basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

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

TECHNICAL MATHEMATICS P2/*TEGNIESE WISKUNDE V2*

MAY/JUNE 2024

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/RE	Statement with reason/*Bewering met rede*
F	Correct formula/*Korrekte formule*

These marking guidelines consist of 20 pages.
Hierdie nasienriglyne bestaan uit 20 bladsye.

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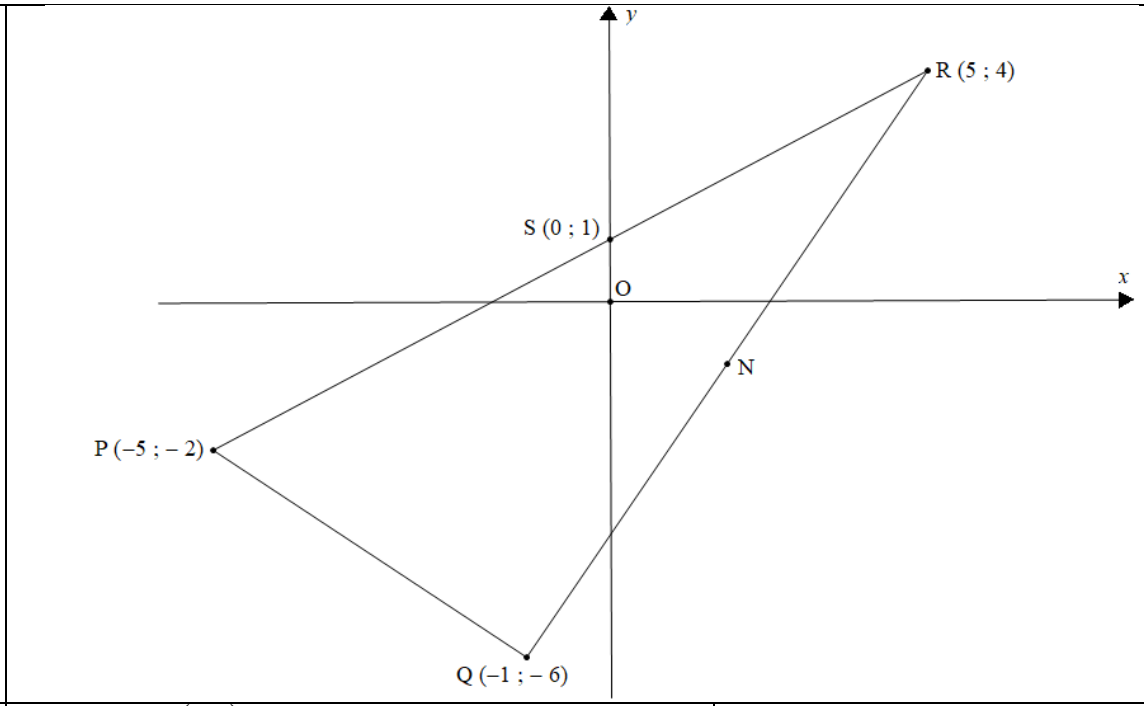
NOTE:

- 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 indicated 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 op alle aspekte van die nasienriglyne toegepas word soos aangedui deur die nasienkode* **CA.**

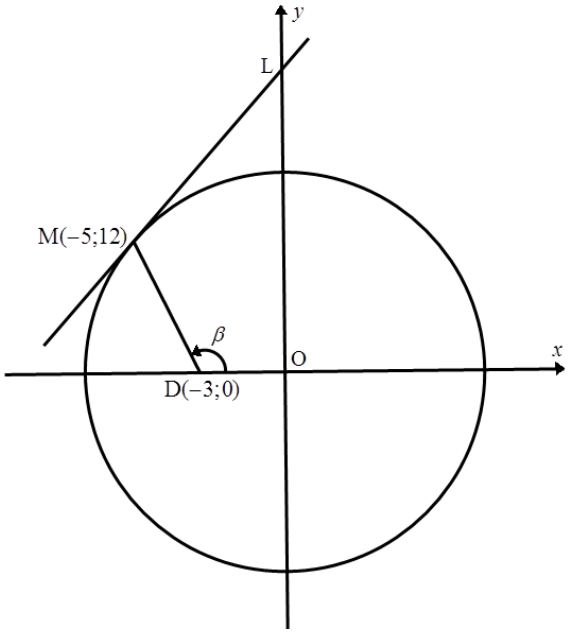
QUESTION/*VRAAG* 1



1.1.1	$m_{PQ}=\frac{-2-(-6)}{-5-(-1)}$ $=-1$	✓SF **A** ✓gradient/*gradiënt* **CA** (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)

