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**MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA**

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P2 / WISKUNDE V2

JUNE/JUNIE 2026

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

**This marking guideline consist of 18 pages.
Hierdie nasienriglyne bestaan uit 18 bladsye.**



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**NOTE:**

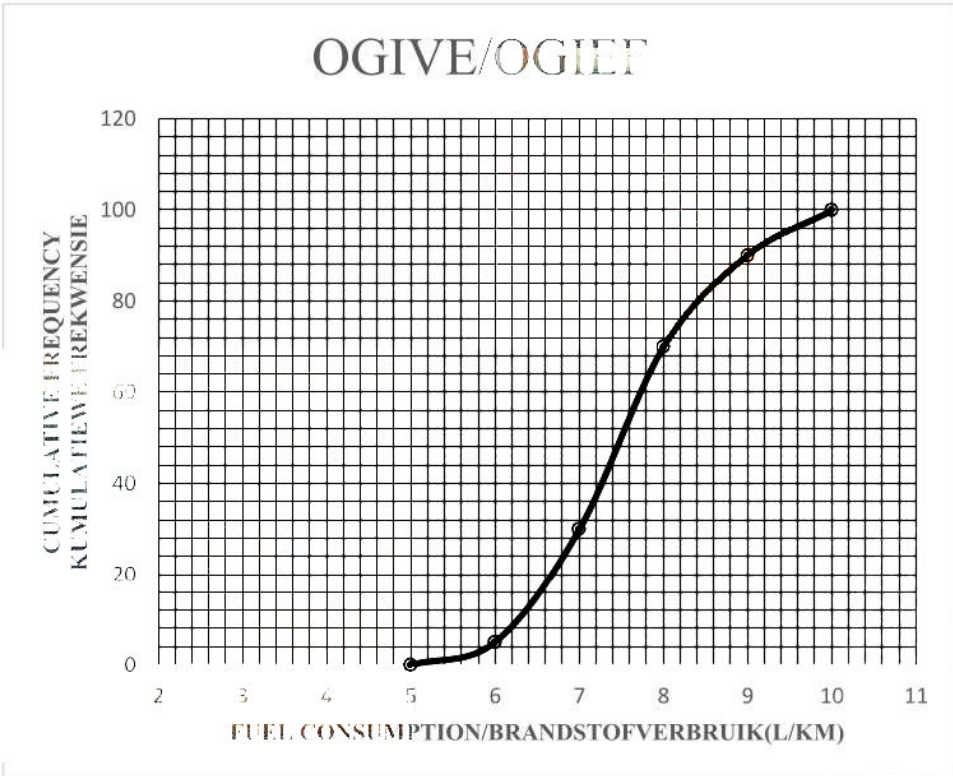
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:

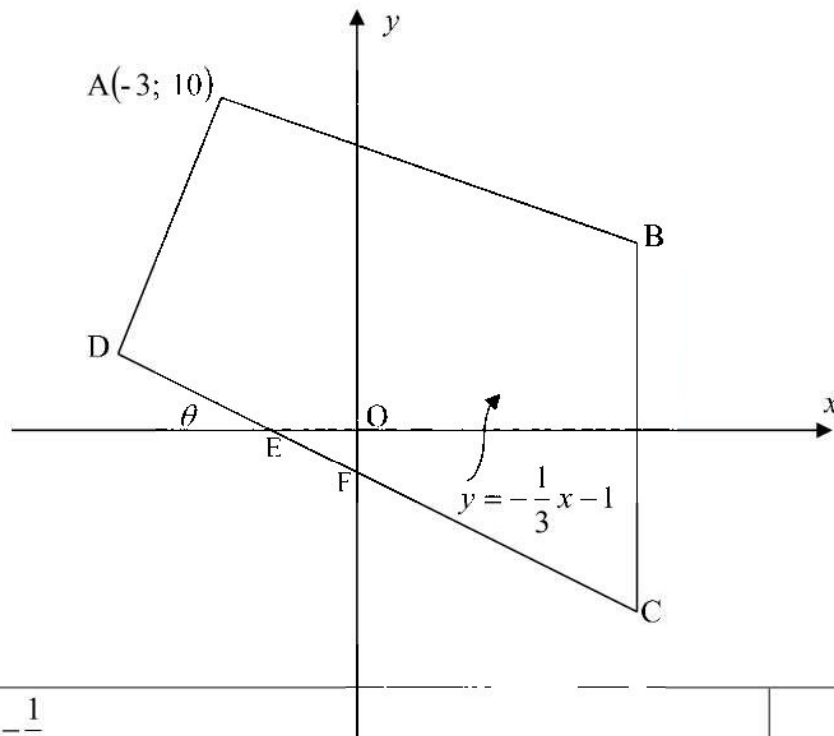
- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyn van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

QUESTION/VRAAG 1		
1.1	$\text{Mean/Gemiddeld} = \frac{229}{10}$ $= 22,9$	✓ sum/som ✓ answer/antwoord (2)
1.2	$\sigma = 3,48$	✓ answer/antwoord (1)
1.3	17 20 23,5 25 28	✓ 17 and/en 28 ✓ 20 and/en 25 ✓ 23,5 (3)
1.4	$(\bar{x} - \sigma; \bar{x} + \sigma) = (22,90 - 3,48; 22,90 + 3,48)$ $= (19,42; 26,38)$ 4 temperatures lies outside one standard deviation. 4 temperature lê buite een standaardafwyking van die gemiddeld.	✓ Lower limit onderste grens ✓ Upper limit boonste grens ✓ answer/antwoord (3)
		[9]



