



education
MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P2 / WISKUNDE V2
SEPTEMBER 2026
MARKING GUIDELINE/NASIENRIGLYNE

MARKS/PUNTE: 150

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

NOTE:

- If candidate answers a question TWICE, only answer the FIRST attempt
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version
- Consistent 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/MEETKUNDE	
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 if the statement is correct)
S/R	Award a mark if statement AND reason are both correct

QUESTION 1 / VRAAG 1

Area/Oppervlakte (x) in m ²	360	120	845	602	1190	530	245	486	350	1005	320	250
Time/Tyd (y) in minutes/minute	50	28	130	75	120	95	55	70	48	110	55	60

1.1	$\hat{y} = 0,09x + 28,14$	✓ 0,09 ✓ 28,14 ✓ Answer/Antwoord (3)
1.2	$r = 0,91$	✓ Answer/Antwoord (1)
1.3	Very strong positive / Baie sterk positief	✓ Answer/Antwoord (1)
1.4	$\hat{y} = 0,09(560) + 28,14$ $= 78,54$ Cost/Koste = $150 + 3(50)$ $= R300$	✓ Substitution/Substitusie ✓ 78,54 ✓ 3 ✓ R300 (4)

[9]

QUESTION 2 / VRAAG 2

Marks Punte	Frequency Frekwensie	Cumulative frequency Kumulatiewe frekwensie
$5 < x \leq 15$	4	
$15 < x \leq 25$	7	
$25 < x \leq 35$	m	21
$35 < x \leq 45$	11	
$45 < x \leq 55$	11	
$55 < x \leq 65$	8	
$65 < x \leq 75$	n	
Total	54	

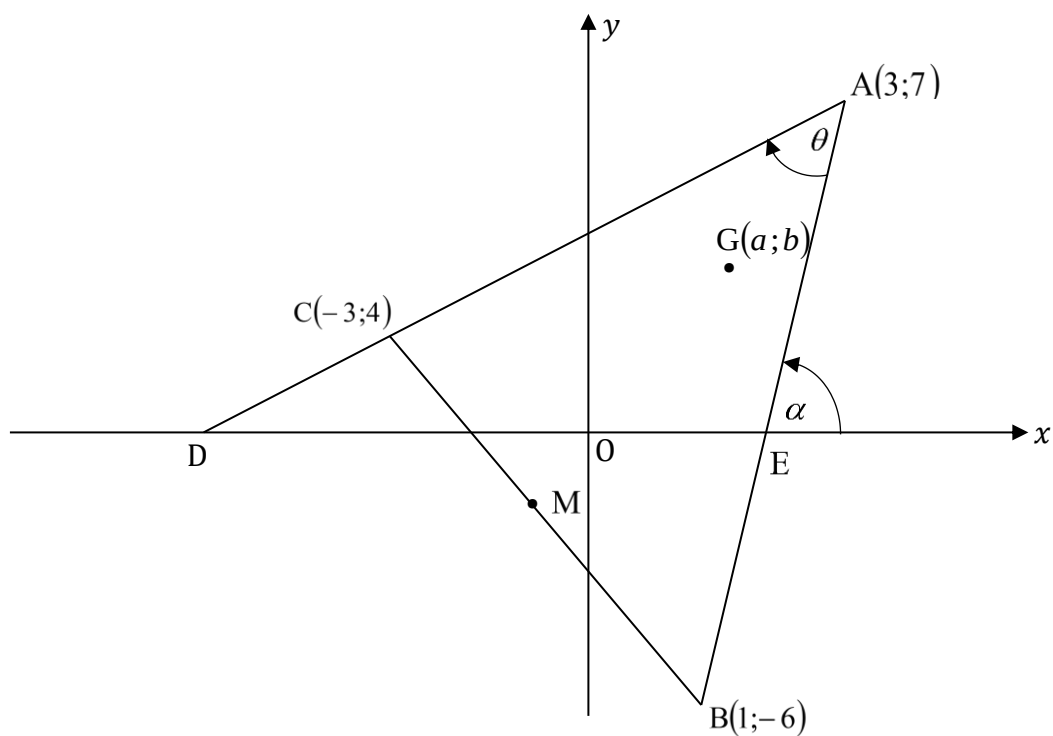
2.1	$m = 10$ $n = 3$	✓ $m = 10$ ✓ $n = 3$ (2)
-----	---------------------	--------------------------------

2.2	<table> <tr> <th>Marks Punte</th><th>Frequency Frekwensie</th><th>Cumulative frequency Kumulatiewe frekwensie</th></tr> <tr> <td>$5 < x \leq 15$</td><td>4</td><td>4</td></tr> <tr> <td>$15 < x \leq 25$</td><td>7</td><td>11</td></tr> <tr> <td>$25 < x \leq 35$</td><td>10</td><td>21</td></tr> <tr> <td>$35 < x \leq 45$</td><td>11</td><td>32</td></tr> <tr> <td>$45 < x \leq 55$</td><td>11</td><td>43</td></tr> <tr> <td>$55 < x \leq 65$</td><td>8</td><td>51</td></tr> <tr> <td>$65 < x \leq 75$</td><td>3</td><td>54</td></tr> <tr> <td>Total/Totaal</td><td>54</td><td></td></tr> </table>	Marks Punte	Frequency Frekwensie	Cumulative frequency Kumulatiewe frekwensie	$5 < x \leq 15$	4	4	$15 < x \leq 25$	7	11	$25 < x \leq 35$	10	21	$35 < x \leq 45$	11	32	$45 < x \leq 55$	11	43	$55 < x \leq 65$	8	51	$65 < x \leq 75$	3	54	Total/Totaal	54		✓ 1 st / _e 4 CF/KF ✓ Last/laaste 3 CF/KF (2)
Marks Punte	Frequency Frekwensie	Cumulative frequency Kumulatiewe frekwensie																											
$5 < x \leq 15$	4	4																											
$15 < x \leq 25$	7	11																											
$25 < x \leq 35$	10	21																											
$35 < x \leq 45$	11	32																											
$45 < x \leq 55$	11	43																											
$55 < x \leq 65$	8	51																											
$65 < x \leq 75$	3	54																											
Total/Totaal	54																												