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* **CA** ✓equation/*vergelyking* **CA** **OR/*OF*** ✓ gradient/*gradiënt* **CA** ✓ substitution/*vervanging* **CA** ✓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** $\approx 2{,}83$ $\frac{PQ}{SN}=\frac{4\sqrt{2}}{2\sqrt{2}}$ $=2$	✓ **SF** **A** ✓value of/*waarde van* PQ **A** ✓value of /*waarde van* SN **A** ✓ $\frac{4\sqrt{2}}{2\sqrt{2}}$ **CA** (4)
		[11]

QUESTION/*VRAAG* 2



2.1.1

$x^2 + y^2 = r^2$
$(-5)^2 + (12)^2 = r^2$
$r^2 = 169$
$x^2 + y^2 = 169$

✓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**

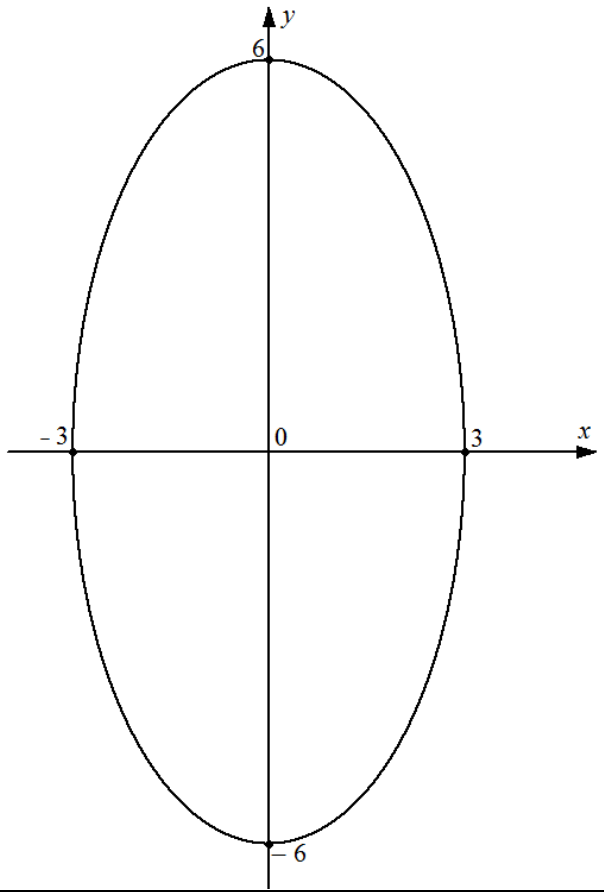
✓gradient/*gradiënt* **CA**

✓substitution/*vervanging* **CA**

✓equation/*vergelyking* **CA**

OR/*OF*

✓**F** **CA**
✓substitution/*vervanging* **CA**
✓ **S** **CA**
✓equation/*vergelyking* **CA**
(4)

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

QUESTION/*VRAAG* 3

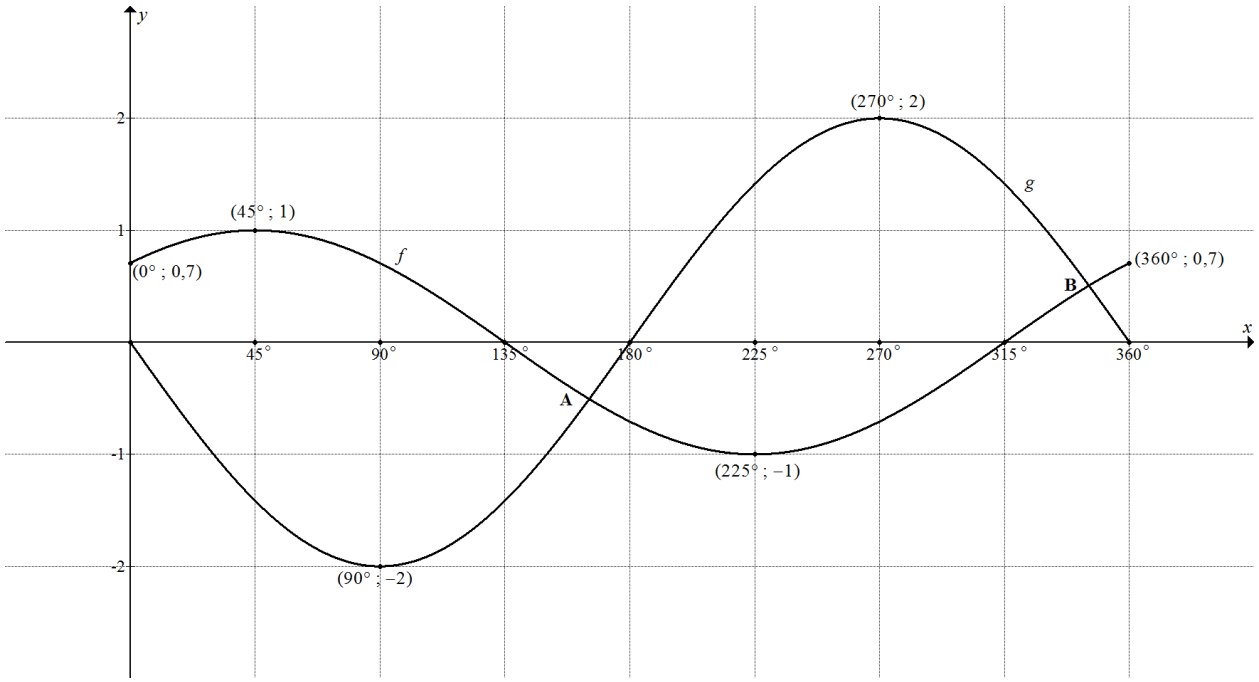
3.1.1	$\text{cosec}\,P \times \tan Q$ $= \text{cosec}\,119° \times \tan 61°$ $= \frac{1}{\sin 119°} \times \tan 61°$ $\approx 2,06$	✓ substitution/*vervanging* ✓ **I** ✓ $2,06$	**A** **A** **CA** (3)
3.1.2	$\cos^2(P + 2Q)$ $= \cos^2(119° + 2 \times 61°)$ $\approx 0,24$	✓ substitution/*vervanging* ✓ $0,24$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

