n = \frac{2500\pi}{3}$ $\therefore n = \frac{125}{6}$ rev/s **OR/*OF*** $\approx 20{,}83$ rev/s **OR/*OF*** $v_B = v_A$ $\therefore \pi \times 40n = 50000\pi$ $\therefore n = 1\,250$ rpm $\therefore n = \frac{1\,250\,\text{rev}}{1\,\text{min}} \times \frac{1\,\text{min}}{60\,\text{sec}}$ $\therefore n = \frac{125}{6}$ rev/s **OR/*OF*** $\approx 20{,}83$ rev/s	✓ conversion /*herleiding* **A** ✓ **M** (equating velocities) **A** ✓ **SF** **CA** ✓ value of *n* /*waarde van n* **CA** **OR/*OF*** ✓ **M** (equating velocities) **A** ✓ **SF** **CA** ✓ conversion /*herleiding* **A** ✓ value of *n* /*waarde van n* **CA** (4)
10.1.5	Area of sector/ *Area van sektor* $= \frac{rs}{2}$ $= \frac{20 \times \frac{160\pi}{9}}{2}$ $= \frac{1600\pi}{9}$ cm^2 **OR/*OF*** $\approx 558{,}51$ cm^2 **OR/*OF*** Area of sector/ *Area van sektor* $= \frac{r^2\theta}{2}$ $= \frac{20^2 \times \left(360° \times \frac{4}{9}\right) \times \frac{\pi}{180°}}{2}$ $= \frac{1600\pi}{9}$ cm^2 **OR/*OF*** $\approx 558{,}51$ cm^2 **OR/*OF*** Area of sector/ *Area van sektor* $= \frac{\theta}{360°}\pi r^2$ $= \frac{360° \times \frac{4}{9}}{360°}\pi \times 20^2$ $= \frac{1600\pi}{9}$ cm^2 **OR/*OF*** $\approx 558{,}51$ cm^2	✓ **F** **A** ✓ **SF** **A** ✓ area **CA** **OR/*OF*** ✓ **F** **A** ✓ **SF** **A** ✓ area **CA** **OR/*OF*** ✓ **F** **A** ✓ **SF** **A** ✓ area **CA** (3)

10.2		
10.2.1	$h = 1{,}8 + 0{,}72 = 2{,}52\text{m}$	✓ value of h / *waarde van h* **A** (1)
10.2.2	$4h^2 - 4dh + x^2 = 0$ $4h^2 - 4dh + x^2 = 0$ $4(2{,}52)^2 - 4d(2{,}52) + (4{,}6)^2 = 0$ $-10{,}08d = -46{,}5616$ $d \approx 4{,}62$ m	✓ **F** **A** ✓ **SF** **CA** ✓ **S** **CA** ✓ value of d / *waarde van d* **CA** (4)
		[20]

QUESTION/*VRAAG* 11

11.1			
11.1.1	$a = \frac{12}{6} = 2 \text{ cm}$	✓ answer / *antwoord*	**A** (1)
11.1.2	$h = \frac{6 + 7{,}22}{2} = 6{,}61 \text{ cm}$	✓ **M** ✓ **ST**	**A** **CA** (2)
11.1.3	$\text{Area} = a\left(\frac{o_1 + o_n}{2} + o_2 + o_3 + \ldots + o_{n-1}\right)$ $= 2\left(\frac{8+2}{2} + 4 + 6 + 6{,}61 + 7{,}22 + 3{,}42\right)$ $= 64{,}50 \text{ cm}^2$ **OR/ *OF*** $\text{Area} = a\left(m_1 + m_2 + m_3 + \ldots + m_n\right)$ $= 2\left(\frac{8+4}{2} + \frac{4+6}{2} + \frac{6+6{,}61}{2} + \frac{6{,}61+7{,}22}{2} + \frac{7{,}22+3{,}42}{2} + \frac{3{,}42+2}{2}\right)$ $= 64{,}50 \text{ cm}^2$	✓ **F** ✓ **SF** ✓ area **OR / *OF*** ✓**F** ✓ **SF** ✓ area	**A** **CA** **A** **A** **CA** **CA** (3)

11.2	$\text{Volume}_{\text{Ball A}} = \frac{4}{3}\pi(11)^3$ $= \frac{5324}{3}\pi \text{ cm}^3$ $\therefore \text{Volume}_{\text{Ball B}} = \frac{1}{2} \times \frac{5324}{3}\pi$ $= \frac{2662}{3}\pi \text{ cm}^3$ $\therefore \frac{4}{3}\pi x^3 = \frac{2662}{3}\pi$ $x^3 = \frac{1331}{2}$ **OR/** ***OF*** $\approx 665,5$ $x = \sqrt[3]{\frac{1331}{2}}$ **OR/** ***OF*** $x = \sqrt[3]{665,5}$ $\approx 8,73 \text{ cm}$	✓ **SF** **A** ✓ vol of ball A / *vol van bal A* **CA** ✓ vol of ball B / *vol van bal B* **CA** ✓ **S** **CA** ✓ value of *x* /*waarde van x* **CA** (5)
11.3		
11.3.1	$\text{S.A} = \pi r^2 + \pi r l$ $= \pi(5)^2 + \pi(5)(7,81)$ $= \frac{1781}{2}\pi$ **OR/** ***OF*** $\approx 201,22 \text{ cm}$	✓ **SF** **A** ✓ surface/*buite* area **CA** (2)
11.3.2	$r_{new/\,nuwe} = 5 \times 1,2 = 6 \text{ cm}$ $h_{new/\,nuwe} = 6 \times 0,9 = 5,4 \text{ cm}$ $\therefore l_{new/\,nuwe} = \sqrt{5,4^2 + 6^2} \approx 8,07 \text{ cm}$ $\therefore \text{SA}_{\text{new/nuwe}} = \pi(6)^2 + \pi(6)(8,07)$ $= \frac{4221}{50}\pi$ **OR/** ***OF*** $\approx 265,21 \text{ cm}^2$ ∴ The new surface area is greater than the original area/*Die nuwe buite-oppervlakte is groter as die oorspronklike oppervlakte.*	✓ new/*nuwe* radius **A** ✓ new height /*nuwe hoogte* **A** ✓ new slant height / *nuwe skuinshoogte* **CA** ✓ new/*nuwe* SA **CA** ✓ concl / *volgtr* **CA** (5)
		[18]

TOTAL/*TOTAAL*: 150