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 2026/*MEI/JUNIE 2026*

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 30 pages.
Hierdie nasienriglyne bestaan uit 30 bladsye.

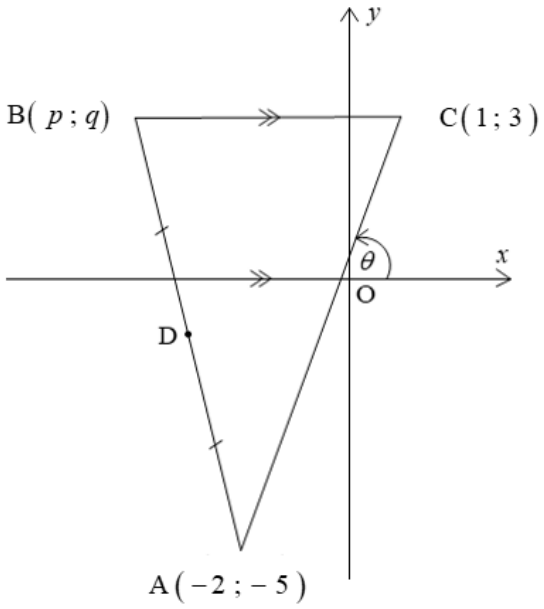
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NOTE:
- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- The method of Consistent Accuracy marking must be applied in all aspects of the marking guideline where indicated with the marking code **CA.**

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

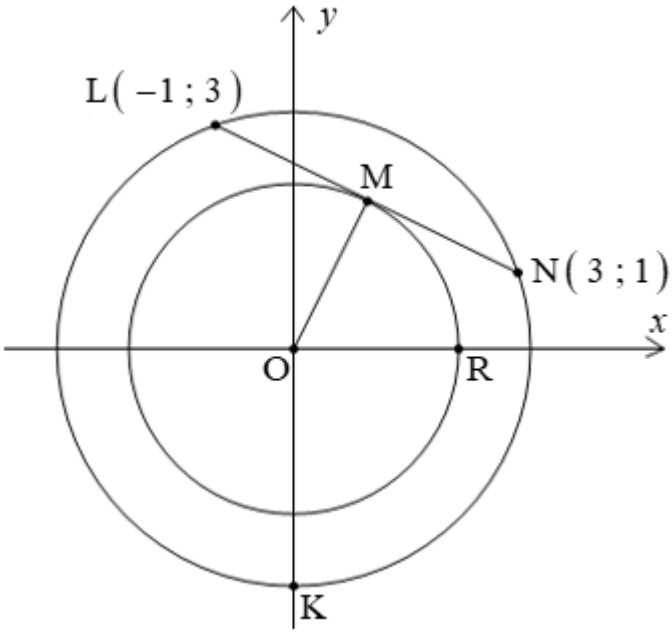


1.1.1	$q = 3$	✓ 3	**A** (1)
1.1.2	$p = -4$	✓ -4	**A** (1)
1.1.3	$m_{AC} = \frac{y_C - y_A}{x_C - x_A}$ $= \frac{3-(-5)}{1-(-2)}$ $= \frac{8}{3} \approx 2,67$	✓ **SF** ✓ gradient/*gradiënt* **AO: full marks / v*olpunte***	**A** **CA** (2)

1.1.4	$\tan\theta = m_{AC}$ $\theta = \tan^{-1}\left(\frac{8}{3}\right)$ OR / OF $\theta = \tan^{-1}(2,67)$ $\therefore \theta \approx 69,44°$ OR / OF $\theta \approx 69,47°$	✓ **SF** ✓ value of / *waarde van* θ **AO: full marks / v*olpunte***	**CA** **CA** (2)
1.1.5	$D\left(\frac{x_A + x_B}{2}; \frac{y_A + y_B}{2}\right)$ $D\left(\frac{-2+(-4)}{2}; \frac{-5+3}{2}\right)$ $D(-3;-1)$	✓ *x*-coordinate/*koördinaat* ✓ *y*-coordinate/*koördinaat*	**CA** **CA** (2)
1.2.1	$2x - 5y = 10$ $y = \frac{2x-10}{5}$ **OR / *OF*** $y = \frac{10-2x}{-5}$ **OR / *OF*** $\therefore y = \frac{2}{5}x - 2$ **OR / *OF*** $y = 0,4x - 2$	✓ make *y* the subject / *maak y die onderwerp* **OR / *OF*** ✓ make *y* the subject / *maak y die onderwerp*	**A** **A** (1)
1.2.2	$\therefore m_{\perp} = -\frac{5}{2} = -2,5$	✓ *m* of perp. line / *m van loodregte lyn*	**CA** (1)
1.2.3 #	$y - (0) = -\frac{5}{2}(x - (5))$ **OR / *OF*** $0 = -\frac{5}{2}(5) + c$ $c = \frac{25}{2}$ $\therefore y = -\frac{5}{2}x + \frac{25}{2}$ **OR / *OF*** $y = -2,5x + 12,5$	✓ **SF** ✓ equation / v*ergelyking*	**CA** **CA** (2)
			[12]

