basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF BASIC EDUCATION
PRIVATE BAG X895, PRETORIA 0001
2024 -05- 20
APPROVED MARKING GUIDELINE
PUBLIC EXAMINATIONS

SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN/ NASIONALE SENIORSERTIFIKAAT-EKSAMEN

TECHNICAL MATHEMATICS P2/*TEGNIESE WISKUNDE V2*

MAY/JUNE 2024

FINAL 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*
SF	Substitution in correct formula/*Vervanging in korrekte formule*
ST	Statement / *Bewering*
ST/RE	Statement with reason/*Bewering met rede*
F	Correct formula/*Korrekte formule*

These marking guidelines consist of 22 pages.
Hierdie nasienriglyne bestaan uit 22 bladsye.

DATE APPROVED/DATUM GOEDGEKEUR	14 MAY 2024
EXTERNAL/*EKSTERNE* MODERATOR	INTERNAL /*INTERNE* MODERATORS
D. MARE	N. TOM
UMALUSI: Approved 14 May 2024 D MARE	W. WHITE

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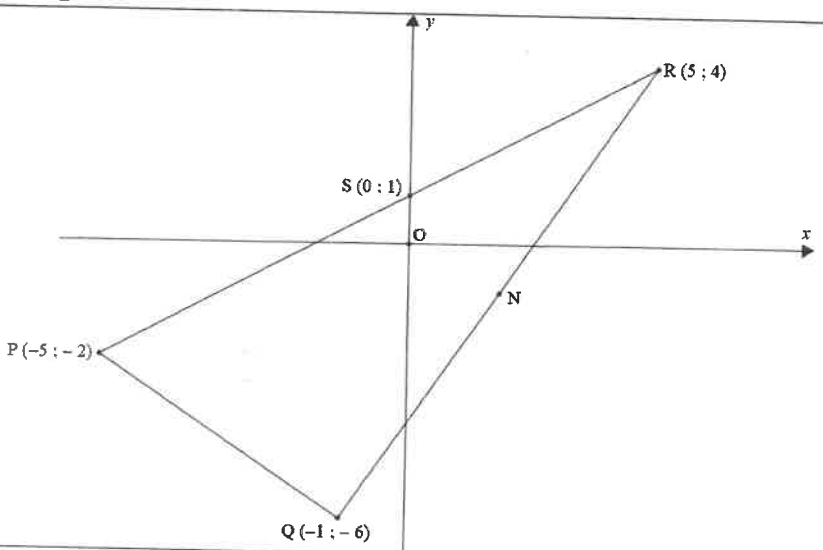
NOTE:

- 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 indicated with the marking code **CA.**
- **Tolerance range is applicable in the following questions: #2.1.2; #6; #7.2 & #8.1.4**

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 op alle aspekte van die nasienriglyne toegepas word soos aangedui deur die nasienkode* **CA.**
- **Toleransie wydte is van toepassing op die volgende vrae: #2.1.2; #6; #7.2 & #8.1.4**

QUESTION/*VRAAG* 1



1.1.1	$m_{PQ}=\frac{-2-(-6)}{-5-(-1)}=\frac{-6-(-2)}{-1-(-5)}$ $=-1$	✓SF **A** ✓gradient/*gradiënt* **CA** **AO: Full marks / *volpunte*** (2)
1.1.2	$N\left(\frac{x_R+x_Q}{2};\frac{y_R+y_Q}{2}\right)$ $N\left(\frac{5+(-1)}{2};\frac{4+(-6)}{2}\right)$ $N(2;-1)$ **OR/*OF*** $x_N=\frac{x_1+x_2}{2};\ y_N=\frac{y_1+y_2}{2}$ $x_N=\frac{5+(-1)}{2},\ y_N=\frac{4+(-6)}{2}$ $N(2;-1)$	✓ *x*-value/*waarde* **A** ✓ *y*-value /*waarde* **A** **OR/*OF*** ✓ *x*-value/*waarde* **A** ✓ *y*-value /*waarde* **A** **AO: Full marks/ *volpunte*** (2)

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1.1.3	$y=-1x+c$ $4=-1(5)+c$ $\therefore c=9$ $\therefore y=-x+9$ **OR/*OF*** $y-y_1=m(x-x_1)$ $y-4=-1(x-5)$ $y-4=-x+5$ $\therefore y=-x+9$	✓ gradient/*gradiënt* **CA** ✓ substitution/ *vervanging* (5; 4) **A** ✓equation/*vergelyking* **CA** **OR/*OF*** ✓ gradient/*gradiënt* **CA** ✓ substitution/*vervanging* (5; 4) **A** ✓equation/*vergelyking* **CA** **AO: Full marks/ *volpunte*** (3)
1.2	$PQ=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $=\sqrt{(-5-(-1))^2+(-2-(-6))^2}$ $=4\sqrt{2}$ **OR/OF** $\approx 5{,}66$ $SN=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $=\sqrt{(0-2)^2+(1-(-1))^2}$ $=2\sqrt{2}$ **OR/OF** $\approx 2{,}83$ $\frac{PQ}{SN}=\frac{4\sqrt{2}}{2\sqrt{2}}$ $=2$ **OR / *OF*** $m_{SN}=\frac{-1-1}{2-0}$ $m_{SN}=-1$ $m_{SN}=m_{PQ}$ $\therefore$ SN // PQ $2SN=PQ$ (midpoint theorem / *midpt stelling*) $\frac{PQ}{SN}=2$	✓ **SF** **A** ✓value of/*waarde van* PQ **A** ✓value of /*waarde van* SN **CA** ✓ $\frac{4\sqrt{2}}{2\sqrt{2}}$ **A** **OR / *OF*** ✓ **SF** **CA** ✓ gradient/*gradiënt* **A** ✓ SN // PQ **A** ✓ **ST & RE** **A** (4)
		[11]

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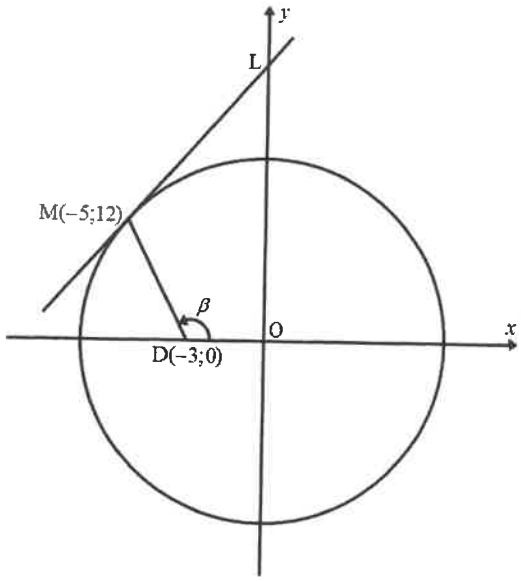
QUESTION/*VRAAG* 2



