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**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE/GRAAD 12

JUNE/JUNIE 2025

**MATHEMATICS P2/WISKUNDE V2
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 18 pages.
Hierdie nasienriglyn bestaan uit 18 bladsye.



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NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone a question, mark the crossed-out version.
- Consistency accuracy applies in ALL aspects of the marking guideline. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

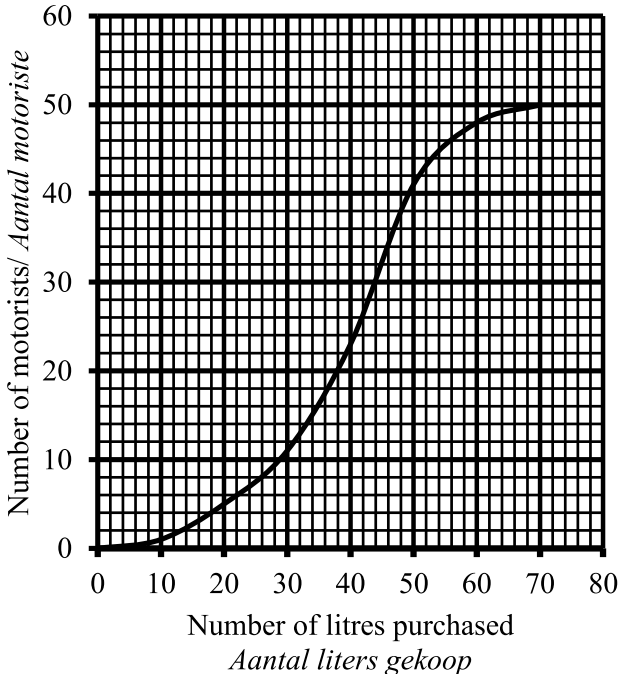
GEOMETRY	
S	A mark for a correct statement. (A statement mark is independent of a reason).
R	A mark for the correct reason. (A reason mark may only be awarded only if the statement is correct.)
S/R	Award a mark if a statement and a reason are both correct.

NEEM KENNIS:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Indien 'n kandidaat 'n poging van 'n vraag deurgetrek het en dit nie oorgedoen het nie, merk die deurgetrekte weergawe.
- Volgehoue Akkuraatheid geld in ALLE aspekte van die nasienriglyn. Hou op merk by tweede berekeningsfout.
- Om antwoorde/waardes te aanvaar om 'n probleem op te los is NIE aanvaarbaar NIE.

MEETKUNDE	
S	'n Punt vir korrekte stelling. (n Stelling punt is onafhanklik van die rede).
R	'n Punt vir die korrekte rede. (n Rede punt mag net toegeken word as die stelling korrek is).
S/R	'n Punt word toegeken as die stelling en die rede beide korrek is.