2.3		✓ Grounded/Gegron ✓ Plot upper boundaries / Plot boonste grense ✓ Smooth Curve/ Gladde kurwe (3)
-----	--	---

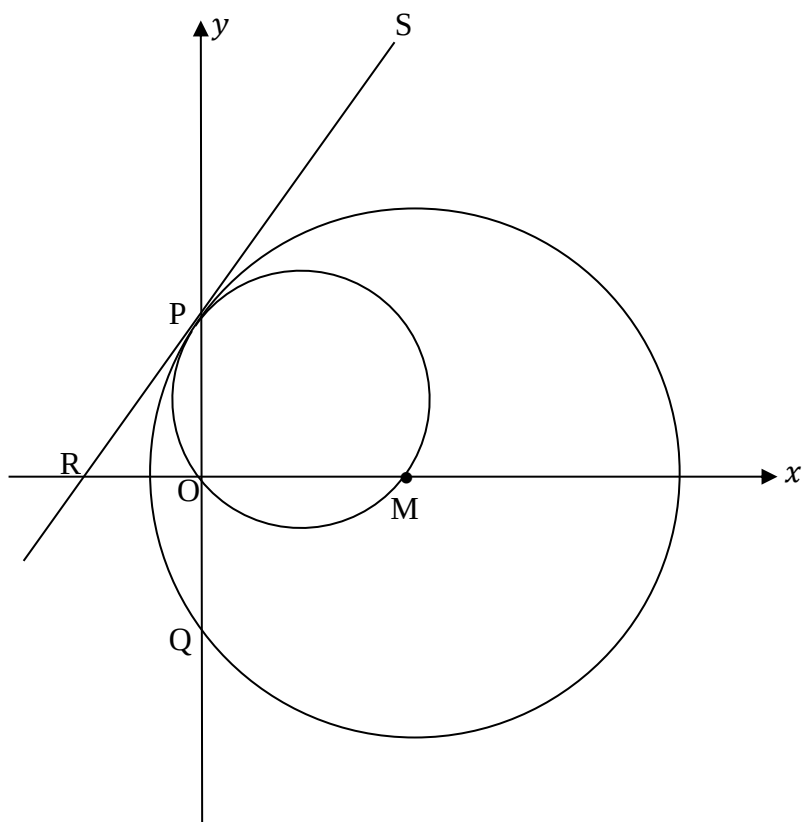
2.4	$P_{25} = 27,5$ marks / punte	✓ Answer/Antwoord
-----	-------------------------------	----------------------

			(1)
2.5	$\bar{x} = \frac{(10)(4) + (20)(7) + (30)(10) + (40)(11) + (50)(11) + (60)(8) + (70)(3)}{54}$ $= 40 \text{marks/ punte}$ $\sigma = 16,33 \text{marks/ punte}$	✓ Method/ Metode ✓ 40 marks/ punte ✓ 16,33 marks/ punte	(3)
			[11]

QUESTION 3 / VRAAG 3

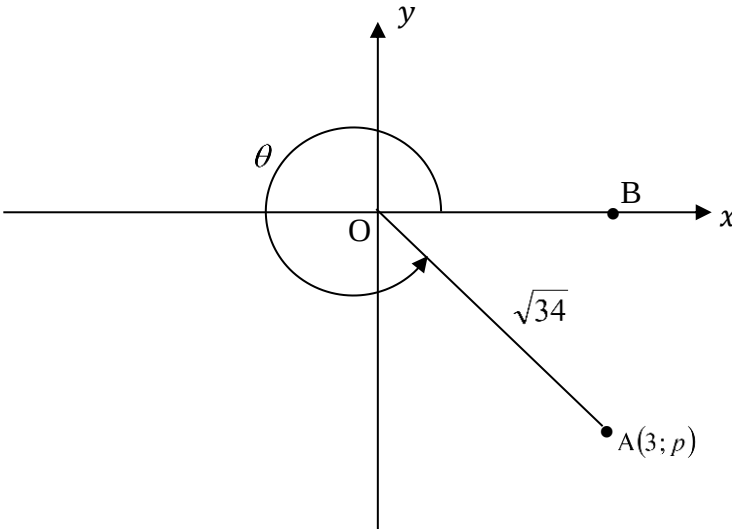
3.1		$m_{AD} = \frac{7-4}{3-(-3)}$ $= \frac{1}{2}$	✓ Substitution/Substitusie ✓ Answer/Antwoord (2)
3.2		$y-7 = \frac{1}{2}(x-3)$ $\therefore y = \frac{1}{2}x + \frac{11}{2}$	✓ Substitution/Substitusie ✓ Answer /Antwoord (2)
3.3		$y = \frac{1}{2}x + \frac{11}{2}$ $0 = \frac{1}{2}x + \frac{11}{2}$ $x = -11$ $D(-11;0)$ $AD = \sqrt{(3-(-11))^2 + (7-0)^2}$ $= 7\sqrt{5} = 15,65$	✓ Substitution/Substitusie ✓ $x = -11$ ✓ Substitution/Substitusie ✓ Answer /Antwoord (4)
3.4		$M\left(\frac{-3+1}{2}; \frac{4-6}{2}\right)$ $M(-1;-1)$	✓ Substitution/Substitusie ✓ Answer/Antwoord (2)