2.1.1	$x^2+y^2=r^2$ $(-5)^2+(12)^2=r^2$ $r^2=169$ $x^2+y^2=169$ **OR / *OF*** $y=\pm\sqrt{169-x^2}$ **OR / *OF*** $x=\pm\sqrt{169-y^2}$	✓substitute/*vervanging* **A** ✓equation/*vergelyking* **CA** **AO: full marks/ *volpunte*** (2)
# 2.1.2	$m_{OM}=-\frac{12}{5}$ $m_{tang}=\frac{5}{12}$ $y=mx+c$ **OR/*OF*** $y-y_1=m(x-x_1)$ $12=\frac{5}{12}(-5)+c$ $y-(12)=\frac{5}{12}(x-(-5))$ $c=\frac{169}{12}$ $\therefore y=\frac{5}{12}x+\frac{169}{12}$ **OR/*OF*** $y.y_1+x.x_1=r^2$ $y(12)+x(-5)=169$ $12y-5x=169$ $\therefore y=\frac{5}{12}x+\frac{169}{12}$	✓gradient/*gradiënt* **A** ✓gradient/*gradiënt* **CA** ✓substitution/*vervanging* $(-5;12)$ **A** ✓equation/*vergelyking* **CA** **OR/*OF*** ✓**F** **A** ✓substitution/*vervanging* $r^2=169$ **CA** ✓substitution/*vervanging* $(-5;12)$ **A** ✓equation/*vergelyking* **CA** (4)

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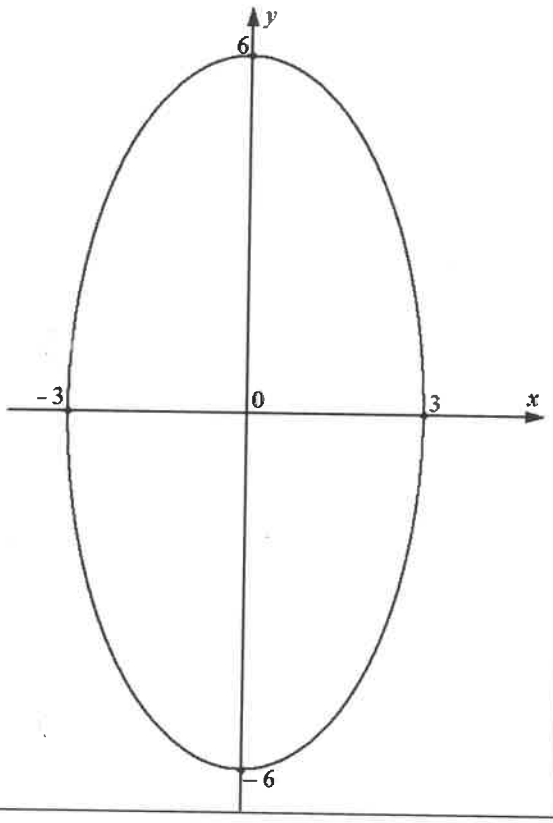
2.1.3	$L\left(0;\frac{169}{12}\right)$ **OR / *OF*** $L(0\ ;\ 14{,}08)$	✓ *x*-coordinate/*koördinaat* ✓ *y*- coordinate/*koördinaat*	**A** **CA** (2)
2.1.4	$m_{MD}=\frac{12-0}{-5-(-3)}=\frac{0-12}{-3-(-5)}=-6$ $\tan\beta=-6$ Ref/ *Verw* $\angle=80{,}54°$ $\therefore\ \beta=99{,}46°$	✓gradient/*gradiënt* ✓**SF** ✓ reference angle/ *verw.hk* ✓angle/*hoek*	**A** **CA** **CA** **CA** (4)
2.2		✓both *x*-intercepts/ *beide x-afsnitte* ✓both *y*-intercepts *beide y-afsnitte* ✓elliptical shape/*eliptiese vorm*	**A** **A** **CA** (3)
			[15]

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QUESTION/*VRAAG* 3

3.1.1	$\text{cosec}P \times \tan Q$ $= \text{cosec}\,119° \times \tan 61°$ $= \frac{1}{\sin 119°} \times \tan 61°$ **OR / *OF*** $\frac{1}{\sin 61°} \times \tan 61°$ $\approx 2,06$	✓ substitution/*vervanging* **A** ✓ $\frac{1}{\sin 119°}$ **OR / *OF*** $\frac{1}{\sin 61°}$ **A** ✓ 2,06 **CA** **AO: Full marks /*volpunte*** (3)
3.1.2	$\cos^2(P + 2Q)$ $= \cos^2(119° + 2 \times 61°)$ $\approx 0,24$	✓ substitution/*vervanging* **A** ✓ 0,24 **CA** **AO: Full marks /*volpunte*** (2)
3.2	$\frac{1}{2}\tan\theta = 2$ $\tan\theta = \frac{2}{1/2} = 4$ $r^2 = x^2 + y^2$ $r^2 = (1)^2 + (4)^2$ $= \sqrt{17}$ $\sin^2\theta + \cos^2\theta = \left(\frac{4}{\sqrt{17}}\right)^2 + \left(\frac{1}{\sqrt{17}}\right)^2$ $= \frac{16}{17} + \frac{1}{17}$ $= \frac{17}{17}$ $= 1$	✓ **S** **A** ✓ substitution/*vervanging* **A** ✓ *r* value/*waarde* **CA** ✓ sin ratio/*verh* **CA** ✓ cos ratio/*verh* **CA** ✓ **S** (squaring/*kwadrering*) **CA** (6)
3.3	$\sin x = \tan 318°$ $\sin x = -0,9004040443$ Ref / *Verw∠* = 64,21° $x = 180° + 64,21°$ or/*of* $x = 360° - 64,21°$ $x = 244,21°$ or/*of* $x = 295,79°$	✓ **S** **A** ✓ reference angle/*verw.hk* **CA** ✓ 244,21° **CA** ✓ 295,79° **CA** (4)
		[15]

