



education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

**NATIONAL SENIOR CERTIFICATE/
*NASIONALE SENIOR SERTIFIKAAT***

GRADE/*GRAAD* 12

MATHEMATICS P2/*WISKUNDE V2*

SEPTEMBER 2026

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

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

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 the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the Marking Guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die Nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

QUESTION/VRAAG 1

60	62	63	63	67	68	70
71	73	76	76	77	78	79
79	80	80	80	82	82	84

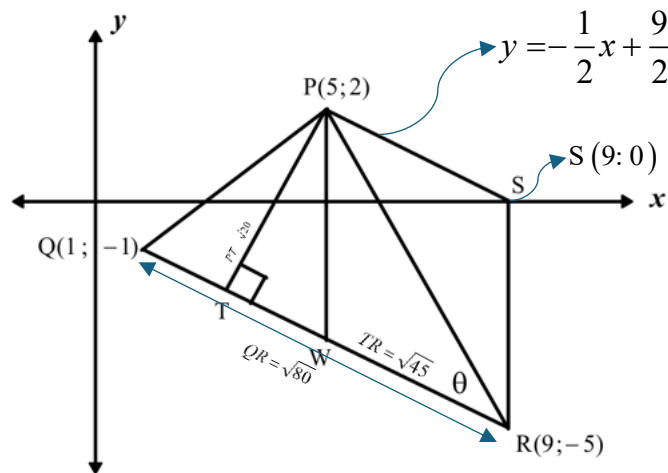
1.1	$\bar{x} = \frac{1550}{21}$ $= 73,81$ - Accept/aanvaar: 73,74 and 73,8 - Answer only: full marks/ <i>Slegs antwoord: vol punte</i>	✓ 1550 ✓ answer/antwoord (2)
1.2	$Q_2 = 76$	✓ 7,6 (1)
1.3	$73,81 - 76 = -2.52$ Negative skew OR skew to the left / <i>Negatief skeef of skeef na links</i>	✓ Negative skew OR skew to the left / <i>Negatief skeef of skeef na links</i> (1)
1.4	$(73,81 - 7,27; 73,81 + 7,27)$ $= (66,54; 81,08)$ $\approx 14 \text{ days}$ Answer only: full marks <i>Slegs antwoord: vol punte</i>	✓ $\sigma = 7,27$ ✓ $(66,54; 81,08)$ ✓ answer/antwoord (3)
		[7]

QUESTION/VRAAG 2

Number of Saturdays absent/ <i>Aantal Saterdag afwesig</i>	0	1	2	2	3	3	5	6	7
Final mark/ <i>Finale punt</i> (as %)	96	91	78	83	75	62	70	68	56

2.1	$a = 91,27$ $b = -4,91$ $\hat{y} = 91,27 - 4,91x$	• If a and b is swopped/As a en b omgeruil is – 1/3 • If a and b is correct but switched in equation/ As a en b korrek is maar in die vergelyking omgeruil is – 2/3 • Wrong a, wrong b, correct equation /Verkeerde a, verkeerde b, korrekte vergelyking – 1/3 • Answer only(ACCURACY) /Slegs antwoord (AKKURAAT) - 3/3	✓ $a = 91,27$ ✓ $b = -4,91$ ✓ equation/vergelyking (3)																			
2.2	SCATTER PLOT SHOWING THE NUMBER OF SATURDAYS ABSENT AND THE FINAL MARK ACHIEVED <table border="1"><caption>Data points from the scatter plot</caption><thead><tr><th>Number of Saturdays absent</th><th>Final Mark (as %)</th></tr></thead><tbody><tr><td>0</td><td>96</td></tr><tr><td>1</td><td>91</td></tr><tr><td>2</td><td>78</td></tr><tr><td>2</td><td>83</td></tr><tr><td>3</td><td>75</td></tr><tr><td>3</td><td>62</td></tr><tr><td>5</td><td>70</td></tr><tr><td>6</td><td>68</td></tr><tr><td>7</td><td>56</td></tr></tbody></table>	Number of Saturdays absent	Final Mark (as %)	0	96	1	91	2	78	2	83	3	75	3	62	5	70	6	68	7	56	✓ y-intercept/afsnit ✓ (4 ; 56,9)/ any correct 2 points (2)
Number of Saturdays absent	Final Mark (as %)																					
0	96																					
1	91																					
2	78																					
2	83																					
3	75																					
3	62																					
5	70																					
6	68																					
7	56																					
2.3	$r = -0,87$	✓ – ✓ 0,87 (2)																				
2.4	The greater the number of days absent, the lower the mark. / Hoe meer dae afwesig, hoe laer is die punt.	✓ greater nr of days/meer dae afwesig ✓ lower mark/laer punt. (2)																				
2.5	$\hat{y} = 91,27 - 4,91(4)$ $= 71,63$ $\approx 72\%$	✓ 4 ✓ 72% (2)																				
			[11]																			