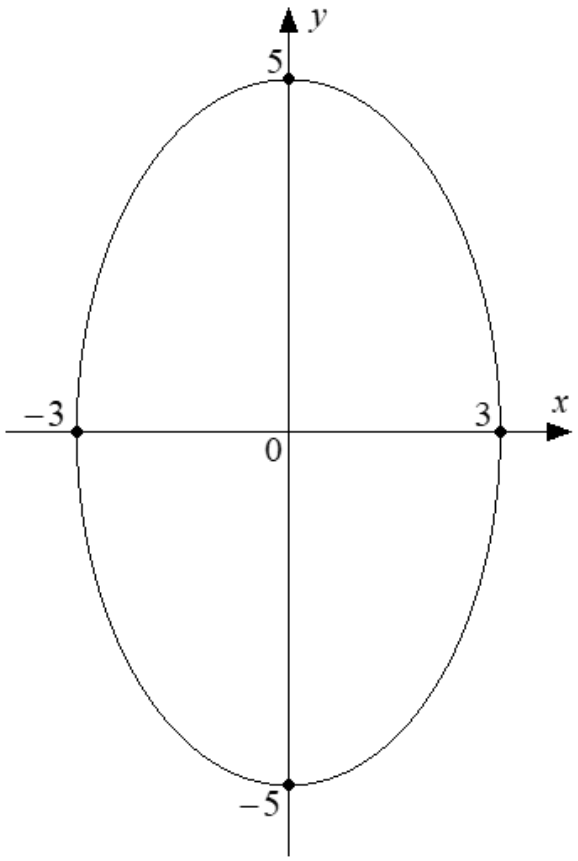
QUESTION/*VRAAG* 2

2.1



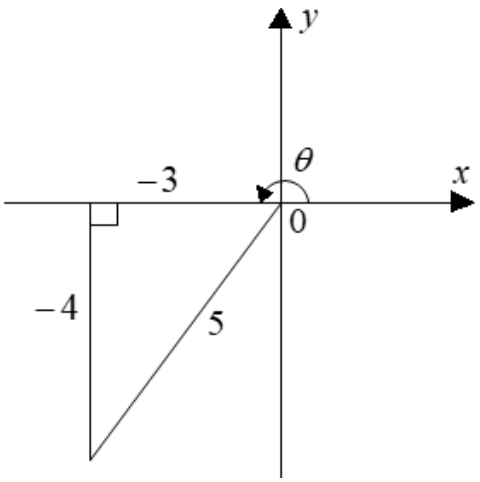
2.1.1	$x^2 + y^2 = r^2$ $(-1)^2 + (3)^2 = r^2$ **OR / *OF*** $(3)^2 + (1)^2 = r^2$ $r^2 = 10$ $\therefore x^2 + y^2 = 10$ **OR / *OF*** $\therefore x = \pm\sqrt{10 - y^2}$ **OR / *OF*** $\therefore y = \pm\sqrt{10 - x^2}$ **OR / *OF*** $x^2 + y^2 = (-1)^2 + (3)^2$ **OR / *OF*** $(3)^2 + (1)^2$ $= 10$	✓ **SF** L or / *of* N ✓ equation/*vergelyking* **OR / *OF*** ✓ **SF** L or / *of* N ✓ equation/*vergelyking* **OR / *OF*** ✓ **SF** L or / *of* N ✓ equation/*vergelyking* **OR / *OF*** ✓ **SF** L or / *of* N ✓ equation/*vergelyking* **AO: full marks / v*olpunte***	**A** **CA** **A** **CA** **A** **CA** **A** **CA** **(2)**
2.1.2	K $\left(0; -\sqrt{10}\right)$ **OR / *OF*** K $(0; -3{,}16)$	✓ $x_K = 0$ ✓ $y_K = -\sqrt{10}$	**A** **CA** (2)
2.1.3	Radius ⊥ Tangent / *Raaklyn*	✓ **RE**	**A** (1)

2.1.4	$\therefore \text{M}\left(\frac{-1+3}{2};\frac{3+1}{2}\right)$	✓ **SF**	**A**
	$\text{M}(1;2)$	✓ coordinates of/ *koördinate van* M	**CA**
	$\therefore$ Equation of smaller circle/*Vergelyking van kleiner sirkel:*		
	$x^2+y^2=(1)^2+(2)^2$	✓ **SF**	**CA**
	$x^2+y^2=5$	✓ $r^2=5$ **OR / *OF*** $r=\sqrt{5}$	**CA**
	$r=\sqrt{5}$		
	$\therefore \text{R}\left(\sqrt{5};0\right)$ **OR / *OF*** $\text{R}(2,24;0)$	✓ coordinates of/ *koördinate van* R	**CA**
	OR / *OF*	**OR / *OF***	
	$\therefore \text{M}\left(\frac{-1+3}{2};\frac{3+1}{2}\right)$	✓ **SF**	**A**
	$\text{M}(1;2)$	✓ coordinates of/ *koördinate van* M	**CA**
	$\text{OM}=\sqrt{(0-1)^2+(0-2)^2}$	✓ **SF**	**CA**
	$\text{OM}=\sqrt{5}$	✓ length of/*lengte van* OM	**CA**
	$\therefore \text{R}\left(\sqrt{5};0\right)$ **OR / *OF*** $\text{R}(2,24;0)$	✓ coordinates of/ *koördinate van* R	**CA**
		AO: full marks / v*olpunte*	(5)
2.2.1	$\frac{x^2}{(3)^2}+\frac{y^2}{(5)^2}=1$	✓ standard form / *standaard vorm*	**A**
	OR / *OF*	**OR / *OF***	
	$\frac{x^2}{\left(\sqrt{9}\right)^2}+\frac{y^2}{\left(\sqrt{25}\right)^2}=1$	✓ standard form / *standaard vorm*	**A**
			(1)

2.2.2		✓ *x*- and *y*-intercepts / *x*- en *y*- *afsnitte* ✓ elliptical shape / *elliptiese vorm*	**CA** **CA** (2)
			[13]

QUESTION/*VRAAG* 3

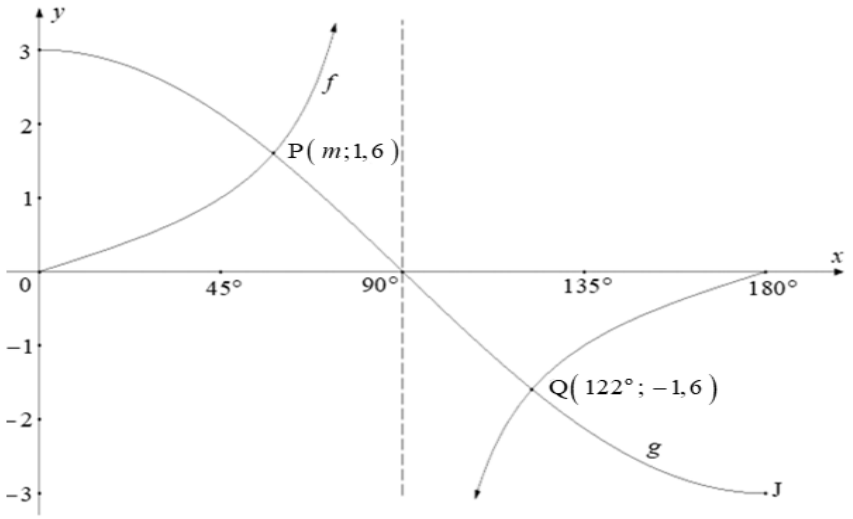
3.1.1	$T = 3,2\pi \times \frac{180°}{\pi} = 576°$	✓ T in degrees/*grade*	**A** (1)
3.1.2	$\text{cosec}(T - R)$ $= \text{cosec}(576° - 22,8°)$ $= \frac{1}{\sin 553,2°}$ $\approx -4,38$ **OR / *OF*** $R = 22,8° \times \frac{\pi}{180°} = \frac{19}{150}\pi \approx 0,40 \text{ rad}$ $\text{cosec}(T - R)$ $= \text{cosec}\left(3,2\pi - \frac{19}{150}\pi\right)$ $= \frac{1}{\sin\left(\frac{461}{150}\pi\right)}$ $\approx -4,38$	✓ substitution/*substitusie* **CA** ✓ **I** **A** ✓ ratio/*verhouding* **CA** **OR / *OF*** ✓ substitution/*substitusie* **CA** ✓ **I** **A** ✓ ratio/*verhouding* **CA** **AO: full marks / v*olpunte*** (3)	

3.2			
	$(-3)^2 + y^2 = (5)^2$ $y = -4$ $\cot\theta - \tan\theta = \left(\frac{-3}{-4}\right) - \left(\frac{-4}{-3}\right)$ $= -\frac{7}{12} \approx -0,58$	✓ **SF** **A** ✓ value of/*waarde van y* **CA** ✓ cot ratio/*verhouding* **CA** ✓ tan ratio/*verhouding* **CA** ✓ **S** **CA** (5)	
3.3.1	Quadrant / K*wadrant* III (3rd / 3de) and / *en* Quadrant / *Kwadrant* IV (4th / 4de)	✓ quadrant/*kwadrant* III **A** ✓ quadrant/*kwadrant* IV **A** (2)	
3.3.2	$\sin x = -\frac{1}{4}$ Ref. / *Verwys.* $\angle = 14,48°$ $x = 180° + 14,48°$ or / *of* $x = 360° - 14,48°$ $\therefore x = 194,48°$ or / *of* $x = 345,52°$ **OR / *OF*** $\sin x = -\frac{1}{4}$ Ref. / *Verwys.* $\angle = 14,48°$ $x = -14,48°$ or / *of* $x \approx -180° - (-14,48°)$ $x \approx -165,52°$	✓ ref. angle/*verwys. hoek* **A** ✓ value of/*waarde van x* **CA** ✓ value of/*waarde van x* **CA** **OR / *OF*** ✓ ref. angle/*verwys. hoek* **A** ✓ value of/*waarde van x* **CA** ✓ value of/*waarde van x* **CA** **AO: full marks / v*olpunte*** (3)	
			[14]