3.5		$\tan \hat{A}DE = m_{AD} = \frac{1}{2}$ $\hat{A}DE = 26,56^\circ$ $m_{AB} = \frac{7 - (-6)}{3 - 1}$ $= \frac{13}{2}$ $\tan \alpha = \frac{13}{2}$ $\alpha = 81,25^\circ$ $\theta + 26,56^\circ = 81,25^\circ$ $\theta = 54,69^\circ \approx 55^\circ$	$\checkmark \hat{A}DE = 26,56^\circ$ $\checkmark$ Substitution/Substitusie $\checkmark m_{AB} = \frac{13}{2}$ $\checkmark \alpha = 81,25^\circ$ $\checkmark \theta = 55^\circ$
3.6		$m_{AM} = m_{AG}$ $\frac{7 - (-1)}{3 - (-1)} = \frac{7 - b}{3 - a}$ $2 = \frac{7 - b}{3 - a}$ $b = 2a + 1$ $GC^2 = (a - (-3))^2 + (b - 4)^2$ $(\sqrt{17})^2 = (a + 3)^2 + (2a + 1 - 4)^2$ $17 = a^2 + 6a + 9 + 4a^2 - 12a + 9$ $5a^2 - 6a + 1 = 0$ $(5a - 1)(a - 1) = 0$ $a = \frac{1}{5}$ or/of $a = 1$ $b = \frac{7}{5}$ or/of $b = 3$	$\checkmark b = 2a + 1$ $\checkmark$ Substitution/Substitusie $\checkmark$ Standard form/Standaardvorm $\checkmark$ Factors/Faktore $\checkmark$ Values/Waardes of/van a $\checkmark$ Values/Waardes van b
			[21]

QUESTION 4/ VRAAG 4

4.1	$x^2 - 8x + y^2 = 9$ $x^2 - 8x + 16 + y^2 = 25$ $(x - 4)^2 + (y - 0)^2 = 25$ $M(4; 0)$	$\checkmark (x - 4)^2 + y^2 = 25$ $\checkmark M(4; 0)$ (2)
4.2	$x^2 - 8x + y^2 = 9$ $(0)^2 - 8(0) + y^2 = 9$ $y = \pm 3$ $PQ = 6 \text{ units / eenhede}$ OR/OF $0 = \frac{0+x_Q}{2}; 0 = \frac{3+y_Q}{2}$ $Q(0; -3)$ $PQ = 6 \text{ units / eenhede}$	$\checkmark$ Substitution/Substitusie $\checkmark$ Answer/Antwoord (2) OR/OF $\checkmark$ Substitution/Substitusie $\checkmark$ Answer/Antwoord (2)
4.3	$(0 - 4)^2 + y^2 = 25$ $y^2 = 9$ $y = 3$ $P(0; 3)$ $m_{PM} = \frac{0 - 3}{4 - 0} = -\frac{3}{4}$	$\checkmark y = 3$ $\checkmark$ Substitution/Substitusie $\checkmark m_{PM} = -\frac{3}{4}$

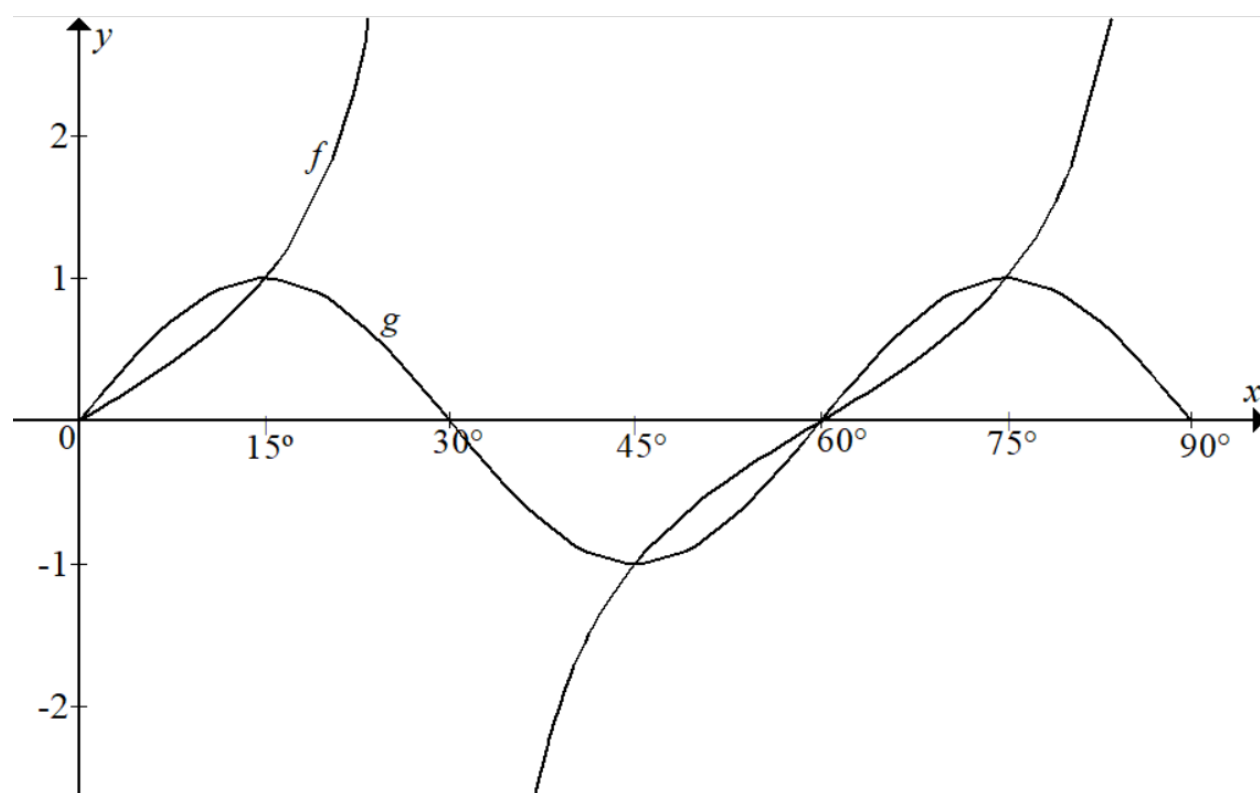
		$m_{\text{tangent/raaklyn}} = \frac{4}{3}$ $y = \frac{4}{3}x + 3$	✓ $m_{\text{tangent/raaklyn}} = \frac{4}{3}$ ✓ Answer/Antwoord (5)
4.4		$y = \frac{4}{3}x + 3$ $0 = \frac{4}{3}x + 3$ $x = -\frac{9}{4}$ $R\left(-\frac{9}{4}; 0\right)$ $RP^2 = \left(0 - \left(-\frac{9}{4}\right)\right)^2 + (3 - 0)^2$ $RP^2 = \frac{81}{16} + 9$ $RP^2 = \frac{225}{16}$ $RP = \frac{15}{4}$ Area/Opp of/van $\triangle PRM = \frac{1}{2}(RP)(PM)$ $= \frac{1}{2}\left(\frac{15}{4}\right)(5)$ $= \frac{75}{8} = 9,34$	✓ $x = -\frac{9}{4}$ ✓ Substitution/Substitusie ✓ $RP = \frac{15}{4}$ ✓ Answer/Antwoord (4)
4.5		$M_{PM}\left(\frac{4+0}{2}; \frac{3+0}{2}\right)$ $M_{PM}\left(2; \frac{3}{2}\right)$ $(0 - 2)^2 + \left(3 - \frac{3}{2}\right)^2 = r^2$ $r^2 = \frac{25}{4}$ $(x - 2)^2 + \left(y - \frac{3}{2}\right)^2 = \frac{25}{4}$	✓ $M_{PM}\left(2; \frac{3}{2}\right)$ ✓ $(x - 2)^2 + \left(y - \frac{3}{2}\right)^2$ ✓ $r^2 = \frac{25}{4}$ (3)
4.6		P, M and P' are collinear/is koliniêr $P'(4; 0)$ $r = 5$ Maximum distance/Maksimum afstand = 5units /eenhede	✓ P, M and P' are collinear/ /is koliniêr ✓ $P'(4; 0)$ ✓ Answer/Antwoord (3)
			[19]