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QUESTION/*VRAAG* 4

4.1.1	$\tan(\pi + A) = \tan A$	✓ $\tan A$ **A** (1)
4.1.2	$\dfrac{\tan(\pi + A)\cdot\cos(180^\circ - A)\cdot\sin(360^\circ - A)}{\sin(2\pi + A)}$ $= \dfrac{\tan A \cdot -\cos A \cdot -\sin A}{\sin A}$ $= \dfrac{\sin A}{\cos A}\cdot\dfrac{\cos A}{1}$ $= \sin A$ **OR/*OF*** $\dfrac{\tan(\pi + A)\cdot\cos(180^\circ - A)\cdot\sin(360^\circ - A)}{\sin(2\pi + A)}$ $= \dfrac{\tan A \cdot -\cos A \cdot -\sin A}{\sin A}$ $= \tan A \cdot \dfrac{\cos A}{\sin A}\cdot\sin A$ $= \tan A \cdot \cot A \cdot \sin A$ $= \tan A \cdot \dfrac{1}{\tan A}\cdot\sin A$ $= \sin A$	✓ $-\cos A$ ✓ $-\sin A$ **A** ✓ $\sin A$ ✓ **I** $\dfrac{\sin A}{\cos A}$ **A** ✓ $\sin A$ **OR / *OF*** ✓ $-\cos A$ ✓ $-\sin A$ **A** ✓ $\sin A$ **A** ✓ **I** $\dfrac{\cos A}{\sin A} = \cot A$ **A** ✓ $\sin A$ **CA** (5)
4.2	-1	✓ -1 **A** (1)
4.3	$\sin x + \cos^2 x \cdot \operatorname{cosec} x = \operatorname{cosec} x$ $\text{LHS}/LK = \sin x + \cos^2 x \cdot \dfrac{1}{\sin x}$ $= \dfrac{\sin^2 x + \cos^2 x}{\sin x}$ $= \dfrac{1}{\sin x}$ $= \operatorname{cosec} x = \text{RHS}/RK$ **OR/ *OF***	✓ **I** $\dfrac{1}{\sin x}$ **A** ✓ **S** **CA** ✓ **I** $\sin^2 x + \cos^2 x = 1$ **A** **OR / *OF***

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	LHS / $LK = \sin x + \cos^2 x \cdot \frac{1}{\sin x}$ $= \sin x + (1-\sin^2 x) \cdot \frac{1}{\sin x}$ $= \sin x + \frac{1}{\sin x} - \sin x$ $= \frac{1}{\sin x}$ $= \text{cosec } x = \text{RHS} / RK$	✓ **I** $\frac{1}{\sin x}$ **A** ✓ **I** $1-\sin^2 x$ **A** ✓ **S** **A** (3)
		[10]

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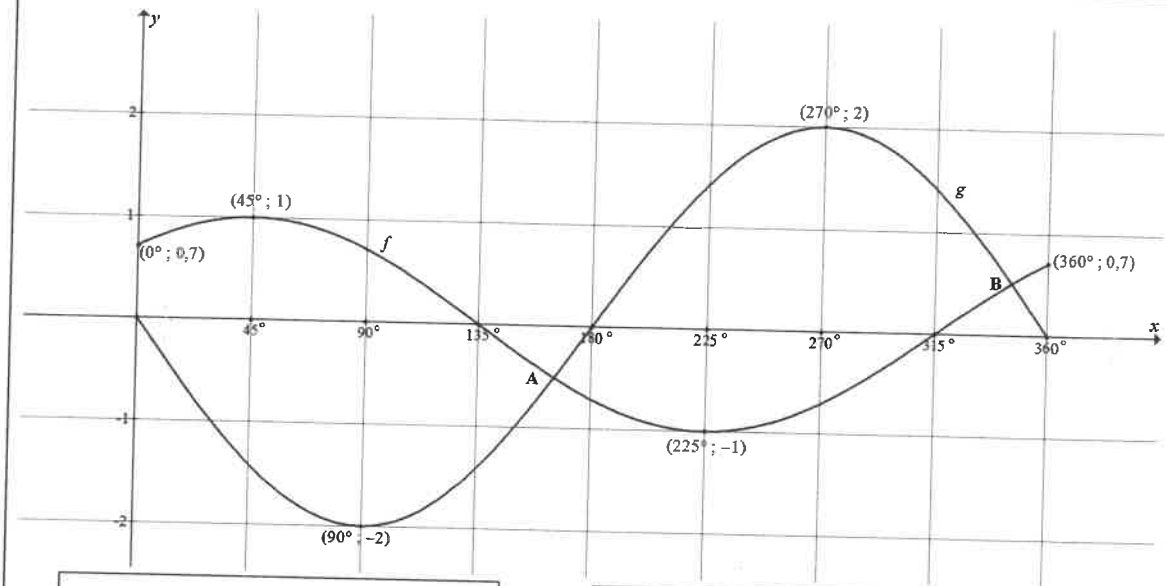
QUESTION/*VRAAG* 5

5.1



f:
- ✓ shape/*vorm* **A**
- ✓ *x*-intercepts / *x- afsnitte* **A**
- ✓ turning points/*draaipunte* (45°; 1), (225°; –1) **A**
- ✓ *y*-intercept / *y-afsnit* **A**

g:
- ✓ shape/*vorm* **A**
- ✓ *x*-intercepts/ *x-afsnitte* **A**
- ✓ turning points/*draaipunte* (90°; –2), (270° ; 2) **A**

(7)

5.2	90°	✓ *x* value/*waarde*	**CA** (1)
5.3	360°	✓ period/*periode*	**A** (1)
5.4	$-\frac{1}{2}\cos(x-45°)=\sin x$ $\cos(x-45°)=-2\sin x$ **A on the graph / *op die grafiek*** **B on the graph / *op die grafiek***	✓ **S** **A** ✓ **A** on the graph/*op die grafiek* **CA** ✓ **B** on the graph/ *op die grafiek* **CA**	(3)
5.5	$x \in (45°;225°)$ **OR/ *OF*** $45° < x < 225°$ **OR/ *OF*** $x > 45°$ and/*en* $x < 225°$ **OR/ *OF*** between/*tussen* 45° and/*en* 225°	✓ critical values/ *kritiese waardes* **CA** ✓ notation/ *notasie* **A** **OR/*OF*** ✓ critical values/*kritiese waardes* **CA** ✓ notation/*notasie* **A**	(2)
			[14]