QUESTION/*VRAAG* 4

4.1.1	$-\cos x$	✓ $-\cos x$	**A** (1)
4.1.2	1	✓ 1	**A** (1)
4.1.3	$\dfrac{\cos(\pi + x)\cdot\tan(360° - x)}{\left[\cos^2(\pi + x) - \sin x\cdot\sin(360° - x)\right]}$ $= \dfrac{(-\cos x)(-\tan x)}{\cos^2 x - \sin x(-\sin x)}$ $= \dfrac{(-\cos x)\left(-\dfrac{\sin x}{\cos x}\right)}{\cos^2 x + \sin^2 x}$ $= \dfrac{\sin x}{1} = \sin x$	✓ $-\tan x$ ✓ $\cos^2 x$ **OR / *OF*** $(-\cos x)^2$ ✓ $-\sin x$ ✓ **I** $\left(\dfrac{\sin x}{\cos x}\right)$ ✓ **S**	**A** **A** **A** **A** **CA** (5)
4.2.1	$\sin^2 x$	✓ $\sin^2 x$ **OR / *OF*** $\dfrac{1}{\dfrac{1}{\sin^2 x}}$	**A** (1)
4.2.2	$2\sin x - 2\sin x\cdot\cos^2 x = 2\sin x(1 - \cos^2 x)$	✓ Factors / *Faktore*	**A** (1)
4.2.3	LHS/*LK* $\dfrac{2}{\text{cosec}^2 x\cdot\sec x} \times \dfrac{1}{2\sin x - 2\sin x\cdot\cos^2 x}$ $= 2\sin^2 x\cdot\cos x \times \dfrac{1}{2\sin x(1 - \cos^2 x)}$ $= 2\sin^2 x\cdot\cos x \times \dfrac{1}{2\sin x\cdot\sin^2 x}$ $= \dfrac{\cos x}{\sin x}$ $= \cot x = \text{RHS} / RK$	✓ $\cos x$ **OR / *OF*** $\dfrac{1}{\cos x}$ ✓ **I** $\sin^2 x$ ✓ $\dfrac{\cos x}{\sin x}$ **OR / *OF*** $\dfrac{1}{\dfrac{\sin x}{\cos x}}$	**A** **A** **A** (3)
			[12]

QUESTION/*VRAAG* 5

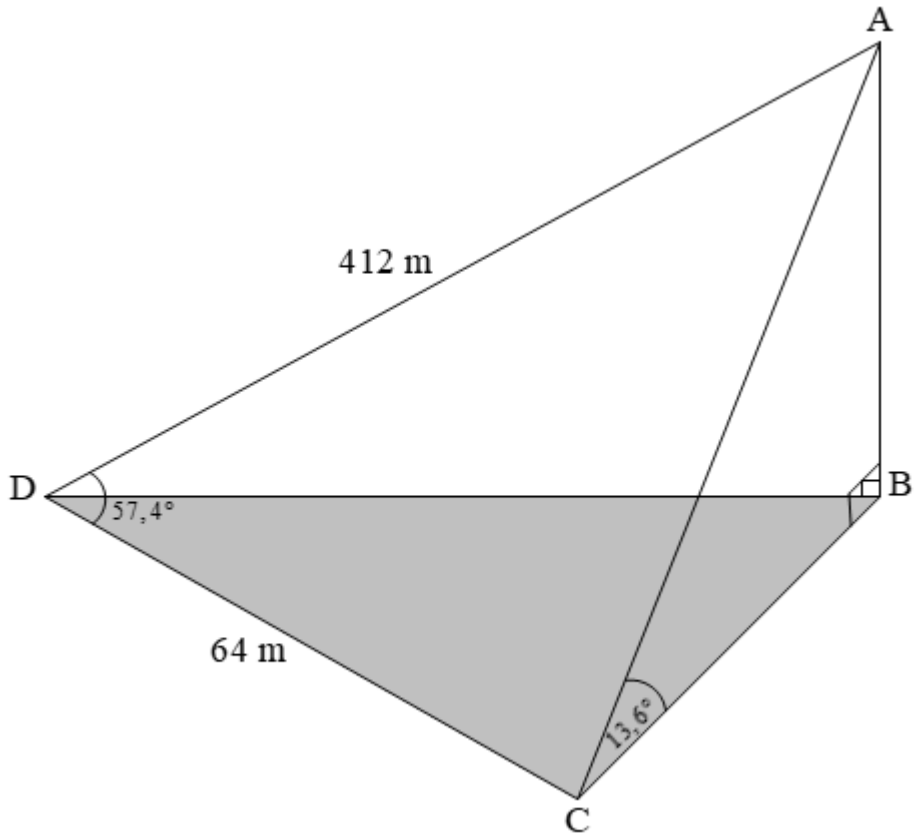


5.1	$a = 3$	✓ value of/ *waarde van a* **A** (1)
5.2	$x = 90°$	✓ equation/ *vergelyking* **A** (1)
5.3	$\text{J}\left(180°; -3\right)$	✓ $180°$ **A** ✓ -3 **A** (2)
5.4	$y \in [-3;3]$ **OR / *OF*** $-3 \le y \le 3$ **OR / *OF*** $y \ge -3$ and / *en* $y \le 3$ **OR / *OF*** From -3 to 3 / *Vanaf* -3 *tot* 3	✓ end points/ *eindpunte* **A** ✓ notation/ *notasie* **A** **OR / *OF*** ✓ end points/ *eindpunte* **A** ✓ notation/ *notasie* **A** **OR / *OF*** ✓ end points/ *eindpunte* **A** ✓ notation/ *notasie* **A** **OR / *OF*** ✓ end points/ *eindpunte* **A** ✓ notation/ *notasie* **A** (2)

5.5	$\tan m = 1,6$	✓ substitution/v*ervanging*	**A**
	$m \approx 57,99°$	✓ value of/ *waarde van m*	**CA**
	OR / *OF*	**OR / *OF***	
	$3\cos m = 1,6$	✓ substitution/v*ervanging*	**CA**
	$\cos m = \frac{1,6}{3}$ $\cos m = \frac{1,6}{3}$		
	$m \approx 57,77°$	✓ value of/ *waarde van m*	**CA**
	OR / *OF*	**OR / *OF***	
	$m = 180° - 122°$	✓ **M**	**A**
	$m = 58°$	✓ value of/ *waarde van m*	**CA**
	OR / *OF*	**OR / *OF***	
	$m = 90° - 32°$	✓ **M**	**A**
	$m = 58°$	✓ value of/ *waarde van m*	**CA**
	OR / *OF*	**OR / *OF***	
	$m = 45° + 32°$	✓ **M**	**A**
	$m = 58°$	✓ value of/ *waarde van m*	**CA**
		AO: full marks / v*olpunte* NPR	(2)
5.6	$0° \leq x \leq 58°$ or / *of*	✓ critical values/ *kritiese waardes*	**CA**
		✓ notation/ *notasie*	**A**
	$90° < x \leq 122°$	✓ critical values/ *kritiese waardes*	**A**
		✓ notation/ *notasie*	**A**
	OR / *OF*	**OR / *OF***	
	$x \in [0° ; 58°] \cup (90° ; 122°]$	✓ critical values/ *kritiese waardes*	**CA**
		✓ notation/ *notasie*	**A**
		✓ critical values/ *kritiese waardes*	**A**
		✓ notation/ *notasie*	**A**
	OR / *OF*	**OR / *OF***	
	x values from $0°$ to $58°$ or greater than $90°$ to $122°$	✓ critical values/ *kritiese waardes*	**CA**
		✓ notation/ *notasie*	**A**
	x waardes vanaf $0°$ tot $58°$ of groter as $90°$ tot $122°$	✓ critical values/ *kritiese waardes*	**A**
		✓ notation/ *notasie*	**A**
			(4)

