



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.**

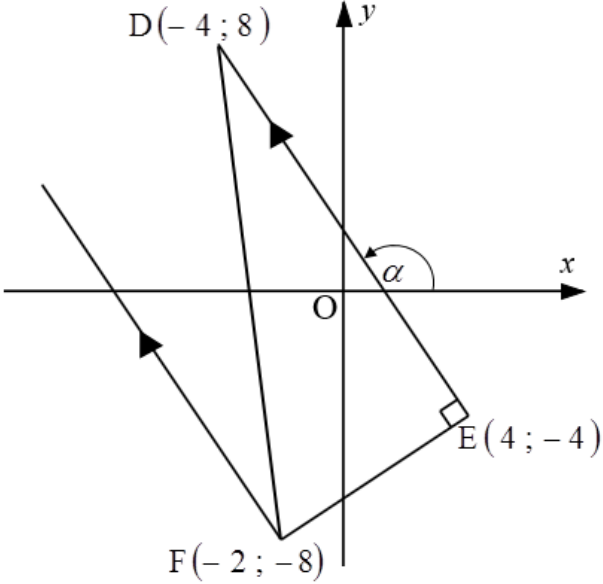
NOTE:

- 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 indicated with the marking code **CA**.

LET WEL:

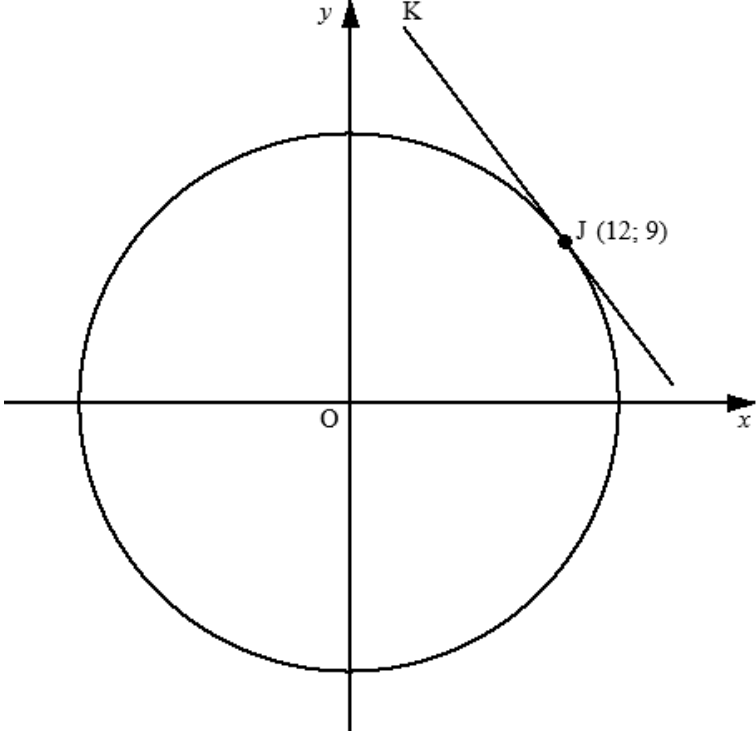
- Indien 'n kandidaat 'n vraag **TWEE** keer beantwoord, sien slegs die **EERSTE** poging na.
- Die metode van Volgehoue akkuraatheid-nasien moet waar moontlik tot alle aspekte van die nasienriglyne toegepas word soos aangedui deur die nasienkode **CA**.