QUESTION 5 / VRAAG 5			
5.1	$\cos(P + Q) = \sin[90^\circ - (P + Q)]$ $= \sin[(90^\circ - P) - Q]$ $= \sin(90^\circ - P)\cos Q - \cos(90^\circ - P)\sin Q$ $= \cos P \cos Q - \sin P \sin Q$	✓ $\sin(90^\circ - (P + Q))$ ✓ $\sin((90^\circ - P) - Q)$ ✓ Expansion	(3)
			
5.2.1	$(3)^2 + (p)^2 = (\sqrt{34})^2$ $p = -5$	✓ Subst. Pyth. ✓ Answer/Antwoord	(2)
5.2.2	$\cos(60^\circ + \theta)$ $= \cos 60^\circ \cos \theta - \sin 60^\circ \sin \theta$ $= \left(\frac{1}{2}\right)\left(\frac{3}{\sqrt{34}}\right) - \left(\frac{\sqrt{3}}{2}\right)\left(\frac{-5}{\sqrt{34}}\right)$ $= \frac{3+5\sqrt{3}}{2\sqrt{34}}$	✓ Expansion/Brei uit ✓ Special Angles/Spesiale hoeke ✓ Substitution/Substitusie ✓ Answer/Antwoord	(4)
5.3	$\sin 50^\circ = \sin 145^\circ \cos(360^\circ - k) - \sin(-375^\circ) \cos(-35^\circ)$ $\sin 50^\circ = \sin 35^\circ \cos k - [-\sin 375^\circ \cos 35^\circ]$ $\sin 50^\circ = \sin 35^\circ \cos k + \sin 15^\circ \cos 35^\circ$ $\therefore k = 15^\circ$	✓ $\sin 35^\circ$ ✓ $\cos k$ ✓ $\sin 15^\circ$ ✓ $\cos 35^\circ$ ✓ Answer/Antwoord	(5)
5.4	$\text{LHS} = 4\cos\theta - \frac{1+\cos 2\theta}{\cos\theta}$ $= \frac{4\cos^2\theta - (1+\cos 2\theta)}{\cos\theta}$ $= \frac{4\cos^2\theta - 1 - (2\cos^2\theta - 1)}{\cos\theta}$	✓ Single Fraction/Enkel breuk ✓ $2\cos^2\theta - 1$	