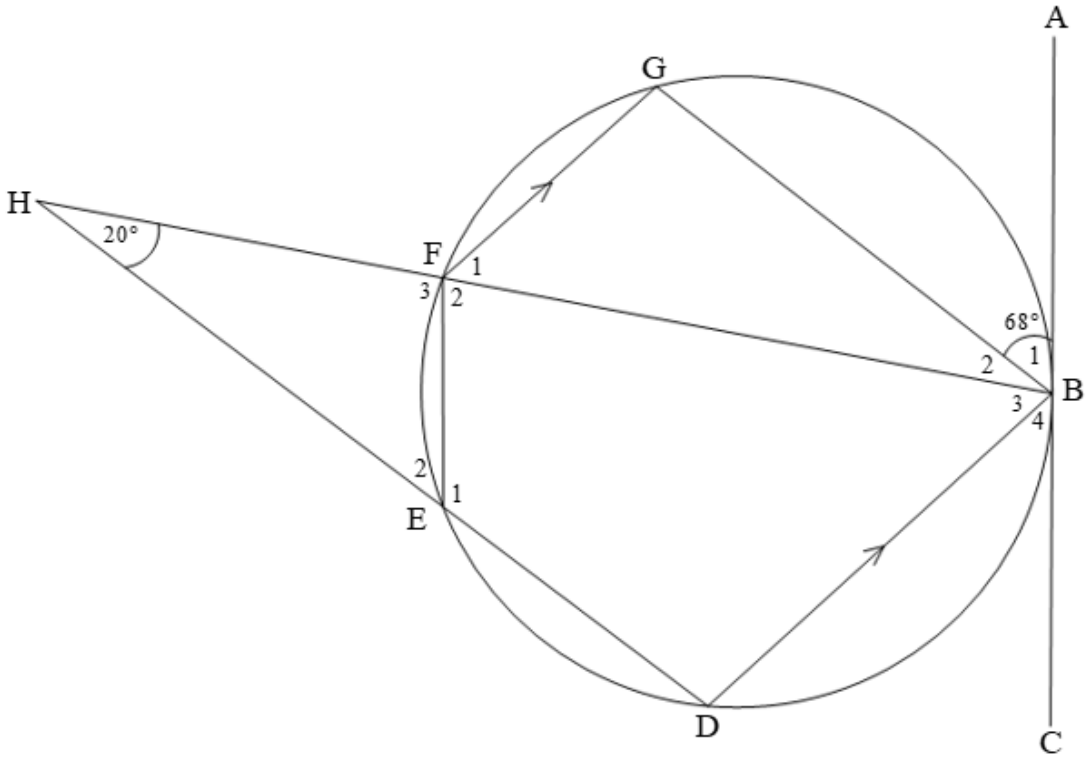
5.7	3	✓ 3	**A** (1)
5.8	$h(x) = -3\cos x + 1$	✓ $-3\cos x$ **OR / *OF*** $-a\cos x$ ✓ $+1$	**CA** **A** (2)
			[15]

QUESTION/*VRAAG* 6



6.1	Area of $\Delta ADC = \frac{1}{2}\cdot AD\cdot DC\cdot \sin D$ $= \frac{1}{2}(412)(64)\sin 57,4°$ $\approx 11\,106,89\,m^2$	✓ ✓ ✓	area rule/ *Oppv. reël* **SF** value of area/ *waarde van oppv.*	**A** **A** **CA** (3)
6.2	$AC^2 = AD^2 + DC^2 - 2AD\cdot DC\cdot \cos\hat{D}$ $AC^2 = (412)^2 + (64)^2 - 2(412)(64)\cdot \cos 57,4°$ $AC^2 = 145\,427,3839$ $AC \approx 381,35\ m^2$ $\sin 13,6° = \frac{AB}{381,35}$ **OR / *OF*** $\frac{AB}{\sin 16,6°} = \frac{381,35}{\sin 90°}$ $AB = 381,35\cdot \sin 13,6°$ $AB \approx 89,67\ m$	✓ ✓ ✓ ✓ ✓ ✓	cos rule/*reël* **SF** **S** length of/ *lengte van* AC sin ratio or rule/ verhouding *of reël* height/ *hoogte* AB	**A** **A** **CA** **CA** **CA** **CA** (6)
				[9]

QUESTION/*VRAAG* 7

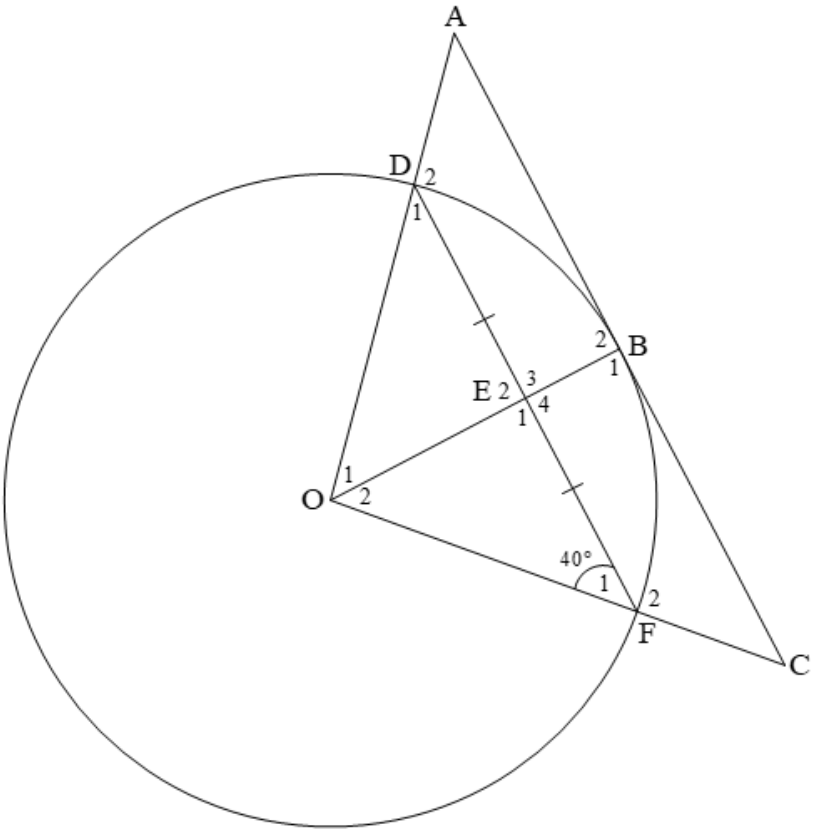


7.1	opposite / *teenoorstaande*	✓ **ST** **A** (1)
7.2.1	$\hat{F}_1 = 68°$ (Tan – chord Theorem / *Raakl. – Koordstelling*)	✓ **ST** **A** ✓ **RE** **A** (2)
7.2.2	$\hat{B}_3 = 68°$ (Alt. ∠s / *Verw.∠e* =; FG ∥ BD)	✓ **ST** **CA** ✓ **RE** **A** (2)
7.2.3	$\hat{E}_2 = 68°$ (Ext. ∠ cyclic. quad / *Buite∠ kdvh.*) **OR / *OF*** $\hat{E}_1 = 112°$ (Opp. ∠s of cyclic quad. / *Teenoorst.∠e kdvh.*) $\hat{E}_2 = 68°$ (∠s on str. line / *∠e op reguitlyn*)	✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **ST/RE** **CA** ✓ **ST** **CA** (2)