QUESTION/VRAAG 2																				
2.1	100 cars/motors	✓ answer/antwoord (1)																		
2.2	$7 \leq x < 8$ or/of $7 < x \leq 8$	✓ answer/antwoord (1)																		
2.3	<table border="1"> <thead> <tr> <th>INTERVAL</th><th>FREQUENCY(NUMBER OF VEHICLES) FREKWENSIE (AANTAL MOTORS)</th><th>CUMULATIVE FREQUENCY KUMULATIEWE FREKWENSIE</th></tr> </thead> <tbody> <tr> <td>$5 \leq x < 6$</td><td>5</td><td>5</td></tr> <tr> <td>$6 \leq x < 7$</td><td>25</td><td>30</td></tr> <tr> <td>$7 \leq x < 8$</td><td>40</td><td>70</td></tr> <tr> <td>$8 \leq x < 9$</td><td>20</td><td>90</td></tr> <tr> <td>$9 \leq x < 10$</td><td>10</td><td>100</td></tr> </tbody> </table>	INTERVAL	FREQUENCY(NUMBER OF VEHICLES) FREKWENSIE (AANTAL MOTORS)	CUMULATIVE FREQUENCY KUMULATIEWE FREKWENSIE	$5 \leq x < 6$	5	5	$6 \leq x < 7$	25	30	$7 \leq x < 8$	40	70	$8 \leq x < 9$	20	90	$9 \leq x < 10$	10	100	✓ Frequency/frekwensie ✓ 5, 30, 70 ✓ 90 & 100 (3)
INTERVAL	FREQUENCY(NUMBER OF VEHICLES) FREKWENSIE (AANTAL MOTORS)	CUMULATIVE FREQUENCY KUMULATIEWE FREKWENSIE																		
$5 \leq x < 6$	5	5																		
$6 \leq x < 7$	25	30																		
$7 \leq x < 8$	40	70																		
$8 \leq x < 9$	20	90																		
$9 \leq x < 10$	10	100																		
2.4	OGIVE/OGIEF 	✓ grounding gegrond ✓ three correct points drie korrekte punte ✓ shape/vorm (3)																		
2.5	$\begin{aligned} \text{IQR} &= Q_3 - Q_1 \\ &= 8,5 - 6,5 \\ &= 2 \end{aligned}$	✓ $Q_3 = 8,5$ Accept/aanvaar 8 - 9 ✓ $Q_1 = 6,5$ Accept/aanvaar 6-7 ✓ answer/antwoord (3)																		
		[11]																		