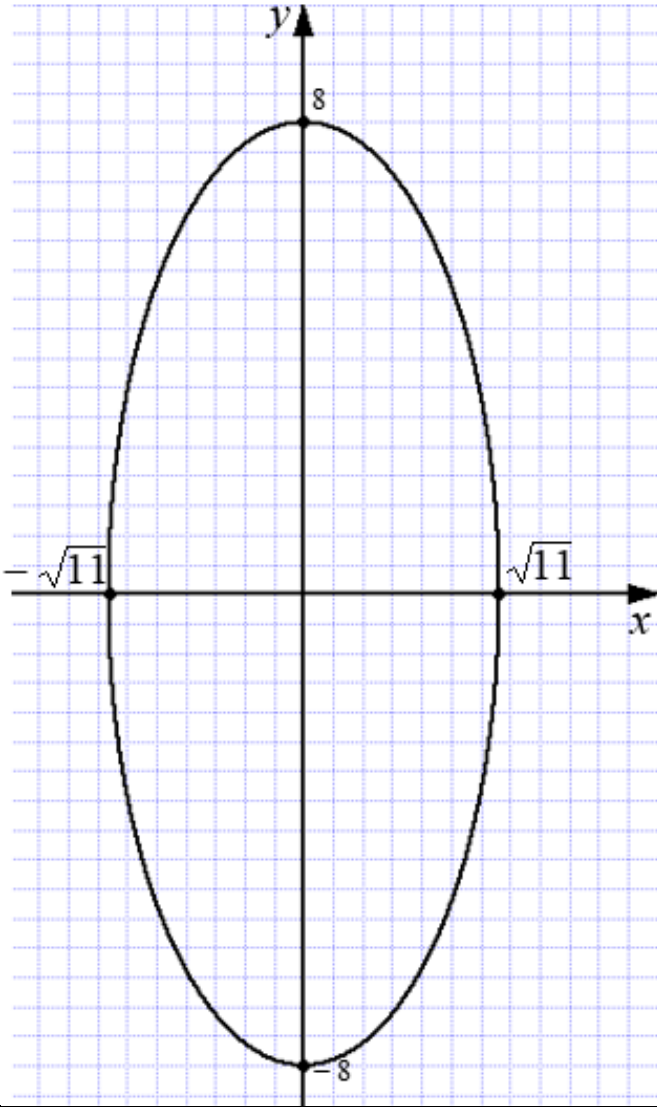
QUESTION/VRAAG 1

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

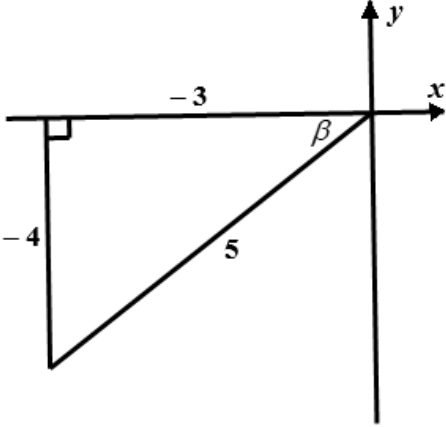
<p>1.3</p>	$m_{\text{parallel/ewewydig}} = -\frac{3}{2}$ $y - (-8) = -\frac{3}{2}(x - (-2)) \text{ OR/OF } -8 = -\frac{3}{2}(-2) + c$ $y = -\frac{3}{2}x - 3 - 8 \qquad c = -8 - 3$ $\therefore y = -\frac{3}{2}x - 11$ <p>Subst/ Vervang (-10; 5):</p> <p>LHS / LK = 5</p> $\text{RHS / RK} = -\frac{3}{2} \times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

QUESTION/VRAAG 2

<p>2.1</p>		
<p>2.1.1</p>	$x^2 + y^2 = r^2$ $12^2 + 9^2 = r^2$ $r^2 = 225$ $\therefore x^2 + y^2 = 225$ <p style="text-align: center;">OR/OF</p> $x^2 + y^2 = 12^2 + 9^2$ $= 225$	<p>✓ SF A</p> <p>✓ equation/vergelyking CA</p> <p style="text-align: center;">OR/OF</p> <p>✓ SF A</p> <p>✓ equation/vergelyking CA (2)</p>
<p>2.1.2</p>	<p>-1</p>	<p>✓ ST A (1)</p>
<p>2.1.3</p>	$m_{OJ} = \frac{9}{12} = \frac{3}{4}$ $m_{JK} = -\frac{4}{3}$ $y - 9 = -\frac{4}{3}(x - 12) \quad \text{OR/OF} \quad 9 = -\frac{4}{3}(12) + c$ $y = -\frac{4}{3}x + 16 + 9 \quad c = 9 + 16 = 25$ $\therefore y = -\frac{4}{3}x + 25$	<p>✓ gradient/gradjënt of/van OJ A</p> <p>✓ gradient/gradjënt of/van JK CA</p> <p>✓ substitution / vervanging CA</p> <p>✓ equation/ vergelyking CA</p>