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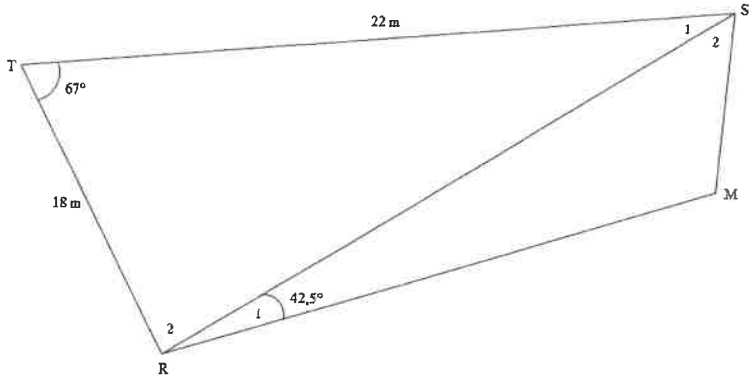
QUESTION/*VRAAG* 6



6.1.1	$SR^2 = TS^2 + TR^2 - 2TS \cdot TR \cos T$ $= (22)^2 + (18)^2 - 2(22)(18)\cos 67°$ $= 498,5409462$ $SR \approx 22,33$ m	✓ cos rule/*reël* **A** ✓ substitution/*vervanging* **A** ✓ length of/*lengte van* SR **CA** (3)
6.1.2	$\hat{M} = 180° - 67° = 113°$	✓ size of/*grootte* $\hat{M}$ **A** (1)
6.2.1	$\frac{SM}{\sin R_1} = \frac{SR}{\sin M}$	✓ sin rule/*reël* **A** (1)
6.2.2	$\frac{SM}{\sin 42,5°} = \frac{22,33}{\sin 113°}$ $SM = \frac{22,33\sin 42,5°}{\sin 113°}$ $= 16,39$ m	✓ substitution/*vervanging* **CA** ✓ length of/*lengte van* SM **CA** (2)
6.3	$\hat{S}_2 = 24,5°$ Area of/*van* $\Delta SMR = \frac{1}{2} SR \times SM \sin \hat{S}_2$ **OR/*OF*** Area of/*van* $\Delta SMR = \frac{1}{2} m \times r \times \sin \hat{S}_2$ Area of/*van* $\Delta SMR = \frac{1}{2}(22,33)(16,39)\sin 24,5°$ $= 75,89$ m^2 Bags/*sakke* $= \frac{75,89}{15,178} = 5$ 5 bags will be required / *sakke sal benodig word*	✓ size of $\hat{S}_2$ **CA** ✓ area rule/*reël* **A** ✓ substitution/*vervanging* **CA** ✓ area **CA** ✓ number of bags/*aantal sakke* **CA** (5)
		[12]

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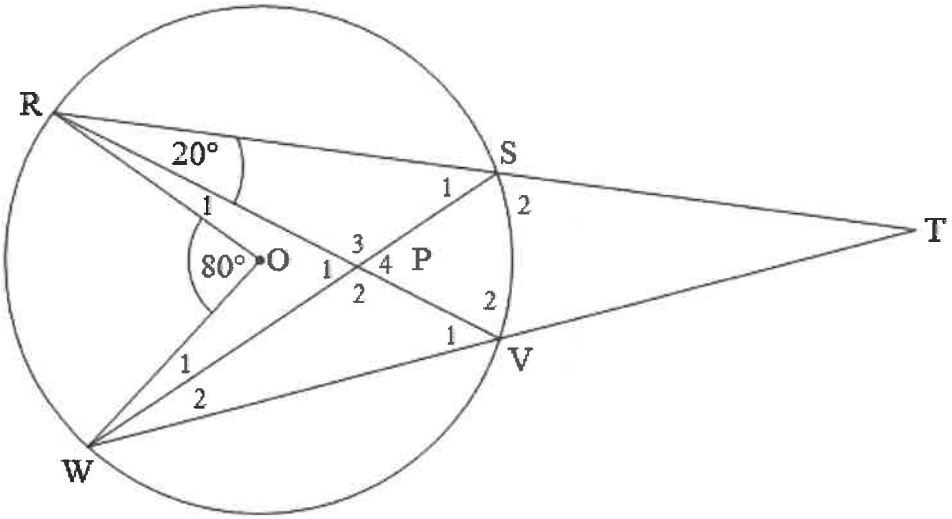
QUESTION / *VRAAG 7*



7.1.1	$\hat{V}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum} \ / \\ midpts\angle = 2\times omtreks\angle\end{pmatrix}$	✓ **ST** **A** ✓ **RE** **A** (2)
7.1.2	$\hat{T} = 20°$ $(\text{ext } \angle \text{ of } \Delta \ / \ buite\angle van\,\Delta)$ **OR / *OF*** $\hat{V}_2 = 140^0$ $\begin{pmatrix}\angle\text{s on straight line/} \\ \angle e\ op\ reguitlyn\end{pmatrix}$ $\therefore T = 20^0$ $\begin{pmatrix}\text{Int } \angle\text{s of } \Delta/ \\ binne\ \angle e\ van\Delta\end{pmatrix}$	✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **ST** **CA** ✓ **RE** **A** (2)