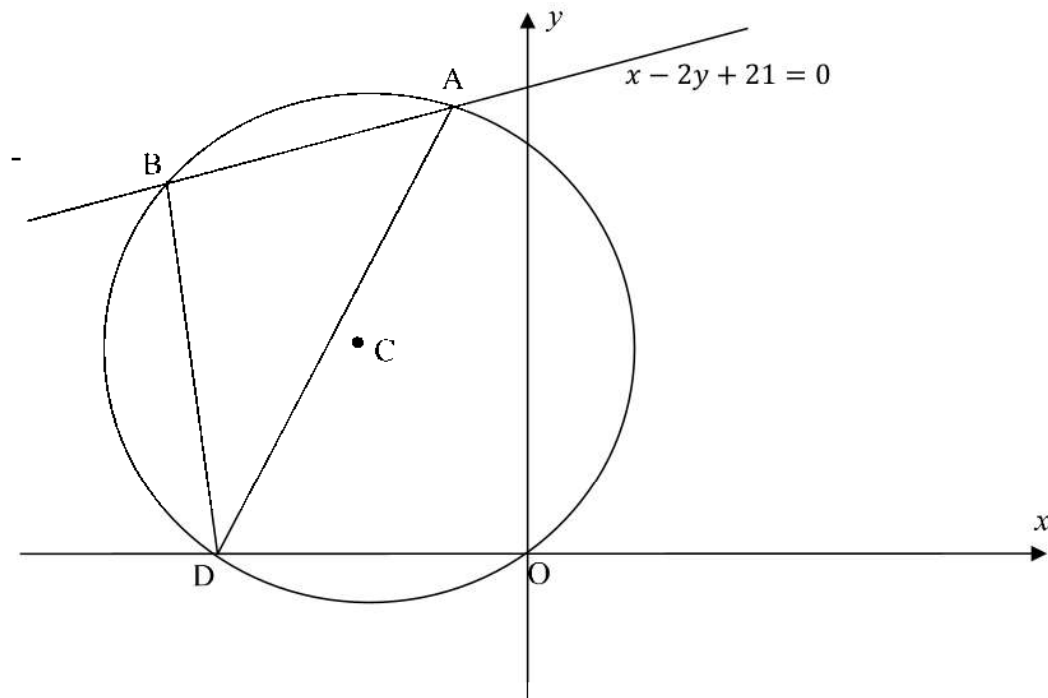
QUESTION/VRAAG 3

3.1	$m_{DC} = -\frac{1}{3}$	✓ $m_{DC} = -\frac{1}{3}$ (1)
3.2	$\tan \hat{XED} = -\frac{1}{3}$ $\hat{XED} = 180^\circ - 18,4349 \dots^\circ = 161,57^\circ$ $\therefore \theta = 18,4^\circ$ OR / OF $0 = -\frac{1}{3}x - 1$ $x = -3$ $\therefore E(-3; 0)$ $\tan \theta = \frac{OF}{OE}$ $= \frac{1}{3}$ $= 18,4^\circ$	$\checkmark \tan \hat{XED} = -\frac{1}{3}$ $\checkmark$ answer /antwoord OR / OF $y = -\frac{1}{3}(0) - 1$ $y = -1$ $\therefore F(-1; 0)$ $\checkmark E(-3; 0); F(-1; 0)$ $\checkmark$ answer /antwoord (2)
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3.3	$AD \perp DC$ $m_{AD} \times m_{DC} = -1$ $\therefore m_{AD} \times \left(-\frac{1}{3}\right) = -1$ $\therefore m_{AD} = 3$ $\therefore y = 3x + c$ $A(-3; 10): 10 = 3(-3) + c$ $10 = -9 + c$ $\therefore c = 19$ $\therefore y = 3x + 19$	$\checkmark m_{AD} = 3$ $\checkmark$ Substitution / substitusie $\checkmark$ Answer/antwoord (3)
3.4	$y = -\frac{1}{3}(6) - 1$ $= -3$ $\therefore C(6; -3)$	$\checkmark$ Substitution / substitusie $\checkmark$ Answer/Antwoord (2)
3.5.1	$y = -\frac{1}{3}x - 1$ and /en $y = 3x + 19$ $3x + 19 = -\frac{1}{3}x - 1$ $\therefore x = -6$ $\therefore y = 3(-6) + 19 = 1$ $\therefore D(-6; 1)$ $AD = \sqrt{(x_D - x_A)^2 + (y_D - y_A)^2}$ $= \sqrt{(-6 - (-3))^2 + (1 - 10)^2}$ $= \sqrt{90} = 9,49 \text{ units / eenhede}$	$\checkmark$ Equating / stel gelyk $\checkmark x = -6$ $\checkmark y = 1$ $\checkmark$ Substitution / substitusie $\checkmark$ Answer/antwoord (5)
3.5.2	$CD = \sqrt{(-6 - 6)^2 + (1 - (-3))^2}$ $= 4\sqrt{10}$ $\text{Area of /Opp van } \triangle ACD = \frac{1}{2} \times 4\sqrt{10} \times \sqrt{90}$ $= 60 \text{ units}^2 / \text{eenhede}^2$	$\checkmark 4\sqrt{10}$ $\checkmark$ substitution / substitusie $\checkmark$ answer /antwoord (3)
3.6	$A(-3; 10) \quad B(6; 6)$ $m_{AB} = \frac{6 - 10}{6 - (-3)}$ $= -\frac{4}{9}$ $m_{DC} = -\frac{1}{3}$ $m_{AB} \neq m_{DC}$ $ABCD$ is not a parallelogram, since opposite sides are not parallel. $ABCD$ is nie 'n parallelogram nie, want teenoorstaande sye is nie ewewydig nie.	$\checkmark$ Substitution / substitusie $\checkmark m_{AB}$ $\checkmark$ Conclusion + Reason Gevolgtrekking + rede
	 Proudly South African	[18]



QUESTION/VRAAG 4



4.1	$x^2 + y^2 + 6x - 8y = 0$ $x^2 + 6x + 9 + y^2 - 8y + 16 = 9 + 16$ $(x + 3)^2 + (y - 4)^2 = 25$ $\therefore C(-3; 4) \text{ radius} = \sqrt{25} = 5$	✓ Completing the square / Voltooi die vierkant ✓ Factorisation / Faktoriseer ✓ $C(-3; 4)$ ✓ radius (4)
4.2	$x - 2y + 21 = 0 \dots\dots\dots (1)$ $(x + 3)^2 + (y - 4)^2 = 25 \dots\dots\dots (2)$ $\therefore x = 2y - 21 \dots\dots\dots (3)$ sub eq(3) into eq(2) / subst vgl (3) in (2) $(2y - 21 + 3)^2 + (y - 4)^2 = 25$ $(2y - 18)^2 + (y - 4)^2 = 25$ $4y^2 - 72y + 324 + y^2 - 8y + 16 = 25$ $y^2 - 16y + 63 = 0$ $(y - 7)(y - 9) = 0$ $\therefore y = 7 \text{ or } y = 9$ $\therefore x = -7 \text{ or } x = -3$ $\therefore A(-3; 9) \text{ and/en } B(-7; 7)$	✓ $x = 2y - 21$ ✓ substitution / substitusie ✓ standard form / standaard vorm ✓ factors/faktore ✓ $A(-3; 9)$ ✓ $B(-7; 7)$ (6)



	$2y = x + 21$ $y = \frac{x+21}{2} \dots (1)$ $(x+3)^2 + (y-4)^2 = 25 \dots (2)$ $(x+3)^2 + \left(\frac{x+21}{2} - 4\right)^2 = 25$ $(x+3)^2 + \left(\frac{x+13}{2}\right)^2 = 25$ $x^2 + 6x + 9 + \frac{x^2 + 26x + 169}{4} - 25 = 0$ $4x^2 + 24x + 36 + x^2 + 26x + 169 - 100 = 0$ $5x^2 + 50x + 105 = 0$ $x^2 + 10x + 21 = 0$ $(x+3)(x+7) = 0$ $x = -3 \text{ or } x = -7$ $y = 9$ or /of $y = 7$ $A(-3; 9)$ and/en $B(-7; 7)$	✓ $y = \frac{x+21}{2}$ ✓ substitution / substitusie ✓ standard form / standard vorm ✓ factors / faktore ✓ $A(-3; 9)$ ✓ $B(-7; 7)$ (6)
4.3.1	$(x+3)^2 + (y-4)^2 = 25$ x – intercept/afsnit: $y = 0$ $(x+3)^2 + (0-4)^2 = 25$ $(x+3)^2 + 16 = 25$ $x^2 + 6x = 0$ $x(x+6) = 0$ $x = 0 \text{ or / of } x = -6$ $\therefore D(-6; 0) \quad A(-3; 9)$ $\therefore x_M = \frac{x_D + x_A}{2} ; y_M = \frac{y_D + y_A}{2}$ $\quad = \frac{-6+3}{2} ; \quad = \frac{0+9}{2}$ $\quad = -\frac{3}{2} ; \quad = \frac{9}{2}$ $\therefore M\left(-\frac{3}{2}; \frac{9}{2}\right)$	✓ subst of / subst van $y = 0$ ✓ standard form Standard vorm ✓ factors / faktore ✓ substitution / substitusie ✓ answer / antwoord (5)