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

QUESTION/VRAAG 3

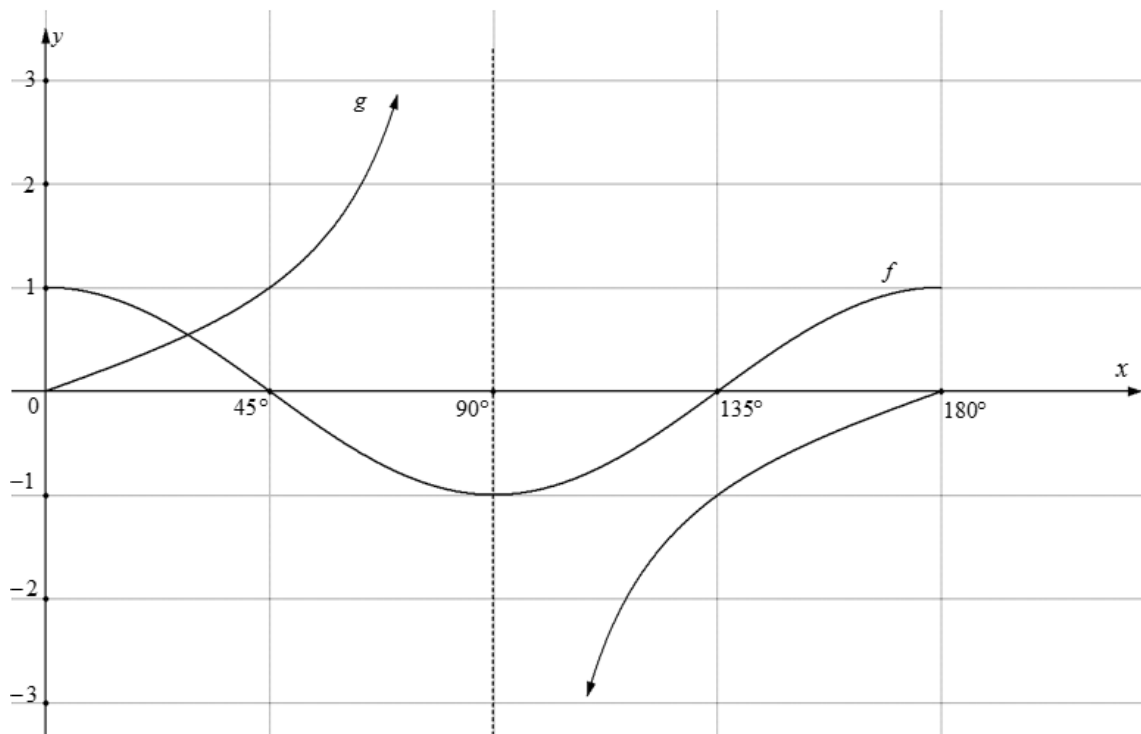
<p>3.1.1</p>	$\sin(x - y)$ $= \sin(152,4^\circ - 24,8^\circ)$ $\approx 0,79$	<p>✓ substitution / <i>vervanging</i> ✓ S</p> <p style="text-align: right;">A CA (2)</p>
<p>3.1.2</p>	$\frac{1}{2} \sec\left(\frac{x}{2} + 80^\circ\right)$ $= \frac{1}{2} \sec\left(\frac{152,4^\circ}{2} + 80^\circ\right)$ $=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