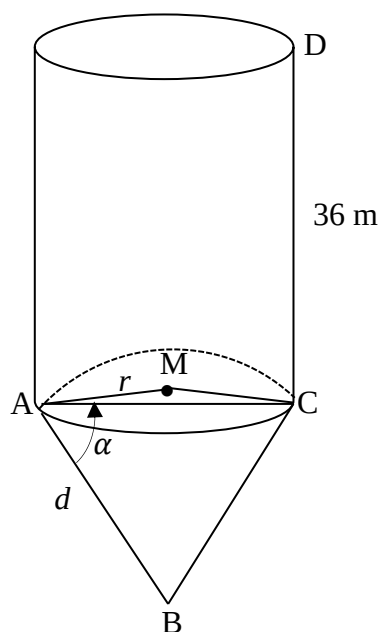
	$= \frac{2\cos^2\theta}{\cos\theta}$ $= 2\cos\theta$ $\text{RHS} = \frac{\sin 2\theta}{\sin\theta}$ $= \frac{2\sin\theta\cos\theta}{\sin\theta}$ $= 2\cos\theta$	✓ Simplification/Vereenvoudig ✓ $2\sin\theta\sin$ (4)
5.5	$2\cos x = 3\tan x$ $2\cos x = \frac{3\sin x}{\cos x}$ $2\cos^2 x = 3\sin x$ $2(1 - \sin^2 x) = 3\sin x$ $2 - 2\sin^2 x = 3\sin x$ $2\sin^2 x + 3\sin x - 2 = 0$ $(2\sin x - 1)(\sin x + 2) = 0$ $\sin x = \frac{1}{2} \text{ or /of } \sin x = -2 \text{ Invalid/Ongeldig}$ $x = 30^\circ + k \cdot 360^\circ; k \in \mathbb{Z} \text{ or/of}$ $x = 150^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$	✓ $\frac{3\sin x}{\cos x}$ ✓ $1 - \sin^2 x$ ✓ Standard form/Standaard vorm ✓ Equation/Vergelyking ✓ $x = 30^\circ$ or/of $x = 150^\circ$ ✓ $k \cdot 360^\circ; k \in \mathbb{Z}$ (6)
5.6	$\cos 45^\circ = 1 - 2\sin^2 22,5^\circ$ $\frac{\sqrt{2}}{2} = 1 - 2\sin^2 22,5^\circ$ $\sin^2 22,5^\circ = \frac{1 - \frac{\sqrt{2}}{2}}{2}$ $= \frac{2 - \sqrt{2}}{4}$ $3 - 4\sin^2 22,5^\circ = 3 - 4\left(\frac{2 - \sqrt{2}}{4}\right)$ $= 3 - 2 + \sqrt{2}$ $= 1 + \sqrt{2}$ OR/OF $\sin^2 22,5^\circ = \frac{1 - \cos 45^\circ}{2}$ $\sin^2 22,5^\circ = \frac{1 - \frac{\sqrt{2}}{2}}{2}$ $= \frac{2 - \sqrt{2}}{4}$ $3 - 4\sin^2 22,5^\circ = 3 - 4\left(\frac{2 - \sqrt{2}}{4}\right)$ $= 1 + \sqrt{2}$	✓ $\cos 45^\circ = 1 - 2\sin^2 22,5^\circ$ ✓ Special Angle/Spesiale hoek ✓ Substitution/Substitusie ✓ Answer/Antwoord (4) OR ✓ $\sin^2 22,5^\circ = \frac{1 - \cos 45^\circ}{2}$ ✓ Special Angle ✓ Substitution/Substitusie ✓ Answer/Antwoord (4)
		[28]

QUESTION 6 / VRAAG 6

6.1

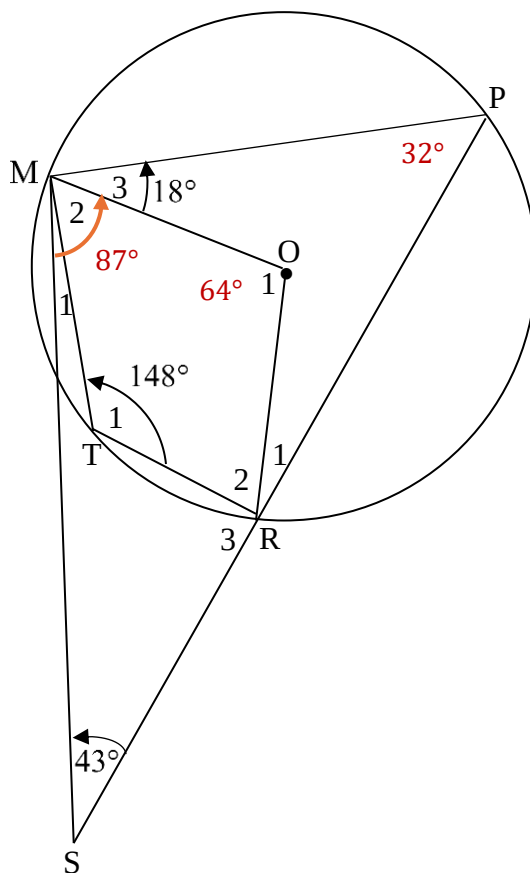


6.1.1	60°	✓ Answer /Antwoord (1)
6.1.2	$x = 30^\circ$ $x = 90^\circ$	✓ $x = 30^\circ$ ✓ $x = 90^\circ$ (2)
6.1.3	$0^\circ \leq x \leq 15^\circ$ or/of $30^\circ < x \leq 45^\circ$	✓ $0^\circ \leq x \leq 15^\circ$ ✓ $30^\circ < x \leq 45^\circ$ (2)
6.2.1	The graph of $y = \sin 6x$ has been translated 10° to the right. Die grafiek van $y = \sin 6x$ het 10° regs geskuif.	✓ 10° ✓ to the right / regs (2)
6.2.2	$p(x) = -2 \sin(6x - 60^\circ) + 1$ $y \in [-2, 2]$ OR/OF $-2 \leq y \leq 2$ Range/Waardeversameling: $y \in [-2 + 1; 2 + 1]$ $y \in [-1; 3]$ OR/OF Range/Waardeversameling: $-1 \leq y \leq 3$	✓ $y \in [-2; 2]$ ✓✓ $y \in [-1; 3]$ (3)
		[10]