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4.3.2	$B(-7; 7); C(-3; 4)$ $m_{CB} = \frac{y_B - y_C}{x_B - x_C}$ $= \frac{7 - 4}{-7 - (-3)}$ $= -\frac{3}{4}$ $y = -\frac{3}{4}x + c$ $7 = -\frac{3}{4}(-7) + c$ $c = \frac{7}{4}$ $\therefore y = -\frac{3}{4}x + \frac{7}{4}$ $M\left(-\frac{9}{2}; \frac{9}{2}\right)$ $LHS = \frac{9}{2}$ $RHS = -\frac{3}{4}\left(-\frac{9}{2}\right) + \frac{7}{4} = \frac{41}{8}$ $LHS \neq RHS$ $\therefore CB \text{ does not pass through } M.$ $\therefore CB \text{ gaan nie deur } M \text{ nie.}$	✓ m_{CB} ✓ equation of CB vergelyking van CB ✓ LHS and RHS LK en RK ✓ conclusion / gevolgtrekking (4)
4.4	$(x - 3)^2 + (y + 4)^2 = 25$ $\therefore \text{centre / middelpunt: } K(3; -4); r = 5$ $KC = \sqrt{(x_C - x_K)^2 + (y_C - y_K)^2}$ $= \sqrt{(-3 - 3)^2 + (4 - (-4))^2}$ $= \sqrt{100}$ $= 10 \text{ units / eenhede}$ sum of radii of circles / som van radiusse = $5 + 5 = 10$ The student is correct / die student is korrek.	✓ coordinates of centre and radius koördinate van middelpunt en radius ✓ KC ✓ sum of radii / som van radiusse ✓ conclusion / gevolgtrekking (4)
		[23]



**QUESTION/VRAAG 5**

5.1		
5.1.1	$\cos 2p = 2\cos^2 p - 1 \quad \text{or/of} \quad = 1 - 2\sin^2 p - 1 \quad \text{or/of} \quad = \cos^2 p - \sin^2 p$ $= 2\left(\frac{-12}{13}\right)^2 - 1 \quad \text{or/of} \quad = 1 - 2\left(\frac{-5}{13}\right)^2 \quad \text{or/of} \quad = \left(\frac{-12}{13}\right)^2 - \left(\frac{-5}{13}\right)^2$ $= \frac{119}{169} \quad \text{or/of} \quad = \frac{119}{169} \quad \text{or/of} \quad = \frac{119}{169}$	✓ value of r / waarde van r ✓ identity / identiteit ✓ substitution / substitusie ✓ answer/ antwoord (4)
5.1.2	$\sin(p - 45^\circ) = \sin p \cdot \cos 45^\circ - \cos p \cdot \sin 45^\circ$ $= \sin p \cdot \left(\frac{1}{\sqrt{2}}\right) - \cos p \cdot \left(\frac{1}{\sqrt{2}}\right) \quad \text{or} \quad = \sin p \cdot \left(\frac{\sqrt{2}}{2}\right) - \cos p \cdot \left(\frac{\sqrt{2}}{2}\right)$ $= \frac{\sin p - \cos p}{\sqrt{2}} \quad \text{or/of} \quad = \frac{\sqrt{2}\sin p - \sqrt{2}\cos p}{2}$ $= \frac{-\frac{5}{13} + \frac{12}{13}}{\sqrt{2}} \quad \text{or/of} \quad = \frac{\sqrt{2}}{2} \left(-\frac{5}{13} + \frac{12}{13}\right)$ $= \frac{7\sqrt{2}}{26} \quad \text{or/of} \quad = \frac{7\sqrt{2}}{26}$	✓ expansion / uitbreiding ✓ substitution / substitusie ✓ answer/antwoord (3)



5.2.1	$\sin(85^\circ + \theta)\cos(25^\circ + \theta) - \cos(85^\circ + \theta)\sin(25^\circ + \theta) = \sin[(85^\circ + \theta) - (25^\circ + \theta)]$ $= \sin 60^\circ$ $= \frac{\sqrt{3}}{2}$	✓ compound $\angle$ s/ saamgestelde $\angle$ e ✓ answer/antwoord (2)
5.2.2	$\sin 60^\circ = -\tan x$ $\tan x = -\frac{\sqrt{3}}{2}$ $x = 40,89334$ $x = 180^\circ - 40,89334 \dots\dots^\circ + k180^\circ \quad k \in \mathbb{Z}$ $x = 139,11^\circ + k180^\circ \quad k \in \mathbb{Z}$	✓ equating / stel gelyk ✓ ref/verw $\angle$ ✓ $x = 139,11^\circ$ ✓ $k \in \mathbb{Z}$ (4)
5.3	$\tan(-\theta)\sin(90^\circ + \theta) + \frac{\sin 2\theta}{2\cos(360^\circ + \theta)}$ $= -\tan\theta \cdot \cos\theta + \frac{\sin 2\theta}{2\cos\theta}$ $= -\frac{\sin\theta}{\cos\theta} \cdot \cos\theta + \frac{2\sin\theta \cdot \cos\theta}{2\cos\theta}$ $= -\sin\theta + \sin\theta$ $= 0$	✓ $-\tan\theta$ ✓ $\cos\theta$ ✓ $\cos\theta$ ✓ $2\sin\theta \cdot \cos\theta$ ✓ $-\frac{\sin\theta}{\cos\theta}$ ✓ answer/antwoord (6)
		[19]