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

QUESTION/VRAAG 4

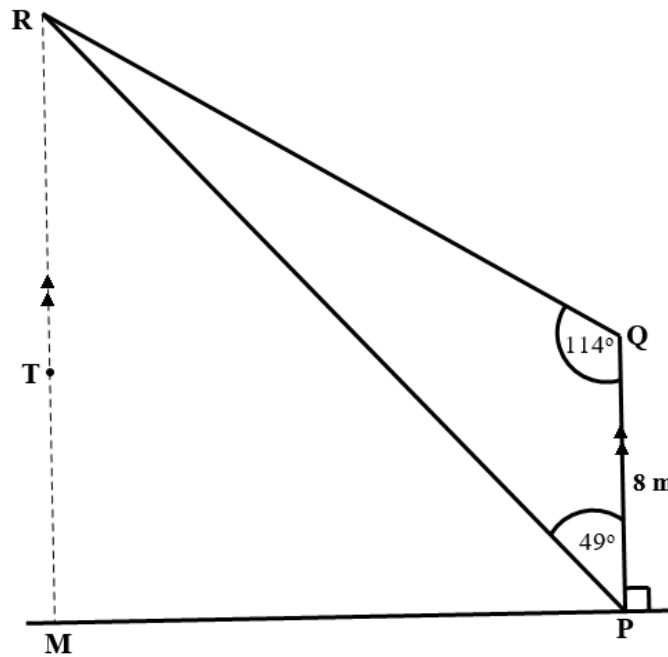
4.1.1	$\frac{1}{\sin A}$	✓ I	A (1)
4.1.2	$\cos A$	✓ reduction /reduksie	A (1)
4.1.3	$-\operatorname{cosec} A$	✓ reduction /reduksie	A (1)
4.2.	$\sin(180^\circ + A) \cdot \cot(360^\circ - A) \cdot \cos(2\pi - A) + \sin^2(360^\circ - A)$ $= (-\sin A) \cdot (-\cot A) \cdot \cos A + (-\sin A)^2$ $= \sin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

QUESTION/VRAAG 5



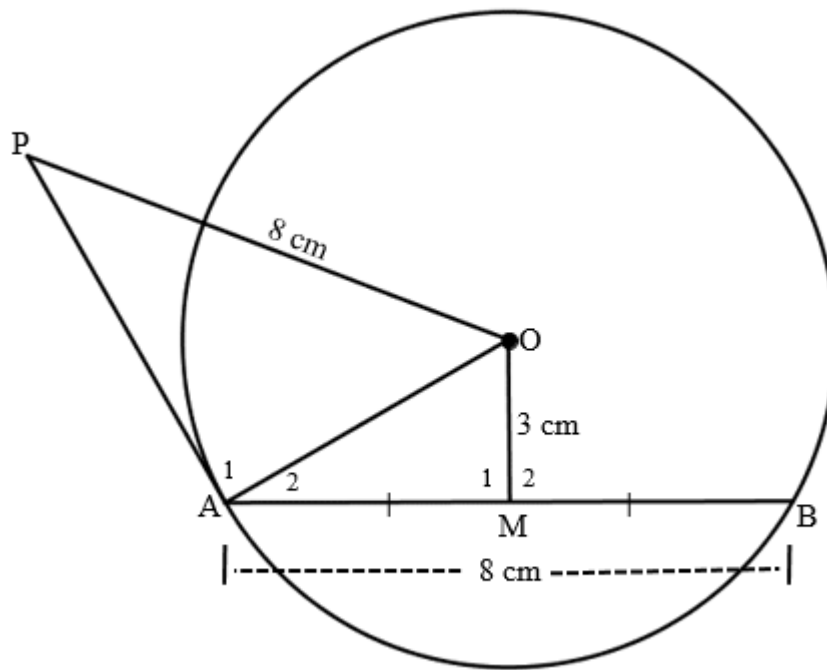
5.1.1	2	✓ value of/waarde van a	A (1)
5.1.2	180°	✓ period /periode	A (1)
5.1.3	$\tan x = 1$ $x = 45^\circ$	✓ S ✓ value of /waarde van x	A AO: full marks/ volpunte (2)
5.1.4	$y \in \mathbb{R}$ OR/OF $y \in (-\infty; \infty)$	✓ range /waardevers	A (1)
5.1.5	$x \in (45^\circ; 135^\circ)$ OR/OF $45^\circ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