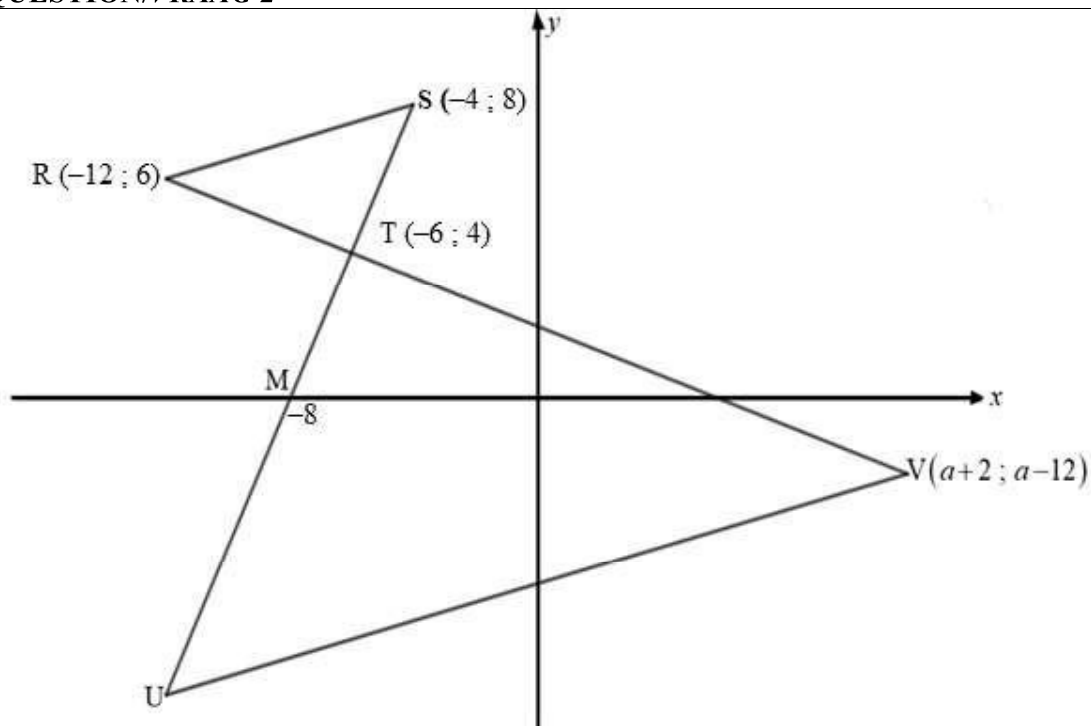
QUESTION/ VRAAG 1																											
1.1	50 motorists/motoriste		✓ answer/antwoord	(1)																							
1.2	$40 \leq x < 50$		✓ answer/antwoord	(1)																							
1.3	<table><tr><th>No. of litres purchased <i>Aantal liters gekoop</i></th><th>Frequency <i>Frekwensie</i></th><th>Cumulative Frequency <i>Kumulatiewe Frekwensie</i></th></tr><tr><td>$0 \leq x < 10$</td><td>1</td><td>1</td></tr><tr><td>$10 \leq x < 20$</td><td>4</td><td>5</td></tr><tr><td>$20 \leq x < 30$</td><td>6</td><td>11</td></tr><tr><td>$30 \leq x < 40$</td><td>12</td><td>23</td></tr><tr><td>$40 \leq x < 50$</td><td>18</td><td>41</td></tr><tr><td>$50 \leq x < 60$</td><td>7</td><td>48</td></tr><tr><td>$60 \leq x < 70$</td><td>2</td><td>50</td></tr></table>	No. of litres purchased <i>Aantal liters gekoop</i>	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe Frekwensie</i>	$0 \leq x < 10$	1	1	$10 \leq x < 20$	4	5	$20 \leq x < 30$	6	11	$30 \leq x < 40$	12	23	$40 \leq x < 50$	18	41	$50 \leq x < 60$	7	48	$60 \leq x < 70$	2	50	✓ correct frequency <i>korrekte frekwensie</i> ✓ {1, 5; 11} CM ✓ {23; 41; 48} CM	(3)
No. of litres purchased <i>Aantal liters gekoop</i>	Frequency <i>Frekwensie</i>	Cumulative Frequency <i>Kumulatiewe Frekwensie</i>																									
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$40 \leq x < 50$	18	41																									
$50 \leq x < 60$	7	48																									
$60 \leq x < 70$	2	50																									
1.4	Cummulative frequency graph (Ogive) <i>Kumulatiewe frekwensie grafiek (Ogief)</i> 	✓ grounding/anker ✓ plotting against the upper limit/<i>steek af teenoor die boonste limiet</i> ✓ shape/vorm	(3)																								
1.5	$Q_1 = 32$ (Accept/ <i>Aanvaar</i> 31)		✓ answer/antwoord	(1)																							
1.6	$\bar{x} = \frac{5 \times 1 + 15 \times 4 + 25 \times 6 + 35 \times 12 + 45 \times 18 + 55 \times 7 + 65 \times 2}{50}$ $= \frac{1960}{50}$ $= 39,2$		✓ correct frequency <i>korrekte frekwensie</i> ✓ division by 50/ <i>deel deur 50</i> ✓ answer/antwoord	(3)																							



1.7	75^{th} percentile/ 75^{ste} persentiel $= \frac{75}{100} \times 50$ $= 37,5$	✓ multiplication by 50/ <i>vermenigvuldig met 50</i> ✓ answer / <i>antwoord</i>	(2)
1.8	$Q_3 = 48$ $IQR = Q_3 - Q_1 = 48 - 32 = 16$	✓ Q_3 ✓ answer/ <i>antwoord</i>	(2)
1.9	No. of motorists that are greater or equal to 75^{th} percentile is 13 number of motorists at 75^{th} percentile or above = 13 Total reward for motorists at 75^{th} or above = $13 \times 60 \times R0,40$ $= 312$ <i>Aantal motoriste gelyk aan of groter as die 75^{ste} persentiel is 13</i> <i>Aantal motoriste by 75^{ste} persentiel of bo = 13</i> <i>Totale beloning vir motoriste by 75^{ste} persentiel of bo</i> $= 13 \times 60 \times R0,40$ $= R312,00$	✓ 13 ✓ 312	(2)
			[18]