QUESTION/*VRAAG* 4

4.1.1	$\tan(\pi + A) = \tan A$	✓ $\tan A$ **A** (1)
4.1.2	$\frac{\tan(\pi + A) \cdot \cos(180° - A) \cdot \sin(360° - A)}{\sin(2\pi + A)}$ $= \frac{\tan A \cdot -\cos A \cdot -\sin A}{\sin A}$ $= \frac{\sin A}{\cos A} \cdot \frac{\cos A}{1}$ $= \sin A$ **OR/*OF*** $\frac{\tan(\pi + A) \cdot \cos(180° - A) \cdot \sin(360° - A)}{\sin(2\pi + A)}$ $= \frac{\tan A \cdot -\cos A \cdot -\sin A}{\sin A}$ $= \tan A \cdot \frac{\cos A}{\sin A} \cdot \sin A$ $= \tan A \cdot \cot A \cdot \sin A$ $= \tan A \cdot \frac{1}{\tan A} \cdot \sin A$ $= \sin A$	✓ $-\cos A$ **A** ✓ $-\sin A$ **A** ✓ $\sin A$ **A** ✓ **I** $\frac{\sin A}{\cos A}$ **A** ✓ $\sin A$ **CA** **OR / *OF*** ✓ $-\cos A$ **A** ✓ $-\sin A$ **A** ✓ $\sin A$ **A** ✓ **I** $\frac{\cos A}{\sin A} = \cot A$ **A** ✓ $\sin A$ **CA** (5)
4.2	-1	✓-1 **A** (1)
4.3	$\sin x + \cos^2 x \cdot \text{cosec } x = \text{cosec } x$ LHS / *LK* $= \sin x + \cos^2 x \cdot \frac{1}{\sin x}$ $= \frac{\sin^2 x + \cos^2 x}{\sin x}$ $= \frac{1}{\sin x}$ $= \text{cosec } x = \text{RHS} / RK$	✓ **I** $\frac{1}{\sin x}$ **A** ✓ **S** C**A** ✓ **I** $\sin^2 x + \cos^2 x = 1$ **A** (3)
		[10]

QUESTION/*VRAAG* 5

5.1



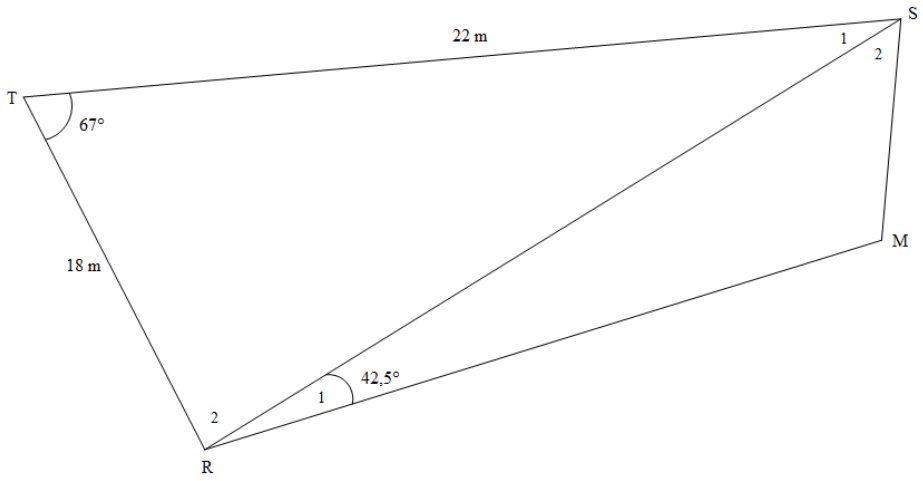
f:
✓ shape/*vorm* **A**
✓ *x*-intercepts / *x- afsnitte* **A**
✓ turning points/*draaipunte*
$(45°; 1)$, $(225°; -1)$ **A**
✓ *y*-intercept / *y-afsnit* **A**