QUESTION/VRAAG 6



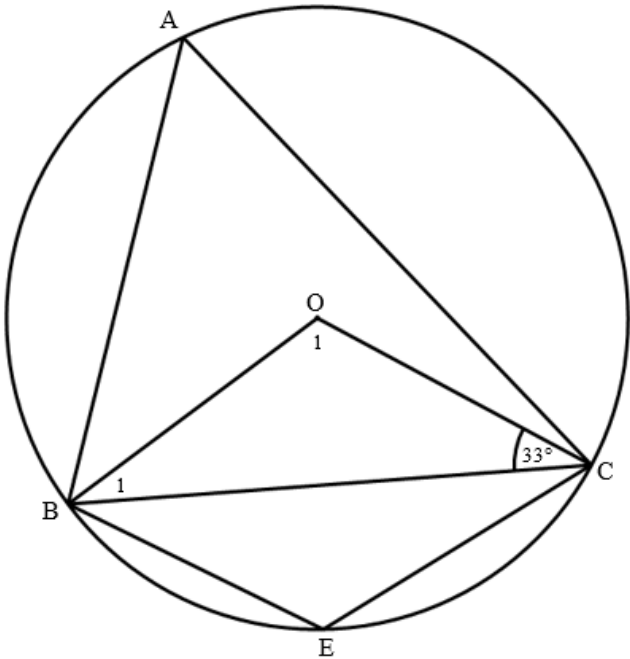
6.1	$\hat{Q}RP = 17^\circ$ $\frac{PR}{\sin 114^\circ} = \frac{8}{\sin 17^\circ}$ $PR = \frac{8 \sin 114^\circ}{\sin 17^\circ}$ $\approx 25 \text{ m}$	✓ angle size /hoek grootte A ✓ substitution /vervanging A ✓ S CA ✓ length / lengte CA (4)
6.2	$\hat{R}PM = 41^\circ$	✓ size /grootte A (1)
6.3	$\sin \hat{R}PM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

QUESTION/VRAAG 7



7.1	$\hat{M}_1 = 90^\circ$ (line from centre to midpoint of chord / lyn vanaf midpt na mdpt vankoord)	✓ ST ✓ RE	A A (2)
7.2	(tan \perp rad / raaklyn \perp radius)	✓ RE	A (1)
7.3	AM = 4 cm Midpoint <i>Middelpunt</i> 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]