7.2.4	$\hat{F}_2 = 20° + 68°$ (Ext. ∠ Δ / *Buite* ∠ Δ) $\therefore \hat{F}_2 = 88°$ **OR / *OF*** $\hat{F}_3 = 92°$ (Int. ∠s Δ / *Binne* ∠*e* Δ) $\hat{F}_2 = 88°$ (∠s on straight line / ∠*e op reguitlyn*) **OR / *OF*** $\hat{D} = 180° - 20° - 68°$ (*Int.* ∠s Δ / *Binne* ∠*e* Δ) $\hat{D} = 92°$ $\therefore \hat{F}_2 + 92° = 180°$ (Opp.∠s cyclic quad / *Teenoorst.* ∠*e kdvh.*) $\therefore \hat{F}_2 = 88°$	✓ **RE** **A** ✓ **ST** **CA** **OR / *OF*** ✓ **RE** (Any of the two / *enige van die twee*) **A** ✓ **ST** **CA** **OR / *OF*** ✓ **RE** (Any of the two / *enige van die twee*) **A** ✓ **ST** **CA** (2)
7.2.5 **#**	$\hat{D} = 180° - 88°$ (Opp. ∠s cyclic. quad. / *Teenoorts.* ∠*e kdvh.*) $\hat{D} = 92°$ **OR / *OF*** $\hat{D} = 92°$ (Int ∠s Δ / *Binne.* ∠*e* Δ) **OR / *OF*** $\hat{D} = \hat{F}_3 = 92°$ (Ext. ∠ cyclic. quad. / *Buite* ∠ *kdvh.*)	✓ **RE** **A** ✓ **ST** **CA** **OR / *OF*** ✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **ST** **CA** ✓ **RE** **A** (2)
		[11]

QUESTION/*VRAAG* 8

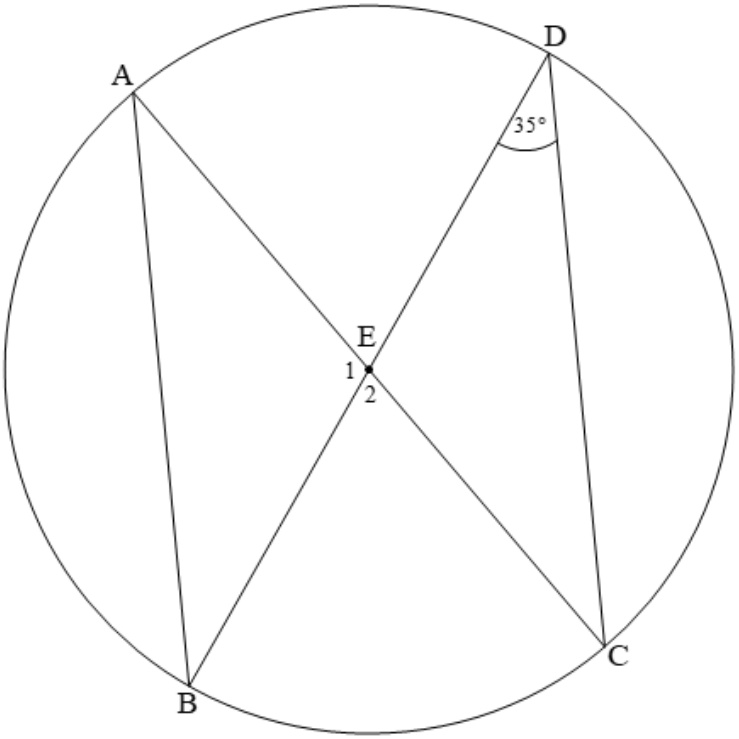
8.1



8.1.1 a)	line from centre to midpt. of chord / *lyn vanuit midpt. na midpt. van koord*	✓ **RE** **A** (1)
8.1.1 b)	Tan. ⊥ Radius / *Raaklyn* ⊥ *Radius*	✓ **RE** **A** (1)
8.1.1 c)	Corr. ∠s = / *Ooreenk*. ∠*e* =	✓ **RE** **A** (1)
8.1.2	$\hat{F}_1 = \hat{D}_1 = 40°$ $(\angle s \text{ opp.} = \text{sides} / \angle e\,teen. = sye)$ $\therefore \hat{A} = \hat{D}_1 = 40°$ $(\text{Corr. } \angle s = / \text{ Ooreenk}. \angle e =; \text{AC} \parallel \text{DF})$	✓ **ST** **A** ✓ **RE** **A** ✓ **RE** **A** (3)

8.1.3	Ext. $\angle$ = opp. int. $\angle$ / *Buite* $\angle$ = *teenoorst. binne* $\angle$ **OR / *OF*** Conv. ext. $\angle$ cyclic quad / *Omg. buite* $\angle$ *kdvh.* **OR / *OF*** Opp. $\angle$s suppl. / *Teenoorst.* $\angle$*e suppl.*	✓ **RE** **A** **OR / *OF*** ✓ **RE** **A** **OR / *OF*** ✓ **RE** **A** (1)

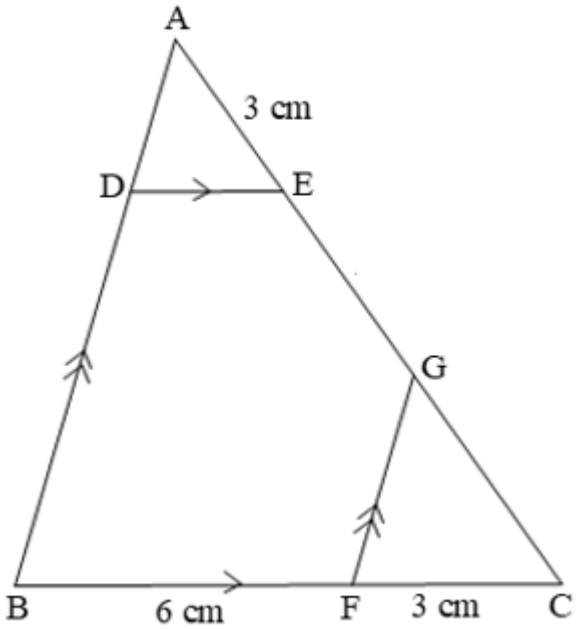
8.2



8.2.1	$\hat{A}$ = 35° ($\angle$s opp. = sides / $\angle$*e teen.=sye*) **OR / *OF*** ($\angle$s in same segm. / $\angle$*e in dies.segm.*) $\hat{B}$ = 35° ($\angle$s opp. = sides / $\angle$*e teen.=sye*) **OR / *OF*** ($\angle$s in same segm. / $\angle$*e in dies.segm.*) $\hat{C}$ = 35° ($\angle$s opp. = sides / $\angle$*e teen.=sye*) **OR / *OF*** ($\angle$s in same segm. / $\angle$*e in dies.segm.*) **Note: The reason mark(s) are dependent on the order in which the angels are stated. /** ***Nota: Die punt(e) vir die rede is afhanklik van die volgorde waarin die hoeke bepaal is.***	✓ **ST** **A** ✓ **RE** **A** ✓ **ST** **A** ✓ **RE** **A** ✓ **ST** **A** ✓ **RE** **A** (6)