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#			
7.2	$\hat{S}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum } /\\ midpts\angle = 2\times omtreks\angle\end{pmatrix}$	✓ ST	CA
	OR/*OF*		
	$\hat{S}_1 = 40°$ $\begin{pmatrix}\angle s \text{ on same segm} /\\ \angle e\ dies\ segm\end{pmatrix}$		
	$\therefore \hat{P}_4 = 60°$ $(\text{ext } \angle \text{ of } \Delta / buite\ \angle van \Delta)$		
	$\therefore \hat{P}_4 + \hat{T} \neq 180°$	✓ ST	CA
	$\therefore$ STVP $\begin{pmatrix}\text{Not cyclic} /\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{opp } \angle s \text{ NOT supp} /\\ teenoorst\ \angle e\ NIE\ \text{sup } pl\end{pmatrix}$	✓RE	A
	OR/ *OF*	**OR/ *OF***	
	$\hat{S}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum } /\\ midpts\angle = 2\times omtreks\angle\end{pmatrix}$	✓ ST	CA
	$\therefore \hat{P}_3 = 120°$ $\begin{pmatrix}\text{Int } \angle s \text{ of } \Delta /\\ Binne\ \angle e\ van \Delta\end{pmatrix}$	✓ ST	CA
	$\therefore \hat{P}_3 \neq \hat{T}$		
	$\therefore$ STVP $\begin{pmatrix}\text{Not cyclic} /\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Ext } \angle \neq \text{opp int } \angle /\\ Buite\ \angle \neq teenoorst\ binne\ \angle\end{pmatrix}$	✓RE	A
	OR/*OF*	**OR/*OF***	
	$\hat{S}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle s \text{ on a straight line}/\\ \angle e\ op'n\ reguitlyn\end{pmatrix}$	✓ ST	CA
	$\hat{V}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle s \text{ on a straight line}/\\ \angle e\ op'n\ reguitlyn\end{pmatrix}$	✓ ST	CA
	$\hat{S}_2 + \hat{V}_2 \neq 180°$		
	$\therefore$ STVP $\begin{pmatrix}\text{Not cyclic} /\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Opp } \angle s \text{ not supp } /\\ Teenoorst\ \angle e\ nie\ supp\end{pmatrix}$	✓RE	A
	OR / *OF*	**OR/ *OF***	
	$\hat{V}_2 = \hat{S}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle s \text{ on a straight line}/\\ \angle e\ op'n\ reguitlyn\end{pmatrix}$	✓ ST	CA
	$\hat{V}_1 \neq \hat{S}_2$ **OR/*OF*** $\hat{V}_2 \neq \hat{S}_1$	✓ ST	CA
	$\therefore$ STVP $\begin{pmatrix}\text{Not cyclic} /\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Ext } \angle \neq \text{opp int } \angle /\\ Buite\ \angle \neq teenoorst binne\ \angle\end{pmatrix}$	✓RE	A
			(3)
			[7]

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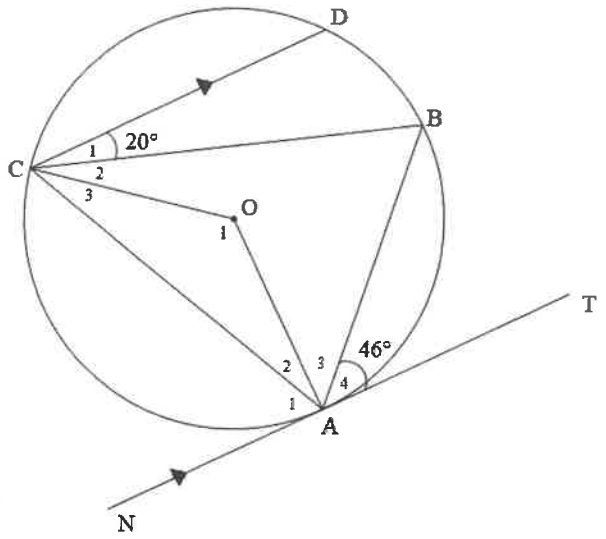
QUESTION/*VRAAG* 8

8.1



8.1.1	$B\hat{C}A = 46°$ (tan - chord / *raaklyn– koord*)	✓ **ST** ✓ **RE**	**A** **A** (2)
8.1.2	$O\hat{A}T = 90°$ (tan ⊥ rad / *raaklyn⊥rad*) $\therefore \hat{A}_3 = 44°$	✓ **ST** ✓ **RE** ✓ **ST**	**A** **A** **CA** (3)
8.1.3	$\hat{A}_1 = 66°$ (alt ∠s; CD ∥ NT / *verw∠e; CD∥NT*)	✓ **ST** ✓ **RE**	**CA** **A** (2)
# 8.1.4	$\hat{B} = 66°$ (tan - chord / *raaklyn– koord*) $\hat{O}_1 = 132°$ (∠ at centre = 2×∠ at circum / *midpts∠= 2×omtreks∠*) **OR / *OF*** $\hat{A}_2 = 24°$ (tan ⊥ rad / *raaklyn ⊥ rad*) **OR/*OF*** (∠s on str line / *∠e op reguitlyn*) $\therefore \hat{C}_3 = 24°$ (∠s opp = sides / *∠e teenoor = sye*) $\therefore \hat{O}_1 = 132°$ (int ∠s of Δ / *binne ∠e van Δ*)	✓ **ST** ✓ **ST** ✓ **RE** **OR / *OF*** ✓ **ST** ✓ **ST** ✓ **ST**	**CA** **CA** **A** **CA** **CA** **CA** (3)

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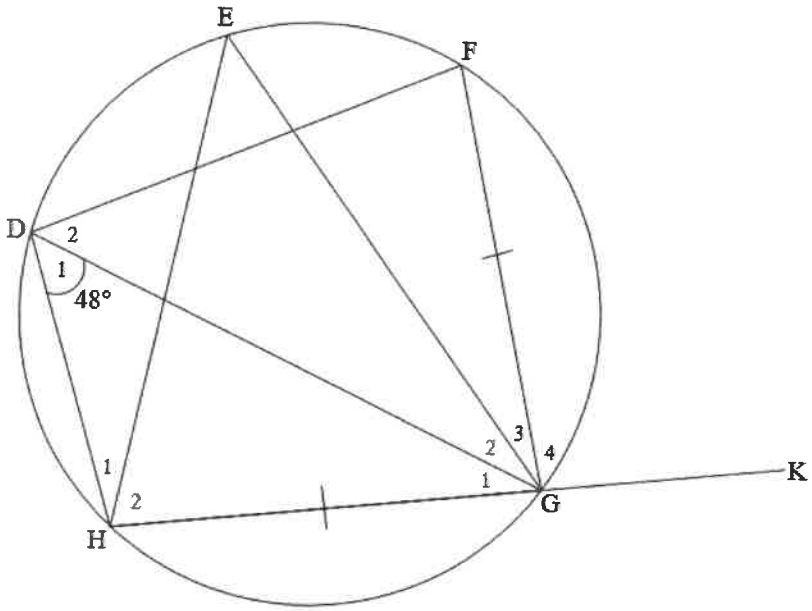
8.2



8.2.1	$\hat{E} = 48°$ (∠s in the same segment / ∠e in dieselfde segment)	✓ ST ✓ RE **A A** (2)
8.2.2	$\hat{D}_2 = 48°$ (equal chords; equal ∠s / gelyke koorde; gelyke ∠e)	✓ ST ✓ RE **CA A** (2)
8.2.3	$\hat{G}_4 = 96°$ (ext ∠ of cyclic quad / buite ∠ van kdvh)	✓ ST ✓ RE **CA A** (2)
		[16]