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

(7)

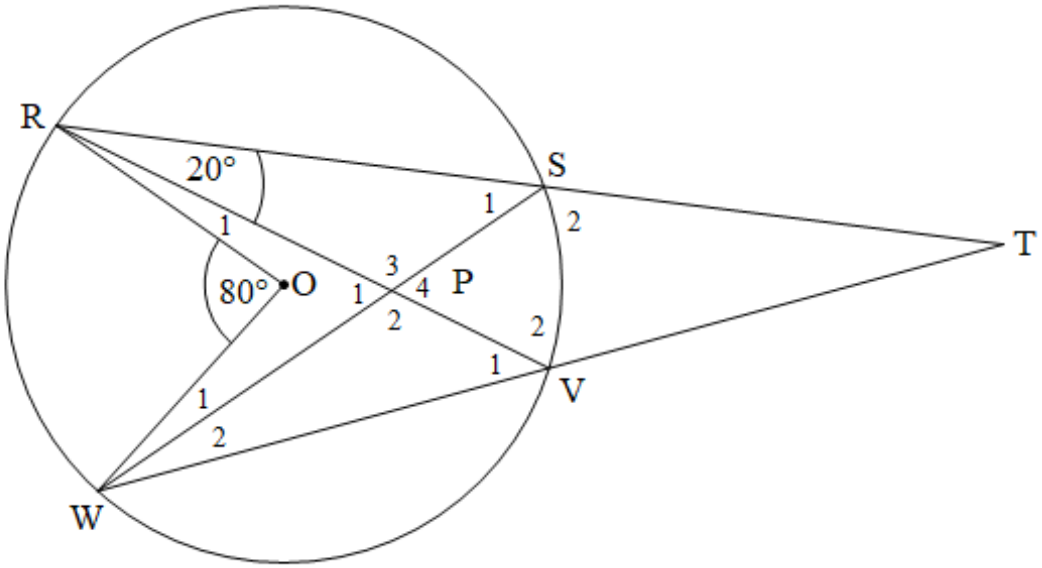
5.2	$90°$	✓ *x* value/*waarde* **A** (1)
5.3	$360°$	✓period/*periode* **A** (1)
5.4	$-\frac{1}{2}\cos(x - 45°) = \sin x$ $\cos(x - 45°) = -2\sin x$ **A on the graph** **B on the graph**	✓ **S** **A** ✓ **A** on the graph/*op die grafiek* **A** ✓ **B** on the graph/ *op die grafiek* **A** (3)
5.5	$x \in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

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/*verv* **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]