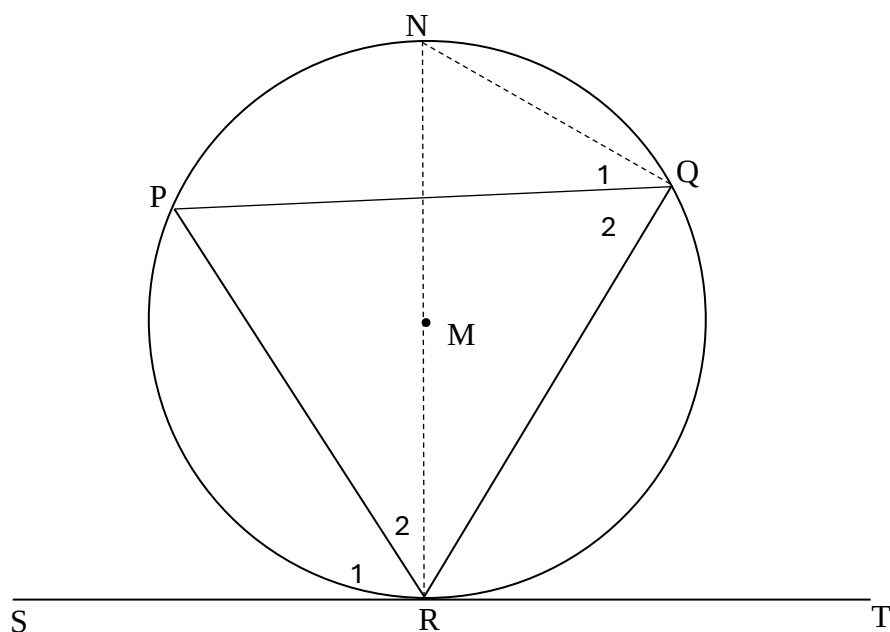
QUESTION 7 / VRAAG 7

7.1	$AB = BC = d$ tans from common pt / raaklyne uit dieselfde punt $\hat{A}CB = \alpha$ $\angle$ s opp = sides / $\angle$ e teenoor = e sye $\hat{B} = 180^\circ - 2\alpha$ sum of $\angle$ s in Δ / binne $\angle$ e van Δ	$\checkmark \hat{A}CB = \alpha$ $\checkmark \hat{B} = 180^\circ - 2\alpha$ (2)
7.2	$AC^2 = AB^2 + BC^2 - 2AB \cdot BC \cos B$ $AC^2 = d^2 + d^2 - 2d \cdot d \cos(180^\circ - 2\alpha)$ $AC^2 = 2d^2 - 2d^2(-\cos 2\alpha)$ $AC^2 = 2d^2 + 2d^2 \cos 2\alpha$ $AC^2 = 2d^2 + 2d^2(2\cos^2 \alpha - 1)$ $AC^2 = 4d^2 \cos^2 \alpha$ $\therefore AC = 2d \cos \alpha$	$\checkmark$ Cosine rule / cosreël $\checkmark -\cos 2\alpha$ $\checkmark 2\cos^2 \alpha - 1$ $\checkmark AC^2 = 4d^2 \cos^2 \alpha$ (4)
7.3	<i>In ΔACM:</i> $\hat{AMC} = 108^\circ$ opp $\angle$ s of cyclic quad / teenoorst $\angle$ e van koordevierhoek $AM = MC = r$ radii / radiusse $\hat{MAC} = 36^\circ$ sum of $\angle$ s in Δ / binne $\angle$ e van Δ $AC = 2r \cos(\hat{MAC})$ $12,22 = 2r \cos 36^\circ$ $r = \frac{12,22}{2 \cos 36^\circ} = 7,55 m$ OR/OF	$\checkmark \hat{AMC} = 108^\circ$ $\checkmark \hat{MAC} = 36^\circ$ $\checkmark 12,22 = 2r \cos 36^\circ$ (3) OR/OF

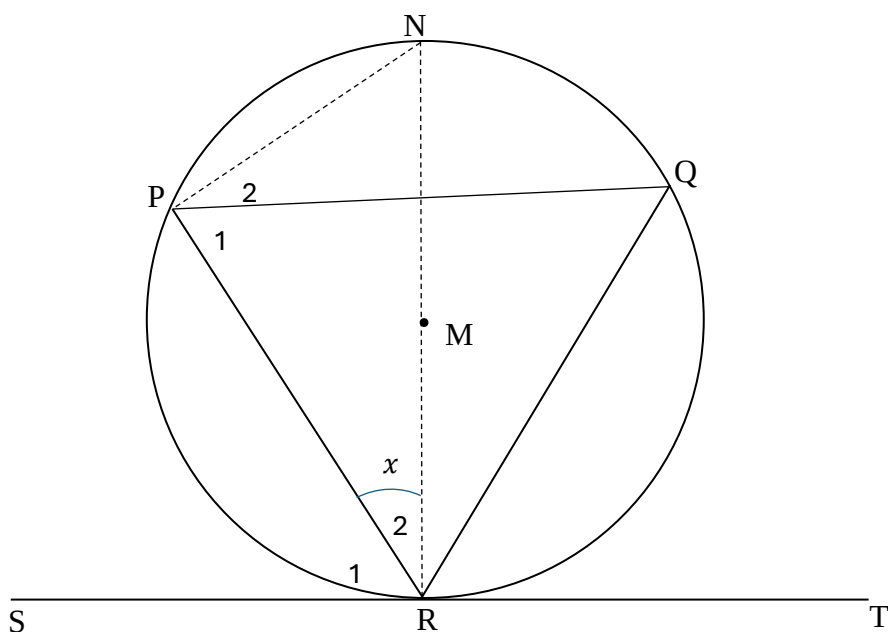
	$\hat{AMC} = 108^\circ$ opp $\angle$ s of cyclic quad/ teenoorst $\angle$ e van koordevierhoek $AM = MC = r$ radii/radiusse $\hat{MAC} = 36^\circ$ sum of $\angle$ s in Δ / binne $\angle$ e van Δ $\frac{r}{\sin 36^\circ} = \frac{12,22}{\sin 108^\circ}$ $r = \frac{12,22 \sin 36^\circ}{\sin 108^\circ} = 7,5523753425 \dots$ $\therefore r = 5,55m$ as required/soos gevra. OR/OF $\hat{AMC} = 108^\circ$ opp $\angle$ s of cyclic quad/ teenoorst $\angle$ e van koordevierhoek $AM = MC = r$ radii/radiusse $AC^2 = r^2 + r^2 - 2r \cdot r \cos 108^\circ$ $(12,22)^2 = r^2 + r^2 - 2r^2 \cos 108^\circ$ $149,3284 = 2r^2 - 2r^2 \cos 108^\circ$ $r^2(2 - 2 \cos 108^\circ) = 149,3284$ $r = \sqrt{\frac{149,3284}{2 - 2 \cos 108^\circ}}$ $\therefore r = 7,55m$ as required/soos gevra.	$\checkmark \hat{AMC} = 108^\circ$ $\checkmark \hat{MAC} = 36^\circ$ $\checkmark \frac{r}{\sin 36^\circ} = \frac{12,22}{\sin 108^\circ}$ (3) OR/OF $\checkmark \hat{AMC} = 108^\circ$ $\checkmark$ Substitution into Cosine Rule /Substitusie in Cos-reël $\checkmark$ simplification/vernoudig (3)
7.4	$V = \pi r^2 h$ $= \pi(7,55)^2(36)$ $= 6446,83m^3$ $= 6\,447\,m^3$	$\checkmark$ Substitution into correct formula /Substitusie in korrekte formule $\checkmark$ Answer/Antwoord (2)
		[11]