QUESTION/VRAAG 2



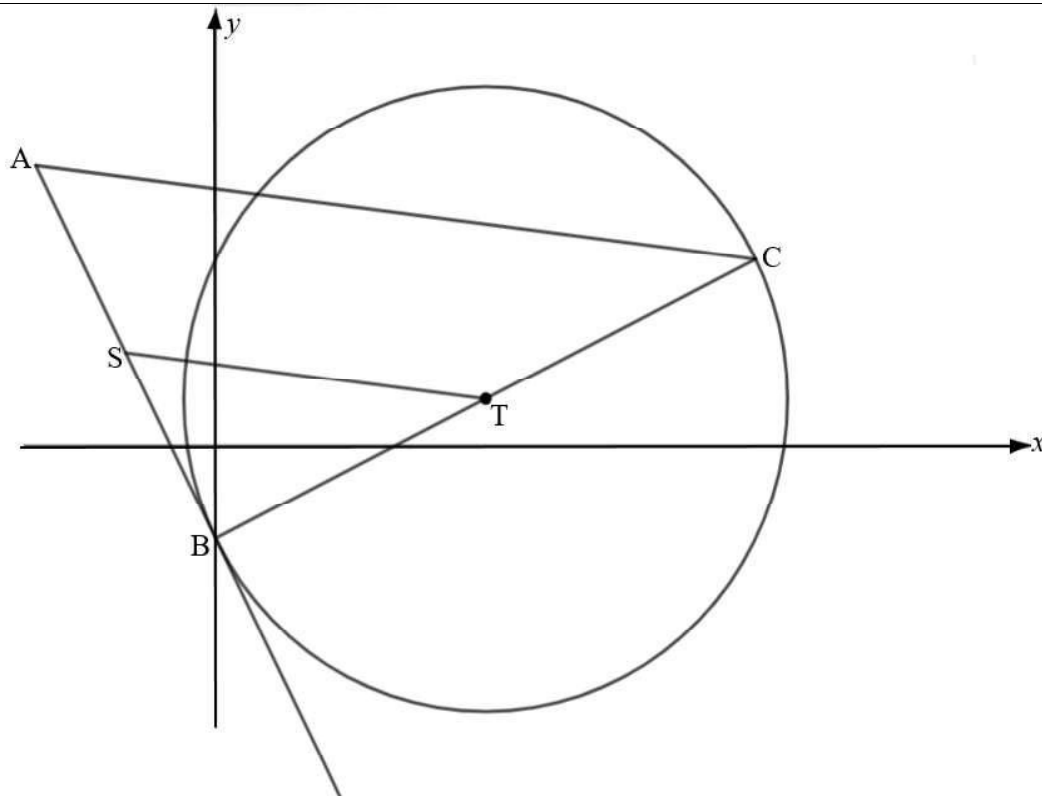
2.1	$m_{RV} = \frac{6-4}{-12+6}$ $= -\frac{1}{3}$	✓ substitution into correct formula <i>vervang in korrekte formule</i> ✓ answer / <i>antwoord</i>	(2)
2.2	$RT = \sqrt{(-12+6)^2 + (6-4)^2}$ $= 2\sqrt{10}$	✓ substitution into correct formula <i>vervang in korrekte formule</i> ✓ answer / <i>antwoord</i>	(2)
2.3	$\frac{a-12-4}{a+2+6} = -\frac{1}{3}$ $\frac{a-16}{a+8} = -\frac{1}{3}$ $3a-48 = -a-8$ $4a = 40$ $a = 10$	✓ $m_{RV} = m_{TV}$ ✓ simplification / <i>vereenvoudiging</i> ✓ answer/ <i>antwoord</i>	(3)
2.4	$-8 = \frac{-4+x}{2}; 0 = \frac{8+y}{2}$ $-12 = x; -8 = y$	✓ correct substitution/ <i>korrekte vervanging</i> ✓ both x-and y-value/ <i>beide x-en y-waarde</i>	(2)