QUESTION / *VRAAG* 7

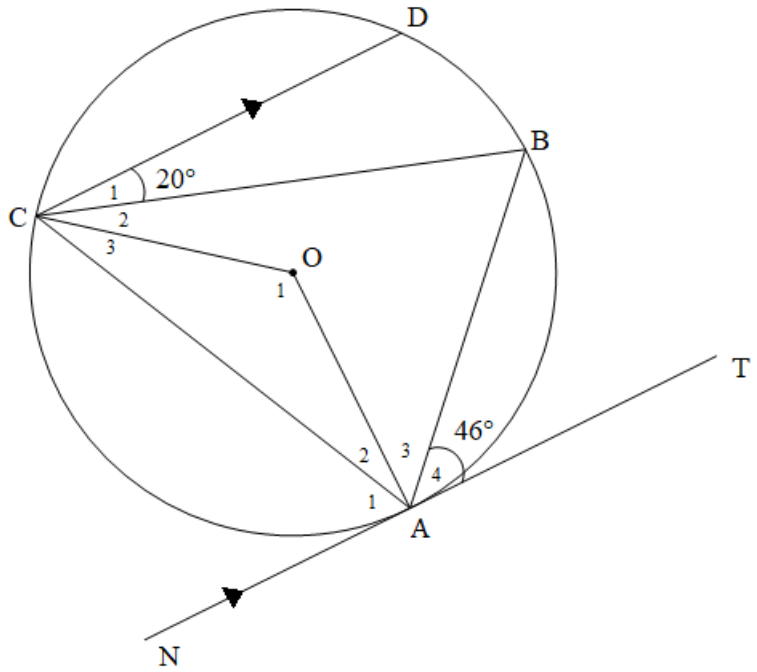


7.1.1	$\hat{V}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum } / \\ midpts\angle = \ 2\times omtreks\angle\end{pmatrix}$	✓ **ST** **A** ✓ **RE** **A** (2)
7.1.2	$\hat{T} = 20°$ $(\text{ext } \angle \text{ of } \Delta \ / \ buite\angle van\,\Delta)$	✓ **ST** **CA** ✓ **RE** **A** (2)
7.2	$\hat{S}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum } / \\ midpts\angle = \ 2\times omtreks\angle\end{pmatrix}$ **OR/*OF*** $\hat{S}_1 = 40°$ $\begin{pmatrix}\angle s \text{ on same segm } / \\ \angle e \ dies \ segm\end{pmatrix}$	✓ **ST** **CA**
	$\therefore \hat{P}_4 = 60°$ $(\text{ext } \angle \text{ of } \Delta / buite\ \angle van\,\Lambda)$ $\therefore \hat{P}_4 + \hat{T} \neq 180°$ $\therefore \text{STVP}$ $\begin{pmatrix}\text{Not cyclic } / \\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{opp } \angle s \text{ NOT supp } / \\ teenoorst\ \angle e\ NIE\ \text{sup}\ pl\end{pmatrix}$ **OR/ *OF***	✓ **ST** **CA** ✓**RE** **A** **OR/ *OF***
	$\hat{S}_1 = 40°$ $\begin{pmatrix}\angle \text{ at centre} = 2\times\angle \text{ at circum } / \\ midpts\angle = \ 2\times omtreks\angle\end{pmatrix}$ $\therefore \hat{P}_3 = 120°$ $\begin{pmatrix}\text{Int } \angle s \text{ of } \Delta / \\ Binne\ \angle e\ van\,\Delta\end{pmatrix}$ $\therefore \hat{P}_3 \neq \hat{T}$ $\therefore \text{STVP}$ $\begin{pmatrix}\text{Not cyclic } / \\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Opp int } \angle \neq \text{ ext } \angle / \\ Teenoorst\ binne\ \angle \neq buite\ \angle\end{pmatrix}$ **OR/*OF***	✓ **ST** **CA** ✓ **ST** **CA** ✓**RE** **A** **OR/*OF***

	$\hat{S}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle\text{s on a straight line/}\\ \angle\text{e } op'n\ reguitlyn\end{pmatrix}$	✓ **ST**	**CA**
	$\hat{V}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle\text{s on a straight line/}\\ \angle\text{e } op'n\ reguitlyn\end{pmatrix}$	✓ **ST**	**CA**
	$\hat{S}_2 + \hat{V}_2 \neq 180°$ $\therefore \text{STVP} \begin{pmatrix}\text{Not cyclic /}\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Opp } \angle\text{s not supp /}\\ Teenoorst\ \angle\text{e } nie\ supp\end{pmatrix}$ **OR / *OF***	✓**RE** **OR/ *OF***	**A**
	$\hat{V}_2 = \hat{S}_2 = 180° - 40° = 140°$ $\begin{pmatrix}\angle\text{s on a straight line/}\\ \angle\text{e } op'n\ reguitlyn\end{pmatrix}$	✓ **ST**	**CA**
	$\hat{V}_1 \neq \hat{S}_2$ **OR/*OF*** $\hat{V}_2 \neq \hat{S}_1$	✓ **ST**	**CA**
	$\therefore \text{STVP} \begin{pmatrix}\text{Not cyclic /}\\ Nie\ siklies\end{pmatrix}\begin{pmatrix}\text{Ext } \angle \neq \text{opp int } \angle\ /\\ Buite\ \angle \neq teenoorst\ binne\ \angle\end{pmatrix}$	✓**RE**	**A**
			(3)
			[7]