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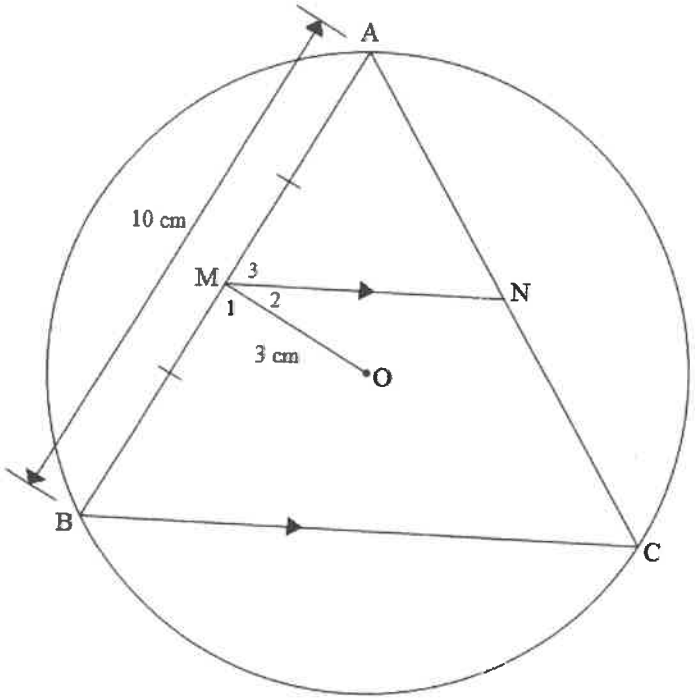
QUESTION / *VRAAG* 9



9.1.1 a)	$\hat{M}_1 = 90°$ (line from centre to midpt of chord / *lyn vanafmidpt sirkel na midpt vankrd*)	✓ **ST** **A** ✓ **RE** **A** (2)
9.1.1 b)	$MB = 5\text{ cm}$ $OB^2 = OM^2 + MB^2$ (Pythagoras) $\therefore OB^2 = 3^2 + 5^2 = 34$ $\therefore OB = \sqrt{34} \approx 5{,}83\text{ cm}$ **OR / *OF*** $MA = 5\text{ cm}$ $OA^2 = OM^2 + MA^2$ (Pythagoras) $\therefore OA^2 = 3^2 + 5^2 = 34$ $\therefore OA = \sqrt{34} \approx 5{,}83\text{ cm}$	✓ length of/*lengte van* MB **A** ✓ Pythagoras **A** ✓ length of/*lengte van* OB **CA** **OR /*OF*** ✓ length of/*lengte van* MA **A** ✓ Pythagoras **A** ✓ length of/*lengte van* OA **CA** (3)
9.1.2	$BC = 2MN$ (Midpoint th / *Middelpt st*) $\therefore BC = 10{,}24\text{ cm}$	✓ **ST** **A** ✓ **RE** **A** (2)

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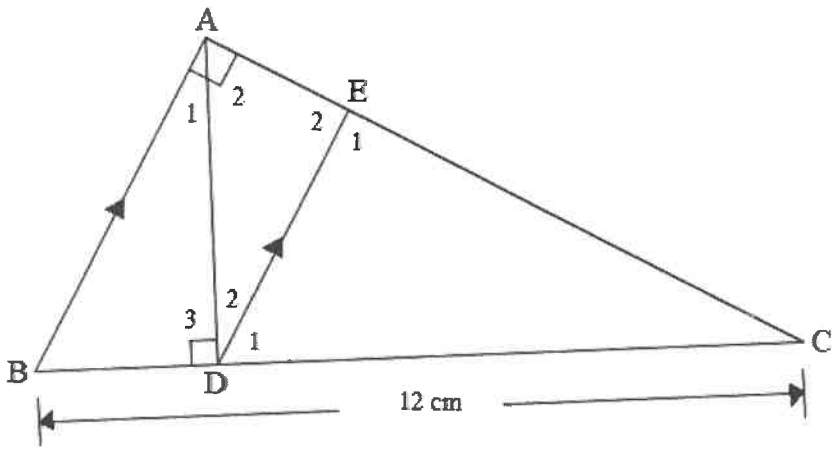
9.2



9.2.1	In Δ ADC and Δ BAC: $A\hat{D}C = \hat{A} = 90°$ (given/*gegee*) $\hat{C}$ is common /*gemeen* $\therefore$ Δ ADC ||| Δ BAC $(\angle\angle\angle)$ **OR / *OF*** $\hat{A}_2 = \hat{B}$ (Int ∠s of Δ / *Binne ∠e van Δ*)	✓ **ST** **A** ✓ **ST** **A** ✓ Concl/ *Gevlgtr* **OR/*OF*** Indicating 3rd pair / *dui 3de paar* **A** (3)
9.2.2	$\frac{DC}{AC} = \frac{AC}{BC}$ $(\Delta ADC \text{ ||| } \Delta BAC)$ $\therefore AC^2 = DC.BC$	✓ **ST** correct ratio / *korrekte verh* **A** (1)
9.2.3 a)	$\frac{DC}{BC} = \frac{CE}{AC}$ (Prop th/*eweredig. st.*; DE || AB) **OR / *OF*** In ΔCED and ΔCAB: 1) $\hat{C}$ is common / *gemeen* 2) $\hat{E}_1 = B\hat{A}C$ (corr/*ooreenk ∠s/e*; AB || DE) 3) $\hat{B} = \hat{D}_1$ (corr/*ooreenk ∠s/e*; AB || DE) ΔCED ||| ΔCAB $(\angle\angle\angle)$ $\therefore \frac{DC}{BC} = \frac{CE}{AC}$	✓ **ST** **A** ✓ **RE** **A** **OR/*OF*** ✓ **ST** (proving similarity / *bewys gelykvormigheid*) **A** ✓ **ST** **A** (2)

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9.2.3 b)	$\frac{DC}{12}=\frac{2}{3}$ (from/*vanaf* 9.2.3a) $\therefore DC=\frac{2}{3}\times 12=8$ cm	✓ substitution / *vervanging* ✓ **ST**	**CA** **CA** (2)
9.2.3 c)	$\therefore AC^2=8\times 12=96$ cm $\therefore AC\approx 9{,}80$ cm	✓ substitution / *vervanging* ✓ **ST**	**CA** **CA** (2)
			[17]