8.2.2	$\hat{E}_2 = 70°$ (Ext. /*Buite* $\angle$ Δ) **OR / *OF*** $\hat{E}_2 = 70°$ ($\angle$ at centre = 2 $\times$ $\angle$at circumf. / *midpts* $\angle = 2 \times$ *omtreks* $\angle$) **OR / *OF*** $\hat{E}_1 = 110°$ (Int. $\angle$s / *Binne* $\angle e$ Δ) $\hat{E}_2 = 70°$ ($\angle s$ on str. line / $\angle e$ *op reguitlyn*)	✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **ST** **CA** ✓ **RE** **A** **OR / *OF*** ✓ **RE** (Any of the two / *enige van die twee*) **A** ✓ **ST** **CA** (2)
8.2.3	S $\angle$ S **OR / *OF*** $\angle$ $\angle$ S	✓ **RE** **A** (1)
		[16]

QUESTION/*VRAAG* 9

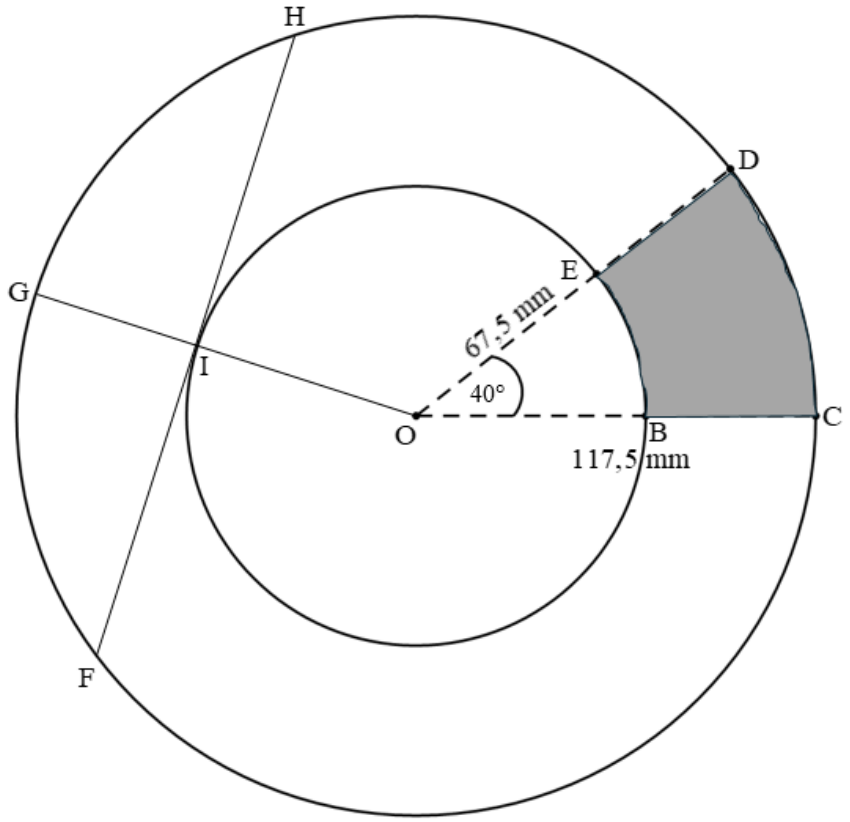


9.1	$\frac{EC}{AE}=\frac{DB}{AD}$ (Prop.Th, DE || BC / *Eweredigheid st*, DE || BC) **OR / *OF*** $\frac{EC}{AE}=\frac{DB}{AD}$ (Line parallel to one side Δ / *Lyn ewewydig aan een sy* Δ) $\frac{EC}{3}=\frac{3}{1}$ $EC = 9\text{ cm}$	✓ **ST** **A** ✓ **RE** **A** **OR / *OF*** ✓ **ST** **A** ✓ **RE** **A** ✓ **SF** **A** ✓ Length / *Lengte* EC **CA** **AO:** $\frac{1}{4}$ (4)
9.2	$\frac{CF}{CB}=\frac{CG}{CA}$ (Prop.Th, GF || AB / *Eweredigheid st*, GF || AB) **OR / *OF*** $\frac{CF}{CB}=\frac{CG}{CA}$ (Line parallel to one side Δ / *Lyn ewewydig aan een sy* Δ) $\frac{3}{9}=\frac{CG}{12}$ $\therefore CG = 4\text{ cm}$	✓ **ST** **A** **OR / *OF*** ✓ **ST** **A** ✓ Substitution/v*ervanging* **CA** ✓ length / *lengte* GC **CA** **AO:** $\frac{1}{3}$ (3)

9.3	In ΔADE & ΔABC:		
	(1) $\hat{A} = \hat{A}$ (common / *gemene* $\angle$)	✓ **ST**	**A**
	(2) $A\hat{D}E = A\hat{B}C$ (corr. $\angle$s/*ooreenk*. $\angle$e DE || BC)	✓ **ST**	**A**
	(3) $A\hat{E}D = A\hat{C}B$ ($\angle s$ of /$\angle e$ *van* Δ) **OR / *OF*** (corr. $\angle$s / ooreenk. $\angle e$; DE || BC)	✓ **ST**	**A**
	$\therefore$ $\Delta ADE \|\|\| \Delta ABC$ ($\angle\angle\angle$)		(3)
			[10]

QUESTION/*VRAAG* 10

10.1



10.1.1	$\theta = 40° \times \frac{\pi}{180°}$ $= \frac{2}{9}\pi \approx 0,70\,\text{rad}$	✓ answer / *antwoord* **A** (1)
10.1.2	$s = r\theta$ $s = (117,5)\left(\frac{2}{9}\pi\right)$ **OR / *OF*** $= (117,5)(0,70)$ $s = \frac{235}{9}\pi \approx 82,03$ mm $\approx 82,25$ mm **OR / *OF*** $s = \frac{40°}{360°} \times 2\pi r$ $s = \frac{40°}{360°} \times 2\pi(117,5)$ $s \approx 82,03$ mm	✓ **F** **A** ✓ **SF** for / *vir* θ **CA** ✓ answer / *antwoord* **CA** **OR / *OF*** ✓ **F** **A** ✓ **SF** for / *vir* θ **A** ✓ answer / *antwoord* **CA** (3)