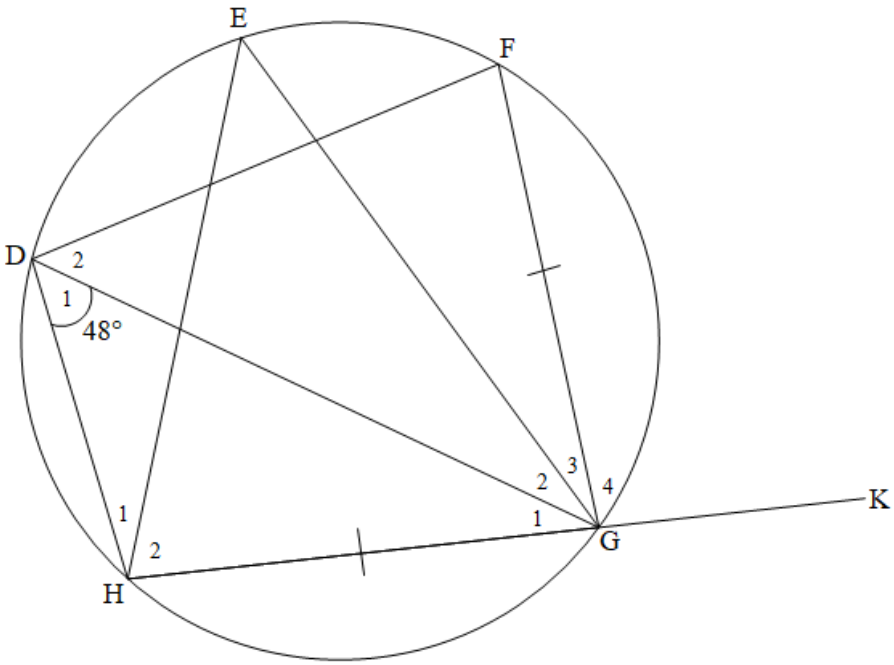
QUESTION/*VRAAG* 8

8.1



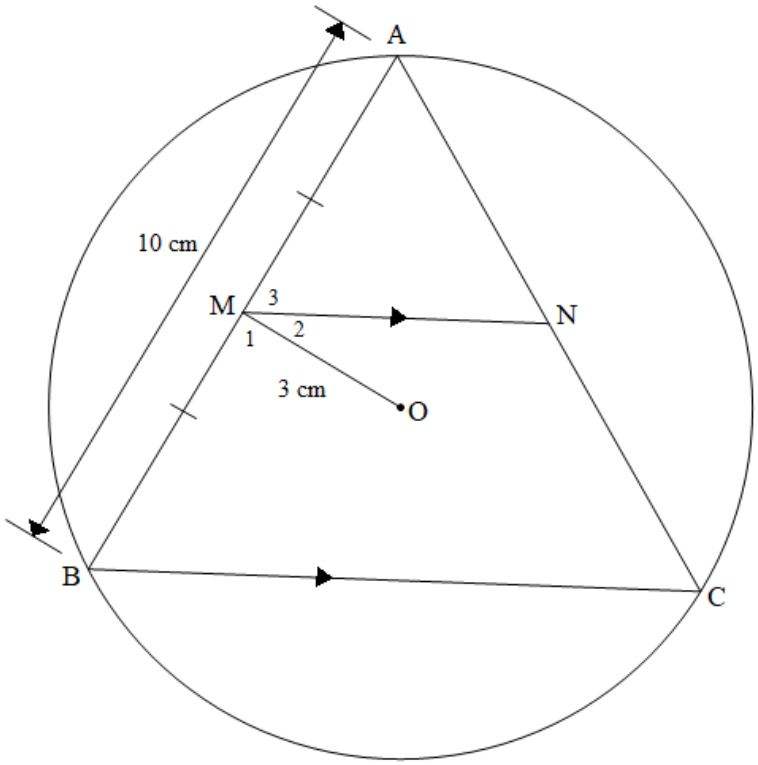
8.1.1	$\hat{BCA} = 46°$ (tan - chord / *raaklyn – koord*)	✓ **ST** **A** ✓ **RE** **A** (2)
8.1.2	$\hat{OAT} = 90°$ (tan ⊥ rad / *raaklyn ⊥ rad*) $\therefore \hat{A}_3 = 44°$	✓ **ST** **A** ✓ **RE** **A** ✓ **ST** **CA** (3)
8.1.3	$\hat{A}_1 = 66°$ (alt ∠s; CD ∥ NT / *verw ∠e; CD ∥ NT*)	✓ **ST** **CA** ✓ **RE** **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*) $\therefore \hat{C}_3 = 24°$ (∠s opp = sides / *∠e teenoor = sye*) $\therefore \hat{O}_1 = 132°$ (int ∠s of Δ / *binne ∠e van Δ*)	✓ **ST** **CA** ✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **ST** **CA** ✓ **ST** **CA** ✓ **ST** **CA** (3)

8.2



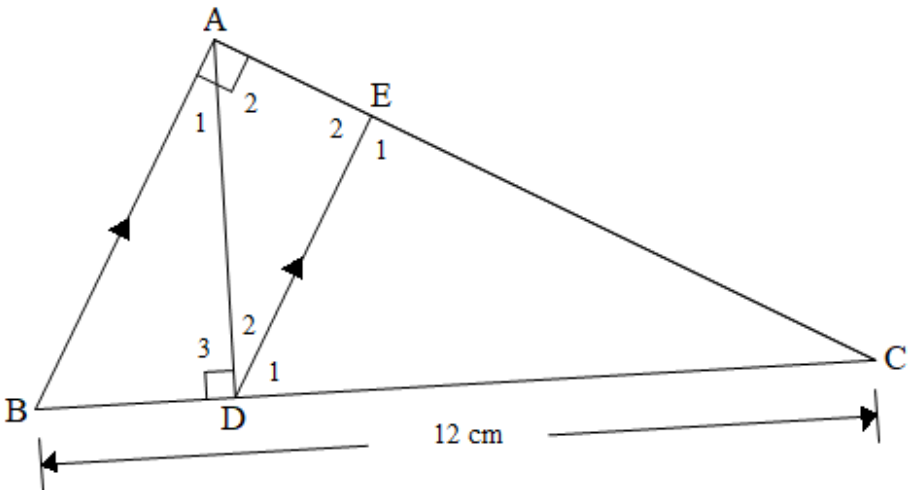
8.2.1	$\hat{E} = 48°$ $\begin{pmatrix}\angle s \text{ in the same segment} / \\ \angle e \text{ in dieselfde segment}\end{pmatrix}$	✓ **ST** **A** ✓ **RE** **A** (2)
8.2.2	$\hat{D}_2 = 48°$ $\begin{pmatrix}\text{equal chords} / \\ \text{gelyke koorde}\end{pmatrix}$	✓ **ST** **CA** ✓ **RE** **A** (2)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