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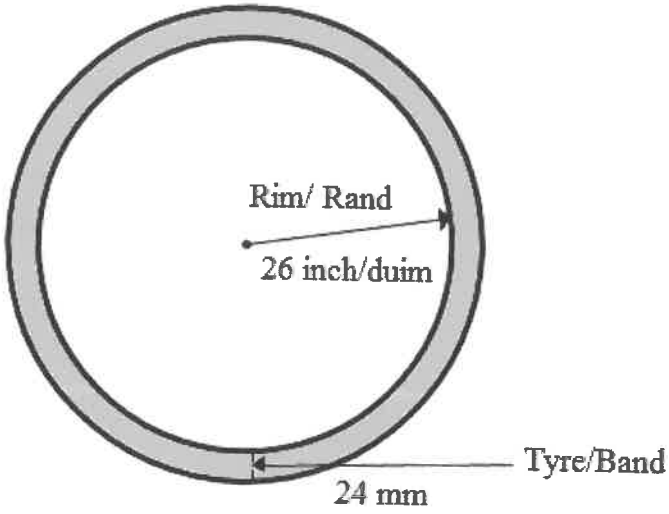
QUESTION/*VRAAG* 10

10.1



10.1.1	$26\,\text{inch}/duim = 26\,\text{inch}/duim \times \frac{0{,}0254\,\text{m}}{1\,\text{inch}} \approx 0{,}66\,\text{m}$	✓answer/*antwoord*	**A** (1)
10.1.2	Diameter/*Middellyn* $= 0{,}66 \times 2 + 2 \times 24\,\text{mm} \times \frac{1\,\text{m}}{1000\,\text{mm}} \approx 1{,}37\,\text{m}$ **OR/ *OF*** Radius $= 0{,}66 + 24\,\text{mm} \times \frac{1\,\text{m}}{1000\,\text{mm}} \approx 0{,}684\,\text{m}$ Diameter/*Middellyn* $= 2 \times 0{,}684 \approx 1{,}37\,\text{m}$	✓**M** ✓answer/*antwoord* **OR/*OF*** ✓**M** ✓answer/*antwoord* **AO: Full marks / *volpunte***	**A** **CA** **A** **CA** (2)
10.1.3	$v = 60\,\text{km/h} = \frac{60\,\text{km}}{1\,\text{h}} \times \frac{1\,\text{h}}{3600\,\text{s}} \times \frac{1000\,\text{m}}{1\,\text{km}} = 16{,}67\ \text{m/s}$ $v = \pi Dn$ $\therefore 16{,}67\ \text{m/s} = \pi(1{,}37)n$ $\therefore n = \frac{16{,}67}{1{,}37\pi}$ $\therefore n \approx 3{,}87\,\text{rev/s}$ **OR/*OF***	✓conversion/*herleiding* ✓**F** ✓**SF** ✓answer/*antwoord* **OR/*OF***	**A** **A** **CA** **CA**

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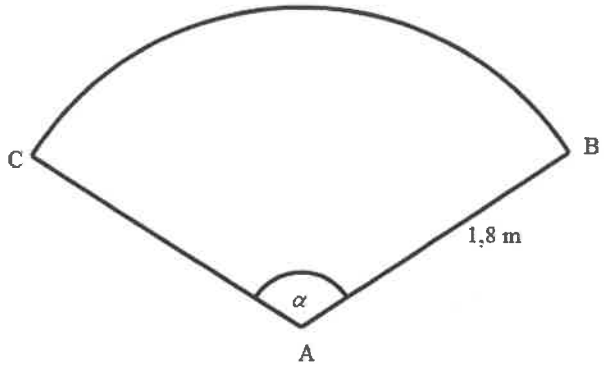
	$v = 60\text{km/h} = \frac{60\text{ km}}{1\text{ h}} \times \frac{1\text{ h}}{3600\text{s}} \times \frac{1000\text{m}}{1\text{ km}} = 16{,}67\text{ m/s}$	✓conversion/*herleiding*	**A**
	$w = \frac{v}{r}$	✓**F**	**A**
	$\therefore w = \frac{16{,}67}{0{,}684} \approx 24{,}371$	✓**SF**	**CA**
	$\therefore w = 2\pi n$		
	$\therefore n = \frac{24{,}371}{2\pi} \approx 3{,}87\text{ rev/s}$	✓answer/*antwoord*	**CA**
			(4)

10.2



	Area of sector/*van sektor* $= \frac{r^2\theta}{2}$	✓ **F**	**A**
	$2{,}5 = \frac{(1{,}8)^2\alpha}{2}$	✓ **SF**	**A**
	$\alpha = \frac{2{,}5 \times 2}{3{,}24} = 1{,}5432\text{ rad}$	✓ α in rad	**CA**
	$\therefore \alpha = 1{,}5432\text{ rad} \times \frac{180°}{\pi\text{ rad}} \approx 88{,}42°..$	✓ α in degrees/*grade*	**CA**
	$\alpha < 90°$ thus α is an acute angle/ $\alpha < 90°$ *dus is α 'n skerphoek*	✓ conclusion/*gevolgtrekking*	**CA**
	OR/*OF*	**OR / *OF***	
	Area of a sector/*van' n sektor* $= \frac{\theta}{360°} \times \pi r^2$	✓ **F**	**A**
	$2{,}5 = \frac{\alpha}{360°} \times \pi(1{,}8)^2$	✓ **SF**	**A**
	$\alpha = \frac{2{,}5 \times 360°}{3{,}24\pi}$	✓ **S**	**CA**
	$\alpha \approx 88{,}42°$	✓ α in degrees/*grade*	**CA**
	$\alpha < 90°$ thus α is an acute angle/ $\alpha < 90°$ *dus is α 'n skerphoek*	✓ conclusion/*gevolgtrekking*	**CA**
			(5)

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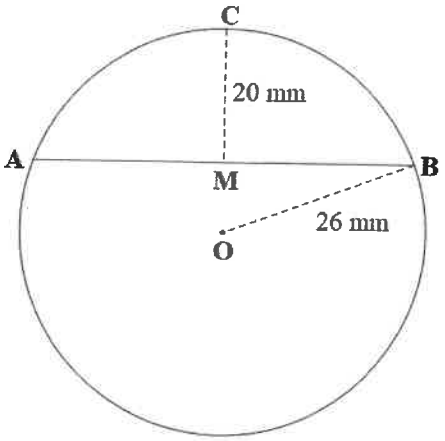
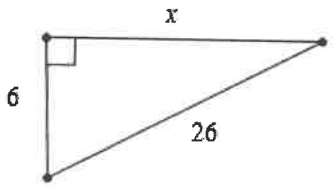
10.3