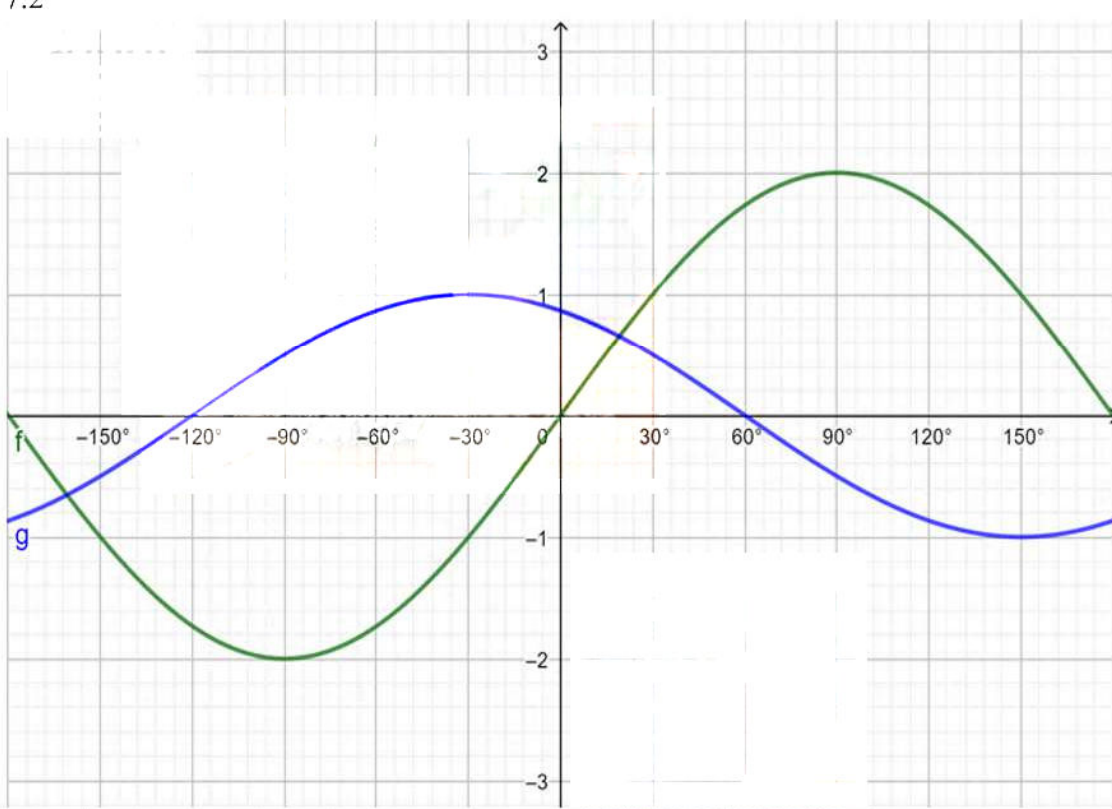


**QUESTION/VRAAG 6**

6.1.1	$\begin{aligned} \text{LHS} &= \frac{\cos^4 x + \sin^2 x \cdot \cos^2 x}{1 + \sin x} = 1 - \sin x \\ &= \frac{\cos^2 x (\cos^2 x + \sin^2 x)}{1 + \sin x} \\ &= \frac{\cos^2 x (1)}{1 + \sin x} \\ &= \frac{1 - \sin^2 x}{1 + \sin x} \\ &= \frac{(1 - \sin x)(1 + \sin x)}{1 + \sin x} \\ &= 1 - \sin x \\ \therefore \text{LHS} &= \text{RHS} \end{aligned}$	✓ common factor / gemeenskaplike faktor ✓ $\cos^2 x + \sin^2 x = 1$ ✓ $\cos^2 x = 1 - \sin^2 x$ ✓ factors / faktore (4)
6.1.2	$\begin{aligned} 1 + \sin x &= 0 \\ \therefore \sin x &= -1 \\ \therefore x &= 180^\circ + 90^\circ + k \cdot 360^\circ \quad k \in \mathbb{Z} \\ \therefore x &= 270^\circ + k \cdot 360^\circ \quad k \in \mathbb{Z} \end{aligned}$	✓ $\sin x = -1$ ✓ answer/antwoord (2)
6.1.3	$\begin{aligned} \therefore \text{minimum of /van } -\sin x &= -1 \\ \therefore \text{minimum of /van } -\sin x + 1 &= -1 + 1 = 0 \end{aligned}$	✓ substitution / substitusie ✓ answer/antwoord (2)
6.2	$\begin{aligned} \sin 3\theta &= \sin(2\theta + \theta) \\ &= \sin 2\theta \cos \theta + \cos 2\theta \sin \theta \\ &= 2 \sin \theta \cos \theta \cos \theta + (1 - 2 \sin^2 \theta) \sin \theta \\ &= 2 \sin \theta (1 - \sin^2 \theta) + \sin \theta - 2 \sin^3 \theta \\ &= 3 \sin \theta - 4 \sin^3 \theta \\ &= 3 \left(\frac{1}{3} \right) - 4 \left(\frac{1}{3} \right)^3 \\ &= \frac{23}{27} \end{aligned}$	✓ $\sin(2\theta + \theta)$ ✓ $2 \sin \theta \cos \theta$ & $1 - 2 \sin^2 \theta$ ✓ $1 - \sin^2 \theta$ ✓ Substitution / substitusie ✓ Answer/antwoord (5)
		[13]