QUESTION / *VRAAG* 9



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

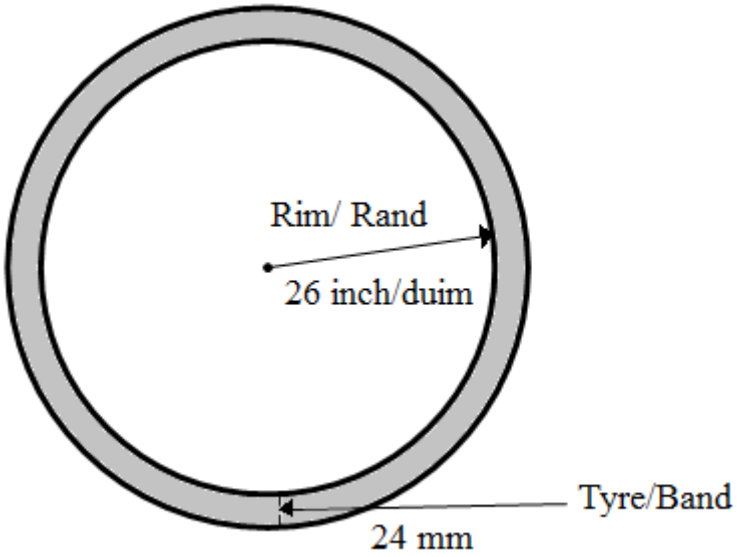
9.2



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 $(\angle\angle\angle)$	✓ **ST** **A** ✓ **ST** **A** ✓ **RE** **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/*ewer st*; DE || AB)	✓ **ST** **A** ✓ **RE** **A** (2)
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* **A** ✓ **ST** **CA** (2)
9.2.3 c)	$\therefore AC^2 = 8 \times 12 = 96$ cm $\therefore AC \approx 9{,}80$ cm	✓ **ST** **CA** ✓ **ST** **CA** (2)
		[17]

QUESTION/*VRAAG* 10

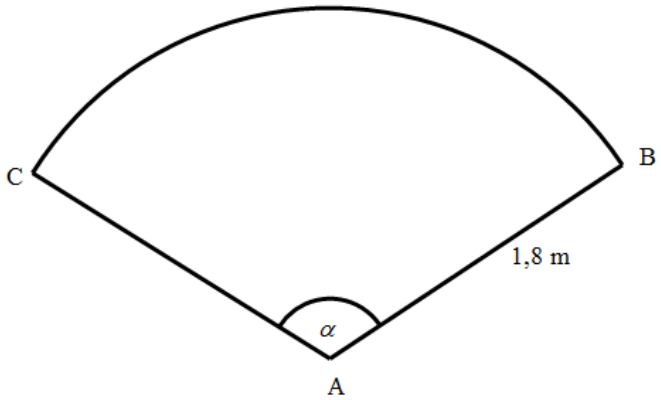
10.1



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*	**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**

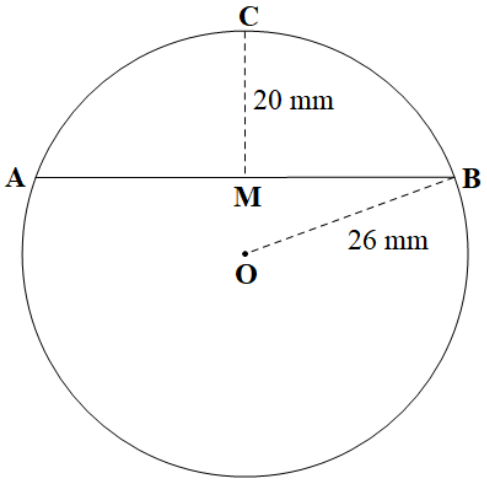
	$v = 60\,\text{km/h} = \frac{60\,\text{km}}{1\,\text{h}} \times \frac{1\,\text{h}}{3600\,\text{s}} \times \frac{1000\,\text{m}}{1\,\text{km}} = 16{,}67\ \text{m/s}$ $w = \frac{v}{r}$ $\therefore w = \frac{16{,}67}{0{,}684} \approx 24{,}371$ $\therefore w = 2\pi n$ $\therefore n = \frac{24{,}371}{2\pi}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