	$4h^2 - 4dh + x^2 = 0$ $4(20)^2 - 4(52)(20) + x^2 = 0$ $\therefore x^2 = 2560$ $\therefore x \approx 50{,}6\text{ mm}$ **OR/*OF*** $\therefore x = 16\sqrt{10}\text{ mm}$	✓**F** **A** ✓ diameter/*middellyn* **A** ✓**SF** **CA** ✓answer/*antwoord* **CA**
	OR / *OF*	**OR / *OF***
	 $x^2 = 26^2 - 6^2$ (Pythagoras) $x^2 = 640$ $\therefore x \approx 25{,}298...$ $AB = 2x$ $\therefore AB \approx 50{,}6\text{ cm}$ **OR/*OF*** $= 16\sqrt{10}\text{ mm}$	✓ $26 - 20 = 6$ mm **A** ✓ Pythagoras **A** ✓ value of/*waarde van x* **CA** ✓ length of/*lengte van* AB **CA** **(4)**
		[16]

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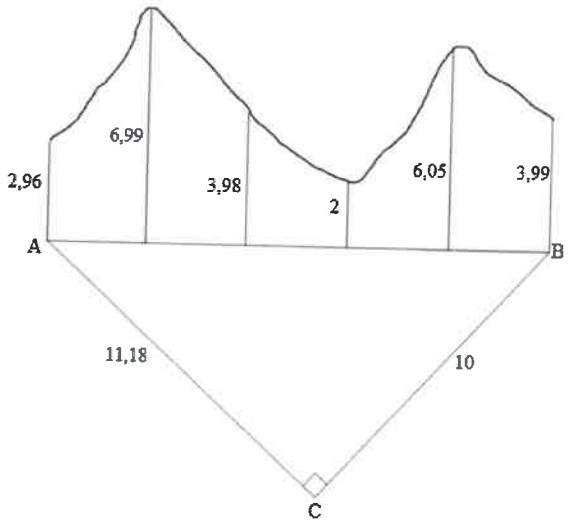
QUESTION / *VRAAG* 11

11.1



11.1.1	$AB^2 = 11{,}18^2 + 10^2$ (Pythagoras) $AB \approx 15$ cm **OR / *OF*** $AB^2 = AC^2 + BC^2 - 2(AC)(BC)\cos C$ $= (11{,}18)^2 + (10)^2 - 2(11{,}18)(10)\cos 90°$ $= 224{,}9924$ $AB \approx 15\,cm$	✓ Substitute/*vervang* ✓answer/*antwoord* **R** **OR / *OF*** ✓ Substitute/*vervang* ✓answer/*antwoord* **R**	**A** **CA** **A** **CA** (2)
11.1.2	width/*wydte* $= \frac{15}{5} = 3$ cm	✓answer/*antwoord*	**CA** (1)
11.1.3	$\text{Area} = a\left(\frac{o_1 + o_n}{2} + o_2 + o_3 + ... + o_{n-1}\right)$ $= 3\left(\frac{2{,}96 + 3{,}99}{2} + 6{,}99 + 3{,}98 + 2 + 6{,}05\right)$ $= 3(22{,}495)$ $\approx 67{,}49\ \text{cm}^2$ **OR / *OF*** $\text{Area} = a(m_1 + m_2 + m_3 + ... + m_n)$ $= 3\left(\frac{2{,}96+6{,}99}{2} + \frac{6{,}99+3{,}98}{2} + \frac{3{,}98+2}{2} + \frac{2+6{,}05}{2} + \frac{6{,}05+3{,}99}{2}\right)$ $= 3(22{,}495)$ $\approx 67{,}49\ \text{cm}^2$	✓**F** ✓**SF** ✓answer/*antwoord* **OR / *OF*** ✓**F** ✓**SF** ✓answer/*antwoord*	**A** **CA** **CA** **A** **CA** **CA** (3)

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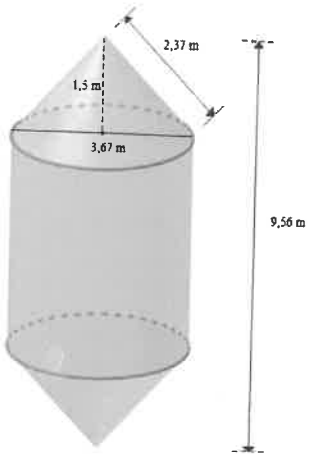
11.2



11.2.1 a)	r of cone / *van keël* $= \frac{367}{200} = 1,835\,\text{m}$	✓answer/*antwoord*	**A** (1)
11.2.1 b)	height of cylinder / *hoogte van silinder* $= 6,56\,\text{m}$	✓answer /*antwoord*	**A** (1)
11.2.2	Volume of cylinder/*silinder* $= \pi(1,835)^2(6,56)$ $= 69,3946...$ Volume of cones/*keëls* $= 2\times\frac{1}{3}\pi(1,835)^2(1,5)$ $= 10,578...$ ∴ Volume container/*houer* $\approx 25,46\pi\ \text{m}^3$ **OR/*OF*** $\approx 79,97\ \text{m}^3$	✓ **SF** ✓ **SF** ✓answer/*antwoord*	**CA** **CA** **CA** (3)
11.2.3	Total surface area / *Totale buite opp* $= 2\pi rh + 2\times\pi r\ell$ $= 2\pi(1,835)(6,56) + 2\times\pi(1,835)(2,37)$ $\approx 32,78\pi\ \text{m}^2$ **OR/*OF*** $\approx 102,96\ \text{m}^2$ ∴ The material will not be sufficient to cover / *Die materiaal sal nie voldoende wees nie*	✓ **F** $2\pi rh$ ✓ **F** $2\times\pi r\ell$ ✓ substitution/*vervanging* ✓ substitution/*vervanging* ✓answer/*antwoord* ✓ conclusion/*gevolgtrekking*	**A** **A** **CA** **CA** **CA** **CA** (6)
			[17]

TOTAL/*TOTAAL*:150

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