2.5	$m_{SU} = \frac{8-4}{-4+6}$ $= 2$ $y-8 = 2(x+4)$ $y = 2x+16$	✓ correct gradient / <i>korrekte gradiënt</i> ✓ substitution of m_{SU} and <i>vervanging van m_{SU} en</i> S(-4 ; 8) or/of T(4 ; 6) or/of M(-8 ; 0) ✓ equation / <i>vergelyking</i>	(3)
2.6	$\tan \theta = m_{SU} = 2$ $\theta = 63,43^\circ$ $\tan \alpha = m_{RV} = -\frac{1}{3}$ $\alpha = 161,57^\circ$ $\therefore \hat{TUV} = 161,57^\circ - 63,43^\circ \text{ [ext. } \angle \text{ of a } \Delta]$ $= 98,14^\circ \quad \text{[buite } \angle \text{ van 'n } \Delta]$	✓ $\theta = 63,43^\circ$ ✓ $\alpha = 161,57^\circ$ ✓ $161,57^\circ - 63,43^\circ$ ✓ answer / <i>antwoord</i>	(4)
		°	
2.7	$TV = 4 \times 2\sqrt{10}$ $= 8\sqrt{10}$ $UT = \sqrt{(-12+6)^2 + (-8-4)^2}$ $= 6\sqrt{65}$ $\text{Area of } \Delta TUV = \frac{1}{2} \times 8\sqrt{10} \times 6\sqrt{65} \times \sin 98,14^\circ$ $= 168$	✓ $TV = 8\sqrt{10}$ ✓ $UT = 2\sqrt{73}$ ✓ correct substitution/ <i>korrekte vervanging</i> ✓ answer / <i>antwoord</i>	(4)
			[20]



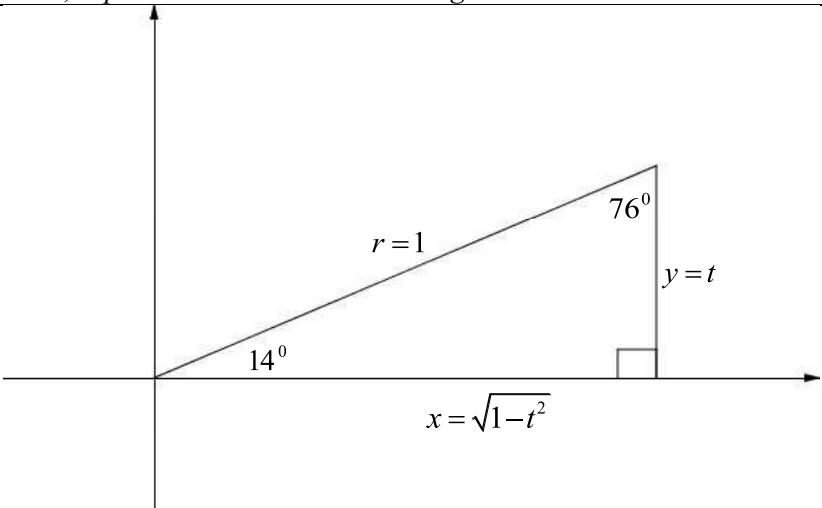
QUESTION/VRAAG 3



3.1	$x^2 + y^2 - 12x - 2y - 8 = 0$ $(x-6)^2 + (y-1)^2 = 45$ $T(6; 1)$	$\checkmark (x-6)^2 + (y-1)^2 = 45$ $\checkmark x\text{-value} / \text{waarde} \checkmark y\text{-value} / \text{waarde}$	(3)
3.2	$x^2 + y^2 - 12x - 2y - 8 = 0$ $0^2 + y^2 - 12(0) - 2y - 8 = 0$ $y^2 - 2y - 8 = 0$ $(y-4)(y+2) = 0$ $y \neq 4 \text{ or / of } y = -2$ $B(0; -2)$	$\checkmark x = 0$ $\checkmark \text{standard form} / \text{standaardvorm}$ $\checkmark y = -2$	(3)