QUESTION/VRAAG 3



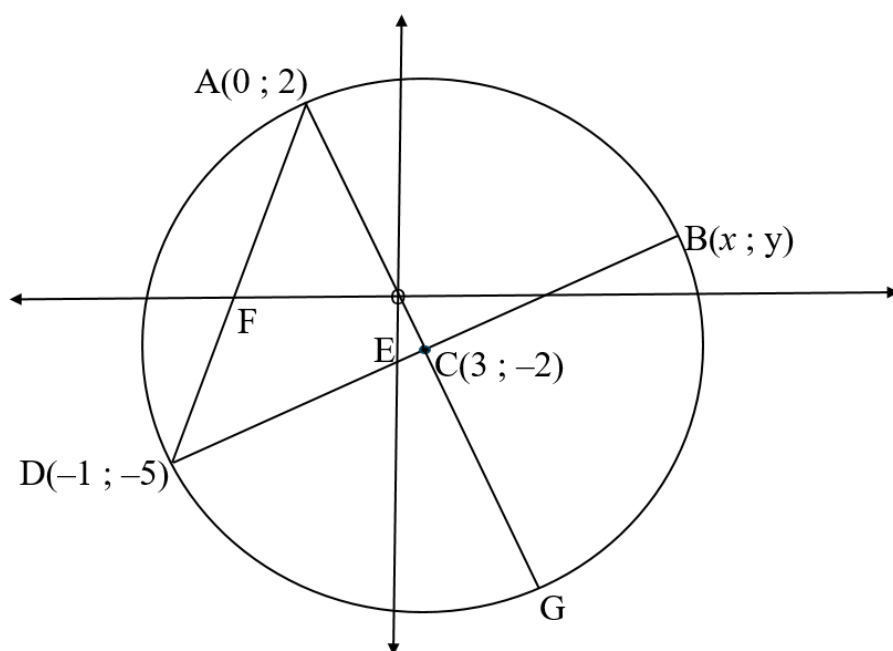
3.1	$m_{QR} = \frac{-1+5}{1-9}$ $= -\frac{1}{2}$	✓ subst./vervang ✓ answer/antwoord (2)
3.2	$m_{PS} = -\frac{1}{2}$ $(5;2): 2 = -\frac{1}{2}(5) + c$ $c = \frac{9}{2}$ $\therefore y = -\frac{1}{2}x + \frac{9}{2}$ or / of $y - 2 = -\frac{1}{2}(x - 5)$ $y - 2 = -\frac{1}{2}x + \frac{5}{2}$ $y = -\frac{1}{2}x + \frac{9}{2}$	✓ $m_{PS} = -\frac{1}{2}$ ✓ subst./vervang coordinates of/ koördinate P ✓ equation/vergelyking of PS or/of ✓ $m_{PS} = -\frac{1}{2}$ ✓ subst./vervang coordinates of/ koördinate P ✓ equation/vergelyking of PS (3)