QUESTION 8 / VRAAG 8

8.1	$\hat{P} = 32^\circ$ opp $\angle$ s of cyclic quad / teenoorst $\angle$ e van koordevierhoek	✓S ✓R	(2)
8.2	$\hat{O}_1 = 2\hat{P}$ $= 64^\circ$ $\angle$ at centre = 2 $\angle$ at circumference /middelpunts $\angle$ = 2x omtreks $\angle$	✓S ✓R	(2)
8.3	$\hat{PMS} + 43^\circ + 32^\circ = 180^\circ$ sum $\angle$ s of $\triangle MPS$ /binne $\angle$ e van $\triangle MPS$ $\hat{PMS} = 105^\circ$ $\therefore \hat{OMS} = 87^\circ$	✓ $\hat{PMS} = 105^\circ$ ✓ $\hat{OMS} = 87^\circ$	(2)
8.4	$\hat{PMT} = 105^\circ - 6^\circ = 99^\circ$ $\hat{R}_3 = \hat{PMT} = 99^\circ$ ext $\angle$ of cyclic quad / buite $\angle$ van koordevierhoek	✓ $\hat{PMT} = 99^\circ$ ✓S/R	(2)
			[8]

QUESTION 9 / VRAAG 9

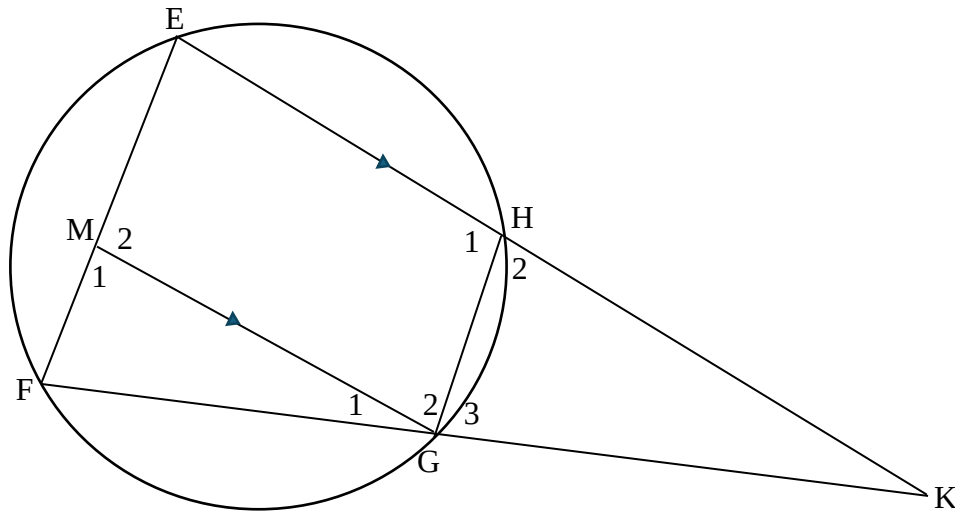
9.1	Construction: Draw diameter RMN and join NQ. Konstruksie: Teken middellyn RMN en verbind NQ. $\hat{R}_1 + \hat{R}_2 = 90^\circ \mid \tan \perp \text{radius/ raaklyn} \perp \text{radius}$ $\hat{Q}_1 + \hat{Q}_2 = 90^\circ \mid \angle s \text{ in the semi-circle / } \angle e \text{ in halfsirkel}$ $\hat{R}_2 = \hat{Q}_1 \mid \angle s \text{ in the same seg/ } \angle e \text{ in dieselfde sirkelsegment}$ $\hat{R}_1 + \hat{R}_2 = \hat{Q}_1 + \hat{Q}_2 \mid = 90^\circ$ $\therefore \hat{R}_2 = \hat{Q}_2$ Hence/Vervolgens $\hat{P}RS = \hat{P}QR$ as required. /soos gevra	✓Construction/Konstruksie ✓S ✓R ✓S/R ✓S/R (5)