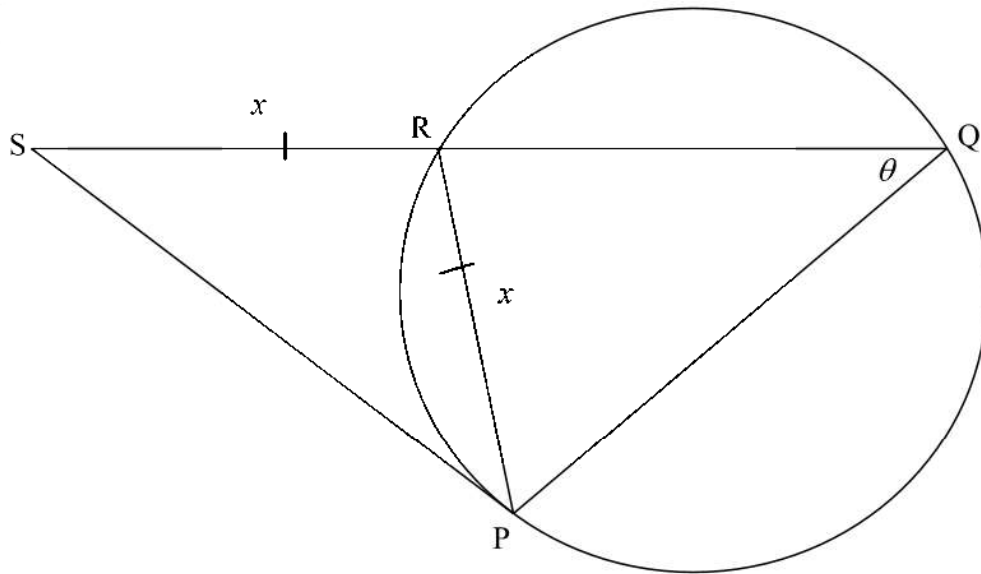
QUESTION/VRAAG 7

7.1	360°	✓ Answer/antwoord (1)
7.2		✓ x – intercept / afsnit ✓ Intersection/ snyding ✓ shape / vorm (3)
7.3	Reflection along the y – axis then shifted 60° to the right. Refleksie in die y -as en dan skuif 60° na regs. OR / OF Reflection along the x -axis then shifted 60° to the left. Refleksie in die y -as en dan skuif 60° na links. OR / OF Translation of 120 to the right / translasie 120 regs.	✓ Reflection y – axis ✓ shifted 60° to the right (2)
7.4	$x \leq -160,89^\circ$ or/of $x \geq 19,11^\circ$	✓ $x \leq -160,89^\circ$ ✓ $x \geq 19,11^\circ$ (2)
7.5	$-30^\circ < x < 0^\circ$	✓ End points / eindpunte ✓ Correct Interval / korrekte interval (2)
		[10]



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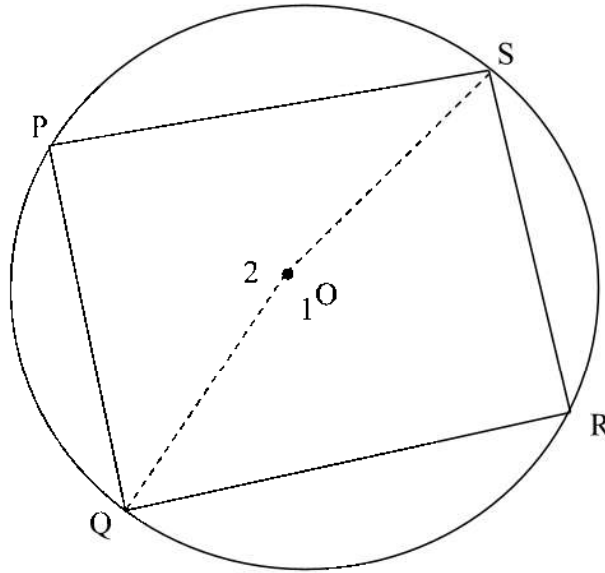
QUESTION/VRAAG 8

8	$\widehat{SPR} = \theta$ [tan-chord theorem/raaklyn koord stelling] $\widehat{SRP} = 180^\circ - 2\theta$ [sum of $\angle$'s of Δ /som van $\angle$ e van Δ] $PS^2 = SR^2 + PR^2 - 2SR.PR \cos \widehat{SRP}$ $= x^2 + x^2 - 2x^2 \cos (180^\circ - 2\theta)$ $= 2x^2 + 2x^2 \cos 2\theta$ $= 2x^2(1 + \cos 2\theta)$ $= 2x^2(1 + 2 \cos^2 \theta - 1)$ $= 2x^2(2 \cos^2 \theta)$ $= 4x^2 \cos^2 \theta$ $\therefore PS = 2x \cos \theta$	✓ S ✓ S ✓ cosine rule / kosinus reël ✓ substitution / substitusie ✓ common factor / gemeenskaplike faktor ✓ identity / identiteit (6)
		[6]



QUESTION/VRAAG 9

9.1



Construction / Konstruksie: Join / verbind OQ and/en OS.

$$\hat{O}_1 = 2\hat{P} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$$

$$\text{middelpunts } \angle = 2 \times \text{omtreks } \angle$$

$$\hat{O}_2 = 2\hat{R} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$$

$$\text{middelpunts } \angle = 2 \times \text{omtreks } \angle$$

but /maar $\hat{O}_1 + \hat{O}_2 = 360^\circ$ [$\angle$'s at a point / $\angle$ e om 'npunt]