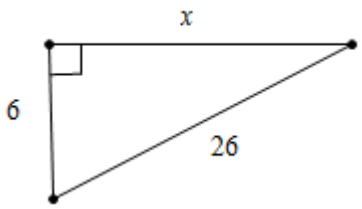
10.2



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

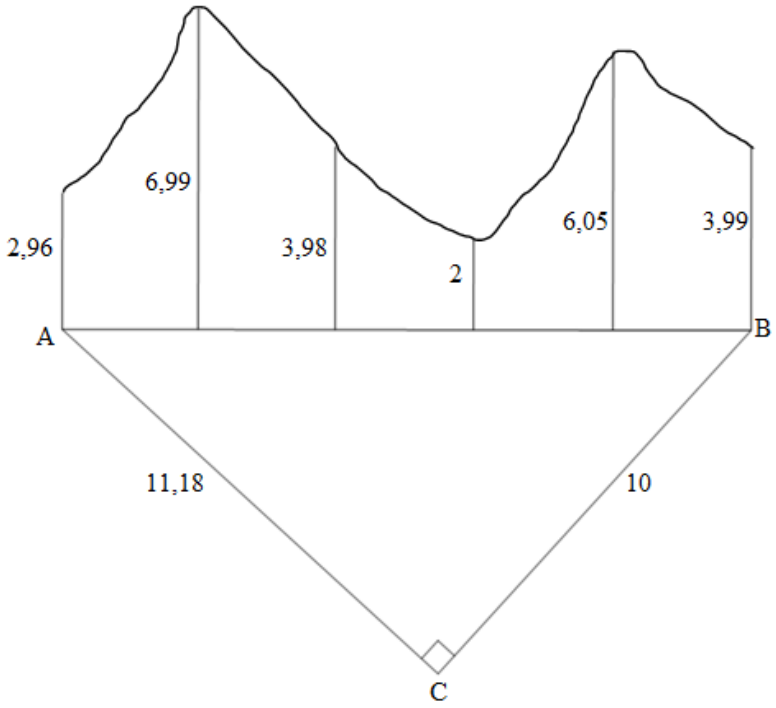
10.3



	$4h^2 - 4dh + x^2 = 0$ $4(20)^2 - 4(52)(20) + x^2 = 0$ $\therefore x^2 = 2560$ $\therefore x \approx 50{,}6\text{ mm}$ **OR/*OF*** $\therefore = 8\sqrt{10}\text{ mm}$ **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*** $= 16\sqrt{10}\text{ mm}$	✓**F** **A** ✓ diameter/*middellyn* **A** ✓**SF** **CA** ✓answer/*antwoord* **CA** **OR / *OF*** ✓ 26 – 20 = 6 mm **A** ✓ Pythagoras **A** ✓ value of/*waarde van x* **CA** ✓ length of/*lengte van* AB **CA** (4)
		[16]

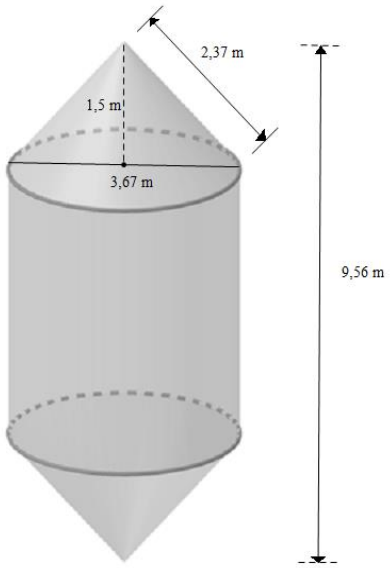
QUESTION / *VRAAG* 11

11.1



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

11.2



11.2.1 a)	r of cone / *van keël* $= 1{,}835\text{ m}$	✓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 container/ *houer* $= \pi r^2 h + 2 \times \frac{1}{3}\pi r^2 h$ $= \pi(1{,}835)^2(6{,}56) + 2 \times \frac{1}{3}\pi(1{,}835)^2(1{,}5)$ $\approx 25{,}46\pi\text{ m}^3$ **OR/*OF*** $\approx 79{,}97\text{ m}^3$	✓ **F** ✓ **SF** ✓answer/*antwoord*	**A** **CA** **CA** (3)
11.2.3	Total surface area / *Totale buite opp* $= 2\pi r h + 2 \times \pi r \ell$ $= 2\pi(1{,}835)(6{,}56) + 2 \times \pi(1{,}835)(2{,}37)$ $\approx 32{,}78\pi\text{ m}^2$ **OR/*OF*** $\approx 102{,}96\text{ m}^2$ $\therefore$ The material will not be sufficient to cover / *Die materiaal sal nie voldoende wees nie*	✓ **F** $2\pi r h$ ✓ **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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