QUESTION 9 / VRAAG 9

9.1	Construction: Draw diameter RMN and join NP. Konstruksie: Teken middellyn RMN en verbind NP. Let/Laat $\hat{R}_2 = x$ $\hat{R}_1 = 90^\circ - x$ $\tan \perp$ radius / raaklyn $\perp$ radius $\hat{N} + \hat{NPR} + \hat{R}_2 = 180^\circ$ sum of $\angle$s in Δ / binne $\angle$e van Δ $\hat{N} = 90^\circ - x$ $\hat{Q} = \hat{N}$ $\angle$s in the same seg / $\angle$e in dieselfde sirkelsegment $\hat{R}_2 = \hat{N}$ $= 90^\circ - x$ Hence/Vervolgens $\hat{PRS} = \hat{PQR}$ as required. /soos gevra	✓Construction/Konstruksie ✓S ✓R ✓S/R ✓S/R (5)

9.2		
9.2.1	$\hat{A}_1 = \hat{B}_1 = x$ tan-chord theorem/raaklyn koord stelling $\hat{A}_2 = \hat{B}_1 = x$ $\angle$ s opp = sides / $\angle$ e teenoor = e sye $\hat{B}_2 = \hat{A}_2 = x$ tan-chord theorem/ raaklyn koord stelling $\hat{B}_1 = \hat{C} = x$ corresp $\angle$ s / ooreenkomstige $\angle$ e, $DC \parallel FB$ $\hat{B}_2 = \hat{D}_1 = x$ alt $\angle$ s / verwisselende $\angle$ e, $DC \parallel FB$	$\checkmark$ S/R $\checkmark$ S/R $\checkmark$ S $\checkmark$ S $\checkmark$ R $\checkmark$ S/R
9.2.2	$\hat{D}_1 = \hat{A}_2$ proven/ bewys ABED is a cyclic quadrilateral converse $\angle$ s in the same seg ABED is 'n koordevierhoek omgekeerde $\angle$ e in dieselfde sirkelsegment.	$\checkmark \hat{D}_1 = \hat{A}_2$ $\checkmark$ R
9.2.3	$\hat{A}_1 = \hat{B}_3 = x$ $\angle$ s in the same seg / $\angle$ e in dieselfde sirkelsegment $\hat{A}\hat{B}\hat{E} = \hat{B}_1 + \hat{B}_2 + \hat{B}_3$ maar/but $\hat{B}_1 = \hat{B}_2 = \hat{B}_3 = \hat{A}_1 = x$ $\therefore \hat{A}\hat{B}\hat{E} = 3\hat{A}_1$	$\checkmark$ S/R $\checkmark$ S
9.2.4	$\hat{D}_1 = \hat{C} = x$ $BC = BD$ sides opp = $\angle$ /sye teenoor = e $\angle$ e $AD = BD$ tans from common pt / raaklyne uit dieselfde punt	$\checkmark \hat{D}_1 = \hat{C}$ $\checkmark$ S/R $\checkmark$ S/R

	$\therefore AD = BC \quad \quad = BD$	
9.3	$\frac{AF}{FE} = \frac{AB}{BC} = \frac{2}{3} \quad \quad \text{prop theorem/eweredigheidstelling, FB EC}$ $\frac{\text{Area of/van } \triangle FAB}{\text{Area of/van } \triangle EAC} = \frac{\frac{1}{2}AF \cdot AB \sin A_2}{\frac{1}{2}AE \cdot AC \sin A_2}$ $= \frac{\frac{1}{2}(2)(2)\sin A_2}{\frac{1}{2}(5)(5)\sin A_2}$ $= \frac{4}{25}$	✓S ✓R ✓ $\frac{\frac{1}{2}AF \cdot AB \sin A_2}{\frac{1}{2}AE \cdot AC \sin A_2}$ ✓ Answer/Antwoord (4)
		[22]

QUESTION 10 / VRAAG 10

10.1.1	In $\triangle KGH$ and/en $\triangle KEF$: $\hat{K} = \hat{K}$ common/gemeenskaplik $\hat{G}_3 = \hat{E}$ ext $\angle$ of cyclic quad/buite$\angle$ van koordevierhoek $\hat{H}_2 = \hat{F}$ ext $\angle$ of cyclic quad/buite$\angle$ van koordevierhoek $\therefore KGH \parallel \triangle KEF$ equiangular/AAA//gelykhoekig/HHH	✓S ✓S/R ✓R (3)
10.1.2	$\frac{EF}{GH} = \frac{KE}{KG}$ $\parallel \Delta$s /e $EF \cdot KG = KE \cdot GH$ But $KG = EF$ given/gegee $\therefore EF^2 = KE \cdot GH$	✓ $\frac{EF}{GH} = \frac{KE}{KG}$ ✓R ✓ $EF \cdot KG = KE \cdot GH$ or/of Substituting/Vervang $KG = EF$ (3)
10.1.3	$\frac{EF}{EM} = \frac{KF}{KG}$ prop theorem/eweredigheidsstelling, $MG \parallel EK$ $EF \cdot KG = EM \cdot KF$ $\therefore KG^2 = EM \cdot KF$	✓ $\frac{EF}{EM} = \frac{KF}{KG}$ ✓ $EF \cdot KG = EM \cdot KF$ or/of Substituting/Vervang $KG = EF$ (2)
10.2	$KE \cdot GH = EM \cdot KF$ $20 \times 4 = EM \times 16$ $\therefore EM = 5 \text{ units / eenhede}$	✓ $KE \cdot GH = EM \cdot KF$ ✓ Substitution/Vervanging ✓ Answer/Antwoord (3)
		[11]
TOTAL: 150		