10.1.3	Area/*Oppv.* $= \frac{r^2\theta}{2}$		✓ **F**	**A**
	Area/*Oppv.* $= \frac{(67,5)^2\left(\frac{2}{9}\pi\right)}{2}$ **OR / *OF*** $= \frac{(67,5)^2(0,70)}{2}$		✓ **SF** for / *vir* θ	**CA**
	Area/*Oppv.* $= \frac{2025}{4}\pi$			
	Area/*Oppv.* $\approx 1590,43\,\text{mm}^2$	$\approx 1594,69\ \text{mm}^2$	✓ Area/Oppv.	**CA**
	OR / *OF*		**OR / *OF***	
	$s = r\theta$			
	$s = (67,5)\left(\frac{2}{9}\pi\right)$ **OR / *OF*** $= (67,5)(0,70)$			
	$s = 15\pi \approx 47,12\ \text{mm}$	$\approx 47,25\,\text{mm}$		
	Area/*Oppv.* $= \frac{rs}{2}$		✓ **F**	**A**
	Area/*Oppv.* $= \frac{(67,5)(15\pi)}{2}$ **OR / *OF*** $= \frac{(67,5)(47,25)}{2}$		✓ **SF** for / *vir s*	**CA**
	Area/*Oppv.* $= \frac{2025}{4}\pi \approx 1590,43\,\text{mm}^2$	$\approx 1594,69\ \text{mm}^2$	✓ Area/*Oppv.*	**CA**
	OR / *OF*		**OR / *OF***	
	Area/*Oppv.* $= \frac{40°}{360°}\pi r^2$		✓ **F**	**A**
	Area/*Oppv.* $= \frac{40°}{360°}\pi(67,5)^2$		✓ **SF**	**A**
	Area/*Oppv.* $= \frac{2025}{4}\pi \approx 1590,43\,\text{mm}^2$		✓ Area/*Oppv.*	**CA**
				(3)

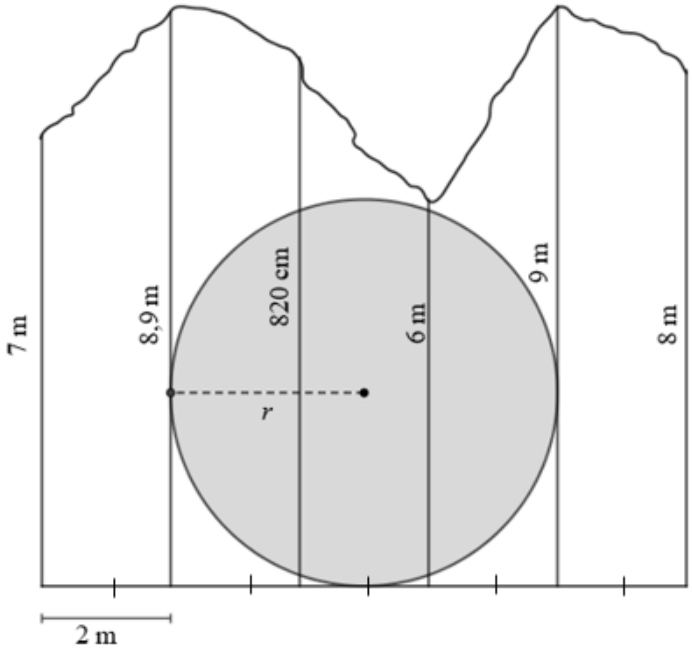
10.1.4	GI $= h = 117,5 - 67, = 50$ mm	✓	values of / *waardes van h & d*	**A**
	$d = 2 \times 117,5 = 235$ mm			
	$4h^2 - 4dh + x^2 = 0$	✓	**F**	**A**
	$4(50)^2 - 4(235)(50) + x^2 = 0$	✓	**SF**	**CA**
	$x^2 = 37000$			
	$x = 10\sqrt{370} \approx 192,35$ mm	✓	Value of / *waarde van x*	**CA**
	OR / *OF*		**OR / *OF***	
	$HI^2 = HO^2 - OI^2$	✓	**M**	**A**
	$HI^2 = (117,5)^2 - (67,5)^2$	✓	**SF**	**A**
	$HI^2 = 9250$			
	$HI = 5\sqrt{370} \approx 96,18$	✓	Length / *Lengte* HI	**CA**
	$x = 10\sqrt{370} \approx 192,35$ mm	✓	Value of / waarde van *x*	**CA**
	OR / *OF*		**OR / *OF***	
	$d = 235$			
	$h = 235 - (117,5 - 67,5) = 185$	✓	values of / *waardes van h & d*	**A**
	$4h^2 - 4dh + x^2 = 0$	✓	**F**	**A**
	$4(185)^2 - 4(235)(185) + x^2 = 0$	✓	**SF**	**CA**
	$x^2 = 37000$			
	$x = 10\sqrt{370} \approx 192,35$ mm	✓	Value of / *waarde van x*	**CA**
				(4)

10.1.5	Area sector OCD / *Oppv. sektor OCD* $= \frac{r^2\theta}{2}$			
#	$= \frac{(117,5)^2\left(\frac{2}{9}\pi\right)}{2}$ **OR / *OF*** $= \frac{(117,5)^2(0,70)}{2}$	✓	**SF**	**CA**
	$= \frac{55225}{36}\pi$			
	$\approx 4819,29\,\text{mm}^2$ $\approx 4832,19\ \text{mm}^2$	✓	Area/*Oppervlakte*	**CA**
	$A_{BCDE} = \frac{55225}{36}\pi - \frac{2025}{4}\pi$	✓	**M**	**A**
	$A_{BCDE} = 3228,86\ \text{mm}^2$	✓	Area of / Oppv. *van* BCDE	**CA**
	$\frac{\text{Area of outer circle}}{\text{Area of BCDE}}$ / $\frac{\textit{Oppv. van buitesirkel}}{\textit{Oppv. van BCDE}}$			
	$= \frac{\frac{55225}{4}\pi}{\frac{9250}{4}\pi}$			
	$\approx 13,43$	✓	Value of ratio / *waarde van verhouding*	**CA**
	OR / *OF*		**OR / *OF***	
	Area/*Oppv.* $= \frac{rs}{2}$			
	Area/*Oppv.* $= \frac{(117,5)\left(\frac{235}{9}\pi\right)}{2}$	✓	**SF**	**CA**
	Area/*Oppv.* $\approx 4819,29\,\text{mm}^2$	✓	Area / *Oppv.*	**CA**
	$A = \frac{55225}{36}\pi - \frac{2025}{4}\pi$	✓	**M**	**A**
	$A = 3228,86\ \text{mm}^2$	✓	Area / *Oppv.*	**CA**
	$\frac{\text{Area of outer circle}}{\text{Area of BCDE}}$ / $\frac{\textit{Oppv. van buitesirkel}}{\textit{Oppv. van BCDE}}$			
	$= \frac{\frac{55225}{4}\pi}{\frac{9250}{4}\pi}$			
	$\approx 13,43$	✓	Value of ratio / *waarde van verhouding*	**CA**
	OR / *OF*		**OR / *OF***	

	$A = \pi r^2$ $A = \pi (67{,}50)^2$ $A = \frac{18225}{4}\pi \approx 14313{,}88 \text{ mm}^2$	✓ **SF** ✓ Area / *Oppv.*	**A** **CA**
	$\text{Area/}Oppv. = \frac{40°}{360°}\left[\frac{55225}{4}\pi - \frac{18225}{4}\pi\right]$ $\text{Area/}Oppv. = \frac{9250}{9}\pi \approx 3228{,}86 \text{ mm}^2$	✓ **M** ✓ Area / *Oppv.*	**A** **CA**
	$\frac{\text{Area of outer circle}}{\text{Area of BCDE}} / \frac{Oppv.\ van\ buitesirkel}{Oppv.\ van\ \text{BCDE}}$ $= \frac{\frac{55225}{4}\pi}{\frac{9250}{4}\pi}$ $\approx 13{,}43$	✓ Value of ratio / *waarde van verhouding*	**CA** (5)
10.2.1	$\omega = 2\pi n$ $90\pi = 2\pi n$ $n = \frac{90\pi}{2\pi}$ $n = 45 \text{ rev/s}$	✓ **F** ✓ **SF** ✓ Rota. freq. / *Rota. Frekw.*	**A** **A** **CA** (3)
10.2.2	$v = \pi D n$ $v = \pi(235)(45)$ $v = 10575\pi \approx 33222{,}34 \text{ mm/s}$ **OR / *OF*** $v = \omega r$ $v = (90\pi)(117{,}5)$ **OR / *OF*** $v = (282{,}74)(117{,}5)$ $v = 10575\pi$ $v \approx 33222{,}34 \text{ mm/s}$ **OR / *OF*** $v \approx 33221{,}95 \text{ mm/s}$	✓ **F** ✓ **SF** ✓ Circ. velocity / *Omtr. snelheid* **OR / *OF*** ✓ **F** ✓ **SF** ✓ Circ. velocity / *Omtr. snelheid*	**A** **CA** **CA** **A** **A** **CA** (3)
			[22]