3.3	$y = -\frac{x}{8} + \frac{7}{8}$ $m_{ST} = -\frac{1}{8}$ $\tan \beta = -\frac{1}{8}$ $\beta = 172,875^\circ$ Inclination of AC = inclination of ST <i>Inklinasie van AC = inklinasie van ST</i> AC ST	✓ equation of ST in the form $y = mx + c$ <i>Vergelyking van ST in die vorm</i> $y = mx + c$ ✓ $m_{ST} = -\frac{1}{8}$ ✓ angle of inclination of ST <i>hoogtehoek van ST</i>	
	OR / OF	OR / OF	
	$y = -\frac{x}{8} + \frac{7}{8}$ $m_{ST} = -\frac{1}{8}$ $= -0,125$ $m_{AC} = \tan 172,825$ $= -0,125$	✓ equation of ST in the form $y = mx + c$ <i>Vergelyking van ST in die vorm</i> $y = mx + c$ ✓ $m_{ST} = -0,125$ ✓ $m_{AC} = -0,125$	(3)
3.4.1	$ST = \sqrt{65}$ $AC = 2ST$ [midpoint theorem] <i>[middelpunt – stelling]</i> $= 2\sqrt{65}$	✓ $AC = 2ST$ ✓ answer / <i>antwoord</i>	(2)
3.4.2	$6 = \frac{0+x}{2}$; $1 = \frac{-2+y}{2}$ $x = 12$; $y = 4$ $C(12 ; 4)$	✓ x-value / <i>waarde</i> ✓ y-value / <i>waarde</i>	(2)
3.4.3	$(2\sqrt{65})^2 = (-4 - 12^2 + (k-4)^2$ $4 = (k-4)^2$ $k-4 = \pm 2$ $k = 6$ or $k \neq 2$	✓ substitution into correct formula <i>vervanging in die korrekte formule</i> ✓ standard form/ <i>standaardvorm</i> ✓ k-value/ <i>waarde</i>	(3)
3.4.4	$\hat{ABC} = 90^\circ$ [diameter $\perp$ tan] / <i>[middellyn $\perp$ raaklyn]</i> $\therefore AC$ is the diameter [line subt 90°] <i>AC is die middellyn [lynstuk onderspan 90°]</i> $M_{AC}(4 ; 5)$ $r^2 = 65$ $(x-4)^2 + (y-5)^2 = 65$	✓ $\hat{ABC} = 90^\circ$ ✓ midpoint of AC <i>middelpunt van AC</i> ✓ r^2 ✓ correct equation <i>korrekte vergelyking</i>	(4)
			[20]

QUESTION/VRAAG 4			
4.1	If $\sin 14^\circ = t$, determine the values of the following in terms of t : <i>As $\sin 14^\circ = t$, bepaal die waardes van die volgende in terme van t:</i>		
			
4.1.1	$x = \sqrt{1-t^2}$ Pyth theorem/Pythagoras Stelling $\cos 14^\circ = \frac{\sqrt{1-t^2}}{1}$	$\checkmark x = \sqrt{1-t^2}$ $\checkmark$ answer / antwoord	(2)
4.1.2	$\sin 38^\circ$ can be expressed as: $\sin 38^\circ$ kan uitgedruk word as: $1 - 2 \sin^2 38^\circ = \cos 76^\circ$ $\sin^2 38^\circ = \frac{1 - \cos 76^\circ}{2}$ $\sin 38^\circ = \sqrt{\frac{1 - \cos 76^\circ}{2}}$ $= \sqrt{\frac{1-t}{2}}$	$\checkmark \sin^2 38^\circ$ $\checkmark \sin 38^\circ$ $\checkmark$ answer / antwoord	(3)
4.1.3	$\sin 59^\circ = \sin(45^\circ + 14^\circ)$ $= \sin 45^\circ \cos 14^\circ + \sin 14^\circ \cos 45^\circ$ $= \frac{\sqrt{2}}{2} \times \frac{\sqrt{1-t^2}}{1} + t \times \frac{\sqrt{2}}{2}$ $= \frac{\sqrt{2}(\sqrt{1-t^2} + t)}{2}$	$\checkmark$ compound angle saamgestelde hoek $\checkmark$ expansion / uitbreiding $\checkmark \checkmark$ each term / elke term	(4)