$$\therefore 2\hat{P} + 2\hat{R} = 360^\circ$$

$$2(\hat{P} + \hat{R}) = 360^\circ$$

$$\therefore \hat{P} + \hat{R} = 180^\circ$$

✓ construction /
konstruksie

✓ S/B ✓ R

✓ S/B+R

✓ S/B ✓ R

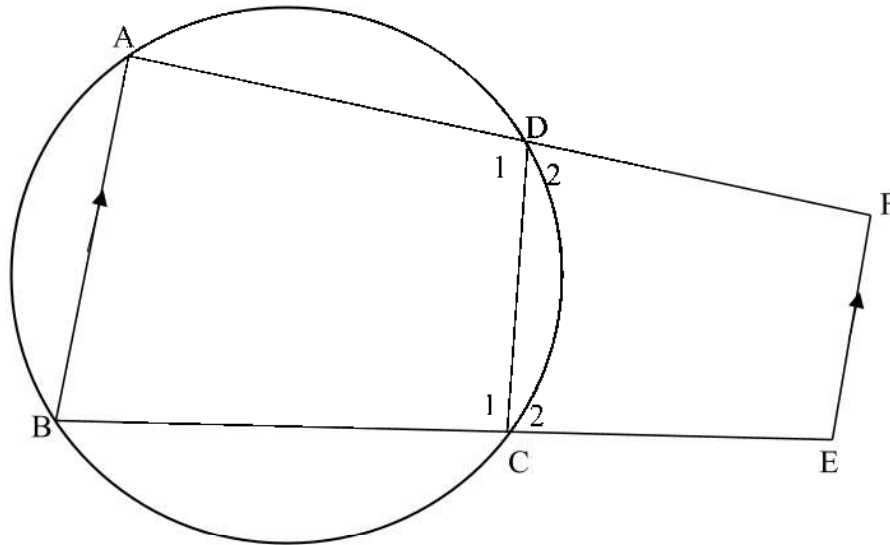
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9.2



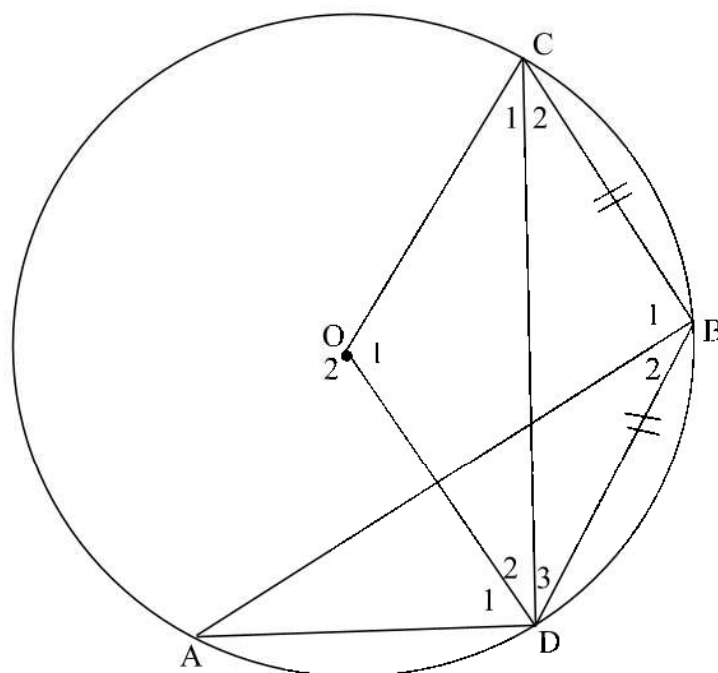
9.2	$\hat{D}_2 = \hat{B}$ but/maar $\hat{B} + \hat{E} = 180^\circ$ $\therefore \hat{D}_2 + \hat{E} = 180^\circ$ $\therefore$ CEFD is a cyclic quadrilateral CEFD is 'n koordevierhoek	[ext $\angle$ of cyclic quad]/ buite $\angle$ van koorde4 $\angle$ [co-int $\angle$'s /ko-binne $\angle$ e; AB FE] [converse opp $\angle$'s of a quad] buite $\angle$ van koordevierhoek omgekeerde	✓ S/B ✓ R ✓ S/B ✓ R ✓ R (5)
			[10]