QUESTION / *VRAAG* 11

11.1

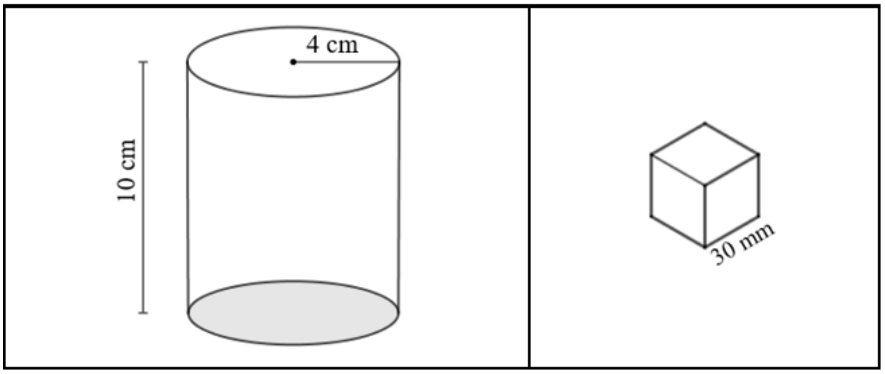


11.1.1	10 m	✓ 10 m	**A** (1)
11.1.2	$r = 3$ m	✓ 3 m	**A** (1)
11.1.3	$820 \text{ cm} \div 100 = 8,2 \text{ m}$	✓ 8, 2 m	**A** (1)

11.1.4 **#**	Area of irregular fig./*Oppv. van onreëlmatige fig.* $A_T = a\left(\frac{o_1+o_n}{2}+o_2+o_3+...+o_{n-1}\right)$ $=(2)\left(\frac{7+8}{2}+8,9+8,2+6+9\right)$ $=\frac{396}{5}=79,2\ \text{m}^2$	✓ **SF** **CA** ✓ area of irregular figure/*oppv. van onreëlmatige fig.* **CA**
	Area of circle/*Oppv. van sirkel* $=\pi(3)^2=9\pi\approx 28,27\ \text{m}^2$	✓ area of circle/ *oppv. van sirkel* **CA**
	Area to be paved/*Oppv. wat gepavlei moet word* $=79,2-9\pi=50,93\ \text{m}^2$	✓ area to be paved / *oppv. om te plavei* **CA**
	No. of paving bricks needed/*Getal plaveistene benodig* $=\frac{50,93}{0,02}\approx 2547$ **OR** / ***OF*** Area covered by bricks / *Oppv. bedek deur stene* $=0,02\times 2500=50\,\text{m}^2$	✓ bricks needed / *bakstene benodig* **OR** / ***OF*** Area of bricks / Oppv. van stene **CA**
	∴ 2 500 paving bricks will NOT be sufficient. /*plavleistene sal nie genoeg wees nie.* **OR** / ***OF***	✓ conclusion/*afleiding* **CA** **OR** / ***OF***

	Area of irregular fig./Oppv. van *onreëlmatige fig.*: $A_T = a\left(m_1 + m_2 + m_3 + ... + m_n\right)$ $= (2)\left(\frac{7+8,9}{2} + \frac{8,9+8,2}{2} + \frac{8,2+6}{2} + \frac{6+9}{2} + \frac{9+8}{2}\right)$ $= \frac{396}{5} = 79\frac{1}{5} = 79,2 \text{ m}^2$	✓ **SF** ✓ area of irregular figure/*oppv. van onreëlmatige fig.*	**CA** **CA**
	Area of circle/ *Oppv. van sirkel* $= \pi(3)^2 = 9\pi \approx 28,27 \text{ m}^2$	✓ area of circle/ *oppv. van sirkel*	**CA**
	Area to be paved/ *Oppv. wat gepavlei moet word* $= 79,2 - 9\pi = 50,93 \text{ m}^2$	✓ area to be paved / *oppv. om te plavei*	**CA**
	No. of paving bricks needed/*Getal plaveistene benodig* $= \frac{50,(93)}{0,02} \approx 2547$ **OR / *OF*** Area covered by bricks / *Oppv. bedek deur stene* $= 0,02 \times 2500 = 50 \text{ m}^2$	✓ bricks needed / *bakstene benodig* **OR / *OF*** Area of bricks / *Oppv. van stene*	**CA**
	∴ 2 500 paving bricks will NOT be sufficient/ *plavleistene sal nie genoeg wees nie*	✓ conclusion/*afleiding*	**CA** (6)

11.2



11.2.1	$30\,\text{mm} \div 10 = 3\ \text{cm}$	✓ 3 cm	**A** (1)
11.2.2	Vol. of cylinder/*van silinder* $= \pi(4)^2(10)$ $= 160\pi\ \text{cm}^3 \approx 502,65\ \text{cm}^3$	✓ **SF** ✓ Vol. of cylinder / *van silinder*	**A** **CA**
	Vol. of 1 ice cube / *van 1 ysblokkie* $= (3)^3$ $= 27\ \text{cm}^3$	✓ Vol. of 1 cube / *van 1 kubus*	**CA**
	Vol. of 3 ice cubes/*van 3 ysblokkies* $= 3 \times 27$ $= 81\ \text{cm}^3$	✓ Vol. of 3 cubes / *van 3 kubusse*	**CA**
	Vol. of remaining space / *van oorblywende spasie* $= 160\pi - (81 + 250)$ $\approx 171,65\ \text{cm}^3$ $\therefore 171,65\ \text{m}\ell$ **OR / *OF***	✓ **M** ✓ Vol. remaining / *wat oorbly* **OR / *OF***	**A** **CA**

	Vol. of cylinder/*van silinder* $= \pi(40)^2(100)$ $= 160\,000\pi \text{ mm}^3 \approx 502\,654,82 \text{ mm}^3$	✓	**SF**	**A**
		✓	Vol. of cylinder / *van silinder*	**CA**
	Vol. of 1 ice cube / *van 1 ysblokkie* $= (30)^3$ $= 27\,000 \text{ mm}^3$	✓	Vol. of 1 cube / *van 1 kubus*	**CA**
	Vol. of 3 ice cubes/*van 3 ysblokkies* $= 3 \times 27\,000$ $= 81000 \text{ mm}^3$	✓	Vol. of 3 cubes / *van* 3 *kubusse*	**CA**
	Vol. of remaining space / *van oorblywende spasie* $= 160\,000\pi - (81000 + 250\,000)$ $\approx 171654,82 \text{ mm}^3$ $\therefore 171,65 \text{ m}\ell$	✓	**M**	**A**
		✓	Vol. remaining / *wat oorbly*	**CA**
				(6)
				[16]

TOTAL/*TOTAAL*:150

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