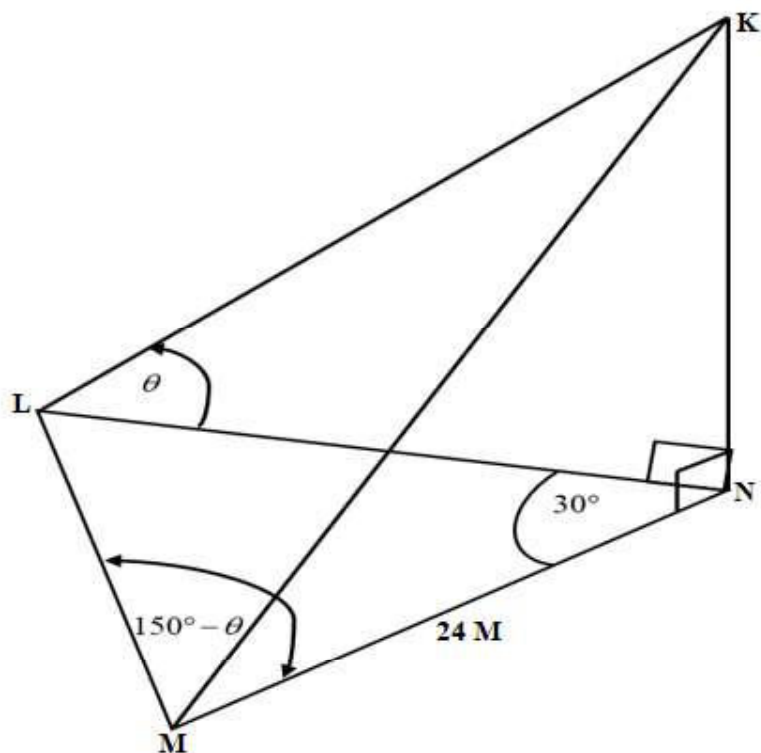
4.2	$\sin A \cdot \tan\left(\frac{1}{2}A - 360^\circ\right) - 1$ $= 2 \sin \frac{1}{2}A \cdot \cos \frac{1}{2}A \cdot \tan \frac{1}{2}A - 1$ $= 2 \sin \frac{1}{2}A \cdot \cos \frac{1}{2}A \cdot \frac{\sin \frac{1}{2}A}{\cos \frac{1}{2}A} - 1$ $= 2 \sin^2 \frac{1}{2}A - 1$ $= -\left(1 - 2 \sin^2 \frac{1}{2}A\right)$ $= -\cos A$	$\checkmark 2 \sin \frac{1}{2}A \cos \frac{1}{2}A \checkmark \tan \frac{1}{2}A$ $\checkmark \frac{\sin \frac{1}{2}A}{\cos \frac{1}{2}A}$ $\checkmark \text{ simplification / vereenvoudiging}$ $\checkmark \text{ factors / faktore}$ $\checkmark \text{ answer / antwoord}$	(6)
4.3.1	$f(x) = \frac{2 \cos x \cos(90^\circ - x)}{\cos^2 x + \sin(180^\circ + x) \cdot \cos(-x) \cdot \tan x}$ $= \frac{2 \cos x \cdot \sin x}{\cos^2 x + (-\sin x) \cdot \cos x \cdot \frac{\sin x}{\cos x}}$ $= \frac{2 \cos x \cdot \sin x}{\cos^2 x - \sin^2 x}$ $= \frac{\sin 2x}{\cos 2x}$ $= \tan 2x$	$\checkmark \sin x$ $\checkmark -\sin x \checkmark \cos x \checkmark \frac{\sin x}{\cos x}$ $\checkmark \sin 2x$ $\checkmark \cos 2x$	(6)
4.3.2	$x = -45^\circ \text{ and/en } x = 45^\circ$	$\checkmark x = -45^\circ \checkmark x = 45^\circ$	(2)
4.4.1	$\cos(\theta + 30^\circ) = \frac{1}{2} \sin \theta$ $\cos \theta \cos 30^\circ - \sin \theta \sin 30^\circ = \frac{1}{2} \sin \theta$ $\frac{\sqrt{3}}{2} \cos \theta - \frac{1}{2} \sin \theta - \frac{1}{2} \sin \theta = 0$ $\frac{\sqrt{3}}{2} \cos \theta - \sin \theta = 0$ $\sin \theta = \frac{\sqrt{3}}{2} \cos \theta$ $\tan \theta = \frac{\sqrt{3}}{2}$ $\theta = 40,89^\circ + 180^\circ \cdot k \text{ or/of } \theta = 220,89^\circ + 180^\circ \cdot k \quad k \in \mathbb{Z}$	$\checkmark \text{ correct expansion /}$ $\text{korrekte uitbreiding}$ $\checkmark \text{ standard form of equation /}$ $\text{standaardvorm van vergelyking}$ $\checkmark \tan \theta = \frac{\sqrt{3}}{2}$ $\checkmark \theta = 40,89^\circ + 180^\circ \cdot k, \quad k \in \mathbb{Z}$	(4)
4.4.2	$\theta = 40,89^\circ \text{ and/en } -139,11^\circ$	$\checkmark \checkmark \text{ each value / elke waarde}$	(2)
			[29]



QUESTION/VRAAG 5			
5.1	Period/Periode = 720°	✓ answer / antwoord	(1)
5.2	$y \in [-2; 0]$ OR / OF $-2 \leq y \leq 0$	✓ correct critical values/ korrekte kritieke waardes ✓ correct notation/ korrekte notasie	(2)
5.3		✓ correct x-intercepts korrekte x-afsnitte ✓ correct turning points korrekte draaipunte ✓ shape/vorm	(3)
5.4	$y = -\frac{1}{2}$	✓ answer / antwoord	(1)
5.5	$\sin x \cos x - \cos x = 0$ $\frac{1}{2} \sin 2x = \cos x$ $\therefore x = -90^\circ$ or $x = 90^\circ$	✓ identity/identiteit $\frac{1}{2} \sin 2x$ ✓ $x = -90^\circ$ ✓ $x = 90^\circ$	(3)
			[10]