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QUESTION/VRAAG 10

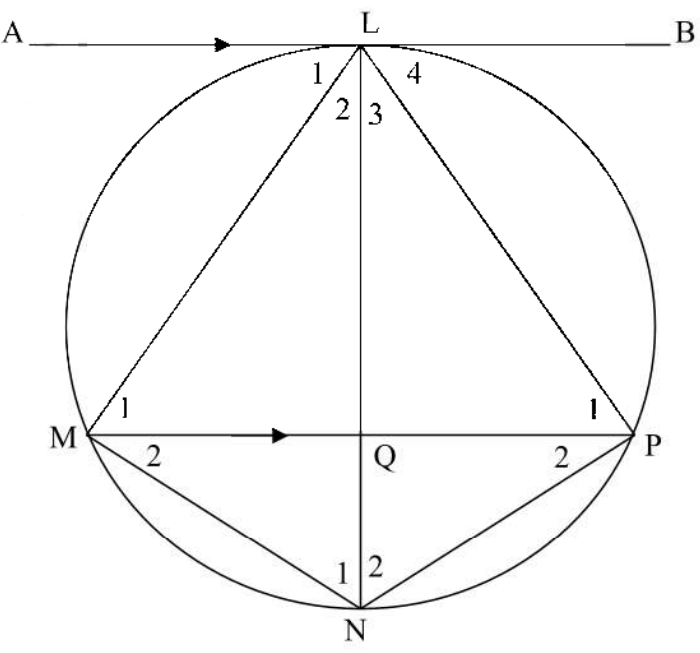


10.1.1		$\hat{A} = \hat{C}_2 = x$ [∠'s in the same seg / ∠e in selfde segment] $\hat{C}_2 = \hat{D}_3 = x$ [∠'s opp = sides / ∠e teenoor = sye]	✓ S/B ✓R ✓ S/B ✓R (4)
10.1.2	a)	$OC = OD$ [radii / radiusse] $\therefore \hat{C}_1 = \hat{D}_2$ [∠'s opp = sides / ∠e teenoor = sye] $\hat{C}_1 + \hat{D}_2 + \hat{O}_1 = 180^\circ$ [sum of ∠'s of Δ / som ∠e van Δ] $\hat{D}_2 + \hat{D}_2 + \hat{O}_1 = 180^\circ$ $\therefore 2\hat{D}_2 = 86^\circ$ $\therefore \hat{D}_2 = 43^\circ 7$	✓ S/B ✓R ✓ answer / antwoord (3)
	b)	$\hat{O}_1 + \hat{O}_2 = 360^\circ$ [∠'s round a point / ∠'e om 'n punt] $94^\circ + \hat{O}_2 = 360^\circ$ $\therefore \hat{O}_2 = 266^\circ$ $\hat{O}_2 = 2(\hat{B}_1 + \hat{B}_2)$ [∠ at centre = $2 \times \angle$ at circumference] middelpunts ∠ = $2 \times$ omtreks∠ $\therefore 266^\circ = 2(\hat{B}_1 + \hat{B}_2)$ $\therefore \hat{B}_1 + \hat{B}_2 = 133^\circ$	✓ S/B+R ✓ S/B ✓R ✓ answer/ antwoord (4)
	c)	$\hat{C}_2 = \hat{D}_3 = x$ [∠'s opp = sides / ∠e teenoor = sye] $\hat{B}_1 + \hat{B}_2 + \hat{C}_2 + \hat{D}_3 = 180^\circ$ [sum of ∠'s of Δ/som ∠e van Δ] $\therefore 133^\circ + x + x = 180^\circ$ $\therefore x = 23,5^\circ$	✓ S/B+R ✓ answer / antwoord (2)



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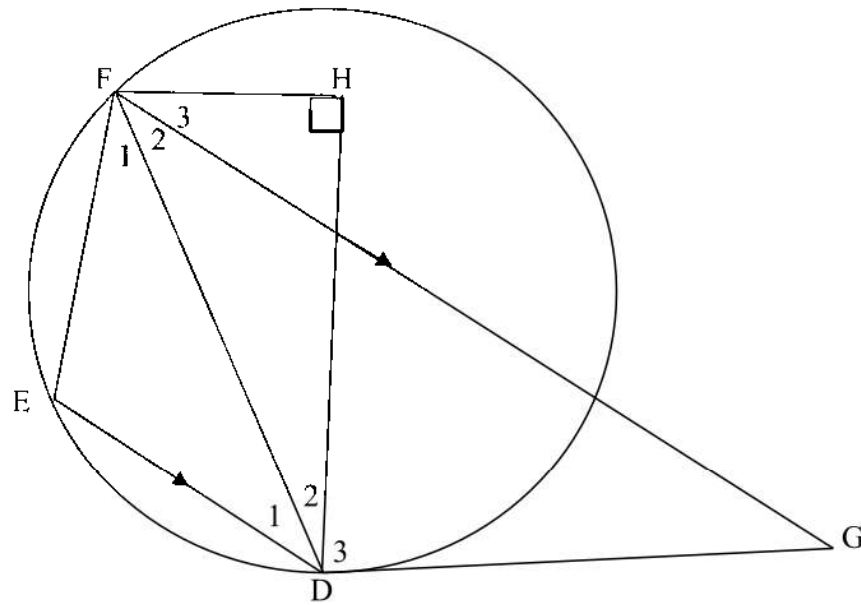
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10.2		
10.2.1	$\hat{L}_1 = \hat{M}_1$ [Alt $\angle$'s, verw $\angle$ e AB $\parallel$ MP] but $\hat{L}_1 = \hat{P}_1$ [tan – chord theorem / raaklyn koord stelling] $\therefore \hat{M}_1 = \hat{P}_1$ [both / beide = $\hat{L}_1$] $\therefore LM = LP$ [sides opp = $\angle$'s / sye teenoor = $\angle$ e]	$\checkmark$ S/B $\checkmark$ R $\checkmark$ S/B $\checkmark$ R (4)
10.2.2	$\hat{N}_2 = \hat{M}_1$ [$\angle$'s in the same seg / $\angle$ e in dieselfde segment] $\hat{N}_1 = \hat{P}_1$ [$\angle$'s in the same seg / $\angle$ e in dieselfde segment] but $\hat{M}_1 = \hat{P}_1$ [proven / bewys] $\therefore \hat{N}_1 = \hat{M}_1$ [both / beide = $\hat{P}_1$] $\therefore \hat{N}_1 = \hat{N}_1$ [both / beide = $\hat{M}_1$] $\therefore LN$ bisects / halveer $M\hat{N}P$	$\checkmark$ S/B $\checkmark$ R $\checkmark$ S/B+R $\checkmark$ S/B (4)
10.2.3	$\hat{N}_1 = \hat{M}_1$ [proven / bewys] $\therefore LM$ is a tangent to circle passing through MNQ, [converse tan – chord theorem] $\therefore LM$ is 'n raaklyn aan die sirkel duer MNQ [raaklyn koord stelling omgekeerde]	$\checkmark$ S/B $\checkmark$ R (2)
		[23]



SA EXAM PAPERS

Proudly South African

QUESTION / VRAAG 11

11.1	In $\triangle EDF$ and $\triangle DFG$: $\hat{E} = \hat{D}_2 + \hat{D}_3$ [tan-chord theorem] raaklyn koord stelling $\hat{D}_1 = \hat{F}_2$ [alt $\angle$'s / verw $\angle$e, $ED \parallel FG$] $\therefore \hat{F}_1 = \hat{G}$ [sum of $\angle$'s of $\triangle$ / som $\angle$e van $\triangle$] $\therefore \triangle FED \parallel \triangle GDF$ [$\angle\angle\angle$]	✓S /B ✓R ✓SB ✓R (4)
11.2	$\frac{FD}{GF} = \frac{DE}{FD}$ [From / uit $\parallel \triangle$'s] $\therefore FD^2 = DE \cdot GF$ In $\triangle FHD$ $FD^2 = FH^2 + HD^2$ [Pythagoras] $\therefore FH^2 + HD^2 = DE \cdot GF$	✓S/B ✓R ✓S (3)
		[7]
		TOTAL/TOTAAL:150