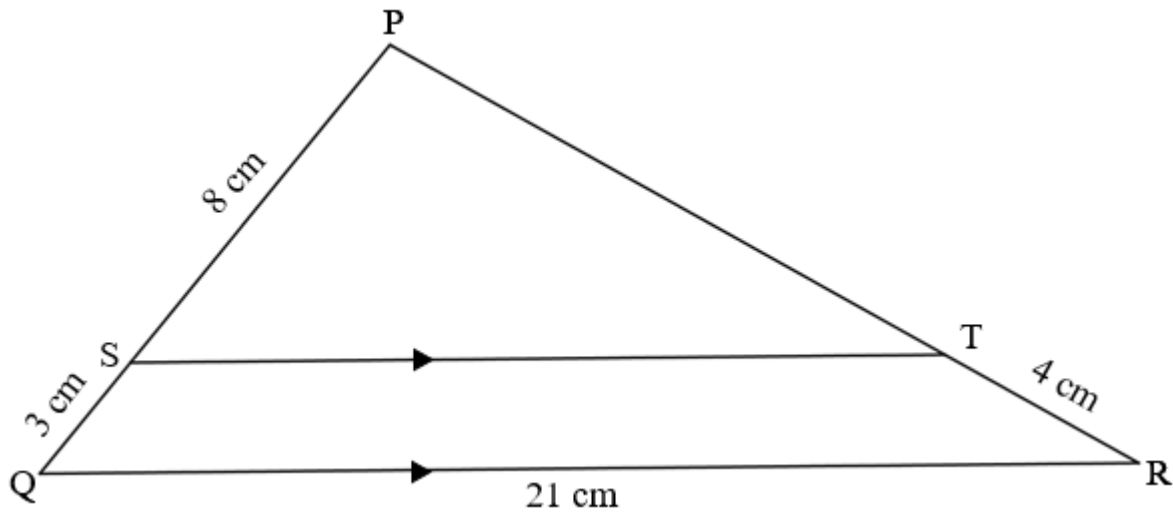
QUESTION/VRAAG 8

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

<p>8.2</p>		
<p>8.2.1</p>	<p>$\hat{D} = 37^\circ$ (tan - chord / raaklyn - koord)</p> <p>$\hat{A} = 37^\circ$ (tan - chord / raaklyn - koord) / (\angles in same segment / \anglee in dies segment)</p> <p>$\hat{C}_2 = 37^\circ$ (alt \angles; AC DB / verw \anglee; AC DB)</p> <p>$\hat{B}_1 = 37^\circ$ (alt \angles; AC DB / verw \anglee; AC DB) / (\angles in same segment / \anglee in dies segment)</p>	<p>✓ ST A ✓ RE A</p> <p>✓ ST/RE A</p> <p>✓ ST A ✓ RE A</p> <p>✓ ST/RE A (6)</p>
<p>8.2.2</p>	<p>In $\triangle AEC$ and/en $\triangle BED$:</p> <p>$\hat{A} = \hat{B} = 37^\circ$ from/vanaf 8.2.1 $\hat{C} = \hat{D} = 37^\circ$ from/vanaf 8.2.1</p> <p>$\therefore \triangle AEC \parallel \triangle BED$ ($\angle\angle\angle$) OR/OF $\hat{E}_1 = \hat{E}_3$ (Vert opp \angles / regoorst \anglee)</p> <p style="text-align: center;">OR/OF</p> <p>In $\triangle AEC$ and/en $\triangle DEB$:</p> <p>$\hat{A} = \hat{D} = 37^\circ$ from/vanaf 8.2.1 $\hat{C}_2 = \hat{B}_1 = 37^\circ$ from/vanaf 8.2.1</p> <p>$\therefore \triangle AEC \parallel \triangle DEB$ ($\angle\angle\angle$) OR/OF $\hat{E}_1 = \hat{E}_3$ (Vert opp \angles / regoorst \anglee)</p>	<p>✓ both ST CA</p> <p>✓ Concl/Gevlgtr OR/OF Indicating 3rd pair / dui 3^{de} paar A</p> <p style="text-align: center;">OR/OF</p> <p>✓ both ST CA</p> <p>✓ Concl/ Gevlgtr OR/OF Indicating 3rd pair / dui 3^{de} paar A (2)</p>

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)	$\hat{Q}_1 = 32^\circ$ (SQ bisect \angle / SQ halveer \angle)	✓ ST A (1)
8.3.1 b)	$\hat{P}_2 = 32^\circ$ (\angle s in same segment / \angle e in dies segment)	✓ ST ✓ RE A A (2)
8.3.2	$\hat{P} = 68^\circ$ (\angle s opp=sides / \angle e teenoor = sye) $\therefore \hat{P}_1 = 36^\circ$ $\hat{S}_2 = 68^\circ - 32^\circ = 36^\circ$ (ext \angle of Δ TQS / buite \angle van Δ TQS) $\therefore \hat{P}_1 = \hat{S}_2$	✓ ST ✓ RE A A ✓ ST ✓ RE CA A A (5)
		[26]

QUESTION/VRAAG 9

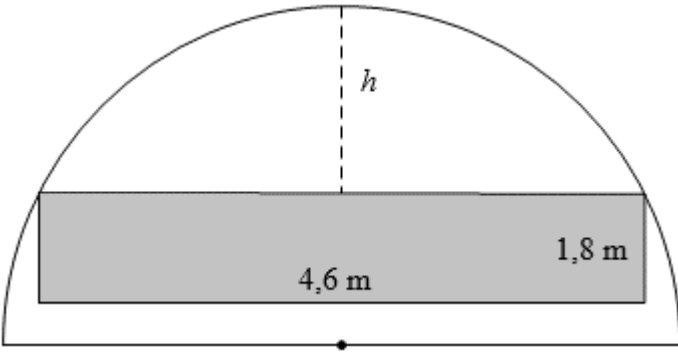


9.1	$\left(\begin{array}{l} \text{propth, } ST \parallel QR / \\ \text{ewer st, } ST \parallel QR \end{array} \right)$ <p>OR/OF $\left(\begin{array}{l} \text{line } \parallel \text{ one side of } \Delta / \\ \text{lyn } \parallel \text{ aan een sy van } \Delta \end{array} \right)$</p>	✓ RE A (1)
9.2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