QUESTION/VRAAG 6



6.1	$\hat{MLN} = 180^\circ - 30^\circ - 150^\circ + \theta = \theta$	✓ answer / antwoord	(1)
6.2	$\frac{LN}{\sin(150^\circ - \theta)} = \frac{24}{\sin \theta}$ $LN = \frac{24 \times \sin(150^\circ - \theta)}{\sin \theta}$ $= \frac{24[\sin 150^\circ \cos \theta - \sin \theta \cos 150^\circ]}{\sin \theta}$ $= \frac{24[\sin 30^\circ \cos \theta - \sin \theta(-\cos 30^\circ)]}{\sin \theta}$ $= \frac{24\left[\frac{1}{2} \cos \theta + \frac{\sqrt{3}}{2} \sin \theta\right]}{\sin \theta}$ $= \frac{12 \cos \theta + 12\sqrt{3} \sin \theta}{\sin \theta}$	✓ correct substitution into sine rule/ korrekte vervanging in die sinusreël ✓ expansion of compound angle/ uitbreiding van saamgestelde hoek ✓ reduction for both trig ratios/ reduksie vir beide trig. verhoudings ✓ answer / antwoord	(4)

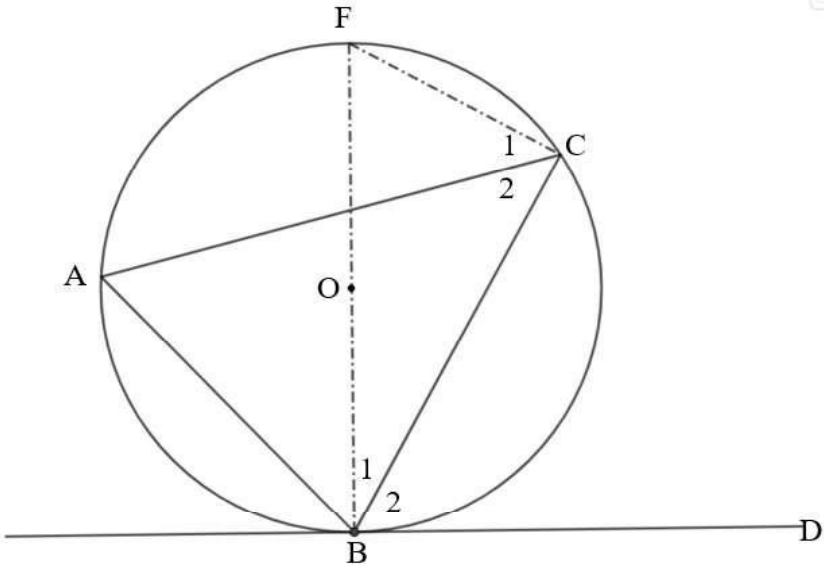


6.3	$\tan \theta = \frac{KN}{LN}$ $KN = \tan \theta \times \frac{12 \cos \theta + 12\sqrt{3} \sin \theta}{\sin \theta}$ $= \frac{\sin \theta}{\cos \theta} \times \frac{12 \cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta} \times \frac{12\sqrt{3} \sin \theta}{\sin \theta}$ $= 12 + 12\sqrt{3} \tan \theta$	✓ correct trig ratio/ korrekte trig verhouding ✓ correct substitution/ korrekte vervanging ✓ $\tan \theta$ in terms of $\sin \theta$ and $\cos \theta$ $\tan \theta$ in terme van $\sin \theta$ en $\cos \theta$	(3)
6.4	$46 = 12 + 12\sqrt{3} \tan \theta$ $12\sqrt{3} \tan \theta = 34$ $\tan \theta = \frac{34}{12\sqrt{3}}$ $\theta = 58,56^\circ$	✓ substitution / vervanging ✓ $\tan \theta = \frac{34}{12\sqrt{3}}$ ✓ answer / antwoord	(3)
			[11]