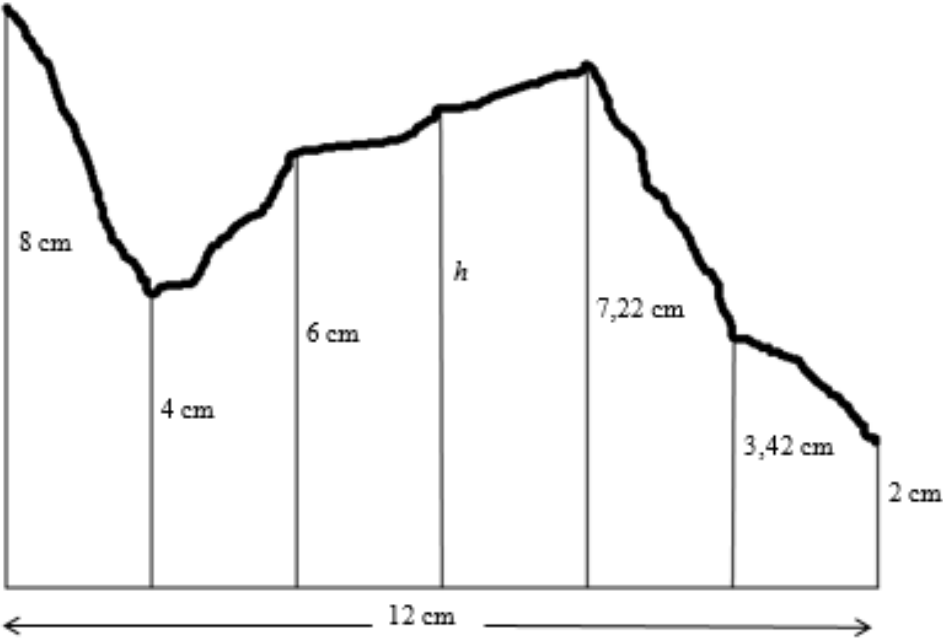
QUESTION/VRAAG 10

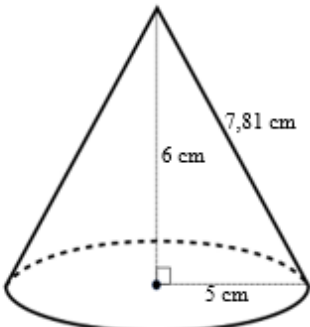
	<p style="text-align: center;">Pulley / Katrol A Pulley / Katrol B</p>	
<p>10.1.1</p>	<p>Reflex/ <i>refleks</i> $\widehat{CAF} = \frac{5}{9} \times 360^\circ = 200^\circ$</p>	<p>✓ $\frac{5}{9} \times 360^\circ$ (1)</p>
<p>10.1.2</p>	<p>$200^\circ = 200^\circ \times \frac{\pi}{180^\circ} = \frac{10\pi}{9}$ OR/OF $\approx 3,49$ rad</p>	<p>✓ angle/<i>hoek</i> in rad A (1)</p>
<p>10.1.3</p>	<p>$s = r\theta$ $= 50 \times \frac{10\pi}{9}$ OR/OF $s = 50(200) \times \frac{\pi}{180^\circ}$ $= \frac{500\pi}{9}$ OR/OF $\approx 174,53$ cm</p>	<p>✓ F A ✓ SF CA ✓ arc length /<i>booglengte</i> CA (3)</p>
<p>10.1.4 a)</p>	<p>$v = \pi Dn$ $= \pi \times 100 \times 500$ $= 50\,000\pi$ 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</p>	<p>✓ F A ✓ SF CA ✓ circm vel /<i>omtreksnld</i> CA OR/OF ✓ F A ✓ SF CA ✓ circm vel /<i>omtreksnld</i> CA (3)</p>

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

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

QUESTION/VRAAG 11

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

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

TOTAL/TOTAAL: 150