QUESTION/VRAAG 7

7.1			
	Constructions: Draw diameter BF and join FA Proof: $\hat{FBD} = 90^\circ$ [tan $\perp$ diameter] $\hat{A} = 90^\circ$ [∠ in semi – circle] $\hat{A}_1 = \hat{B}_1$ [∠s same segment] $\therefore \hat{CAB} = \hat{CBD}$ $\hat{CBD} = \hat{A}$	✓ construction ✓ S/R ✓ S ✓ R ✓ S/R	



	<i>Konstruksies: Teken middellyn BF en verbind FA</i> <i>Bewys:</i> $\hat{F}BD = 90^\circ$ [<i>raaklyn $\perp$ middellyn</i>] $\hat{A} = 90^\circ$ [<i>$\angle$ in semi – sirkel</i>] $\hat{A}_1 = \hat{B}_1$ [<i>$\angle$ e in dieselfde segment</i>] $\therefore \hat{C}AB = \hat{C}BD$ $\hat{C}BD = \hat{A}$ OR/OF 	✓ konstruksie ✓ S/R ✓ S ✓ R ✓ S/R	
	Constructions: Draw diameter BF and join FC	✓ construction	
	$\hat{F}CB = 90^\circ$ [<i>$\angle$ in semi – circle</i>] $\hat{F} + \hat{B}_2 = 90^\circ$ [<i>sum of $\angle$s in a Δ</i>] $\hat{F}BD = 90^\circ$ [<i>tan $\perp$ diameter</i>] $\therefore \hat{B}_1 = \hat{F}$ $\therefore \hat{A}_1 = \hat{B}_1$ [<i>$\angle$s same segment</i>] $\therefore \hat{C}AB = \hat{C}BD$ $\hat{C}BD = \hat{A}$	✓ S/R ✓ S ✓ R ✓ S/R	



	<i>Konstruksies: Teken middellyn BF en verbind FC</i> $\hat{F}\hat{C}\hat{B} = 90^\circ$ [$\angle$ in semi – sirkel] $\hat{F} + \hat{B}_2 = 90^\circ$ [som van $\angle$ e in 'n Δ] $\hat{F}\hat{B}\hat{D} = 90^\circ$ [raaklyn $\perp$ middellyn] $\therefore \hat{B}_1 = \hat{F}$ $\therefore \hat{A}_1 = \hat{B}_1$ [$\angle$ e in dieselfde segment] $\therefore \hat{C}\hat{A}\hat{B} = \hat{C}\hat{B}\hat{D}$ $\hat{C}\hat{B}\hat{D} = \hat{A}$	✓ konstruksie ✓ S/R ✓ S ✓ R ✓ S/R	(5)
7.2			
7.2.1	$QR = SR$ [tangents from same point] [raaklyne vanaf dieselfde punt] $\hat{Q}_3 = \hat{S}_1$ [$\angle$ s opp = sides] / [$\angle$ teenoor = sye] $2\hat{Q}_3 = 180^\circ - 54^\circ$ [$\angle$ s in a Δ] / [$\angle$ e in 'n Δ] $\hat{Q}_3 = 63^\circ$	✓ S/R ✓ S ✓ R ✓ S	(4)
7.2.2	$\hat{P} = \hat{Q}_3 = 63^\circ$ [tan chord theorem] / [raaklyn – koord stelling]	✓ S ✓ R	(2)
7.2.3	$\hat{O}_1 = 2\hat{P} = 126^\circ$ [$\angle$ at centre = $2 \times \angle$ at circumference] [Middelpunts $\angle = 2 \times$ omtrekshoek]	✓ S ✓ R	(2)
			[13]



9.3	$\frac{AD}{CB} = \frac{DF}{BF} \quad \Delta s/e$ $AD = \frac{DF \cdot CB}{BF}$ but/maar: $CB = DB \quad \left[\begin{array}{l} \text{tan from common point} \\ \text{raaklyn vanaf gemene punt} \end{array} \right]$ $\therefore AD = \frac{DF \cdot DB}{BF}$	$\checkmark S \quad \checkmark R$ $\checkmark$ simplification/ <i>vereenvoudiging</i> $\checkmark S/R$	(4)
9.4	$\frac{AC}{AD} = \frac{CF}{FE} \quad \left[\begin{array}{l} \text{line } \text{ to one side of a } \Delta \\ \text{lyn } \text{ aan een sy van 'n } \Delta \end{array} \right]$ $AD = \frac{AC \cdot FE}{CF}$ $\frac{AC \cdot FE}{CF} = \frac{DF \cdot DB}{BF}$	$\checkmark S \quad \checkmark R$ $\checkmark AD = \frac{AC \cdot FE}{CF}$	(3)
			[15]
TOTAL/TOTAAL:			150