3.3	$y = -\frac{1}{2}x + \frac{9}{2}$ $0 = -\frac{1}{2}x + \frac{9}{2}$ $x = 9$ $S(9; 0)$	✓ $y = 0$ ✓ $x = 9$	(2)
3.4	area / oppv trapezium $PQRS = \frac{1}{2}(PS + QR).PT$ $QR = \sqrt{(1-9)^2 + (-1-(-5))^2}$ $QR = \sqrt{80}$ $30 = \frac{1}{2}(\sqrt{20} + \sqrt{80}).PT$ $PT = \sqrt{20}$	✓ subst. coordinates in correct formula/ <i>vervang koördinate in korrekte formule</i> ✓ answer/ <i>antwoord</i> ✓ subst. coordinates in correct formula/ <i>vervang koördinate in korrekte formule</i> ✓ answer/ <i>antwoord</i>	(4)
3.5	$20 = (x_T - 5)^2 + (y_T - 2)^2 \dots\dots \textcircled{1}$ $m_{PT} \times m_{QR} = -1$ $\frac{y_T - 2}{x_T - 5} \times -\frac{1}{2} = -1$ $\frac{y_T - 2}{x_T - 5} = 2$ $\therefore y_T - 2 = 2x - 10 \dots\dots \textcircled{2}$ Subst eq 2 into eq 1/<i>verv verg 2 in verg 1</i> $20 = x^2 - 10x + 25 + (2x - 10)^2$ $20 = x^2 - 10x + 25 + 4x^2 - 40x + 100$ $0 = 5x^2 - 50x + 125$ $0 = x^2 - 10x + 25$ $0 = (x - 7)(x - 3)$ $\therefore x = 7 \text{ of } x = 3$ <i>nvt</i> $T(3; -2)$	✓ subst. distance in correct formula/ <i>vervang afstande in korrekte formule</i> ✓ $m_{PT} = \frac{y_T - 2}{x_T - 5}$ ✓ equation/ <i>vergelyking</i> PT ✓ subst./ <i>vervang</i> PT ✓ std form ✓ answer/ <i>antwoord</i>	(6)

3.6	$PT = \sqrt{20}$ $TR = \sqrt{36+9} = \sqrt{45}$ $\tan \theta = \frac{\sqrt{20}}{\sqrt{45}}$ $\theta = 33,69^\circ$	$\checkmark \quad TR = \sqrt{36+9} = \sqrt{45}$ $\checkmark \quad \tan \theta = \frac{\sqrt{20}}{\sqrt{45}}$ $\checkmark \quad \theta = 33,69^\circ$ (3)
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[20]

QUESTION/VRAAG 4



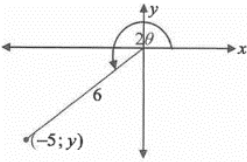
4.1	$3 = \frac{-1+x}{2}$ $6 = -1+x$ $x = 7$ $-2 = \frac{-5+y}{2}$ $-4 = -5+y$ $y = 1$ $\therefore B(7;1)$	✓ subst. coordinates in correct formula/vervang koördinate in korrekte formule ✓ $x = 7$ ✓ subst. coordinates in correct formula/vervang koördinate in korrekte formule ✓ $y = 1$ (4)
4.2	$AC^2 = (0-3)^2 + (2-(-2))^2$ $AC^2 = 25$ $\therefore (x-3)^2 + (y+2)^2 = 25$ $AC^2 = (-1-3)^2 + (-5+2)^2$ Or/of $= 25$ $\therefore (x-3)^2 + (y+2)^2 = 25$	✓ subst. coordinates of/ vervang koördinate van C ✓ $r^2 = 25$ ✓ equation/vergelyking ✓ subst. coordinates of/ vervang koördinate van C ✓ $r^2 = 25$ ✓ equation/vergelyking (3)

4.3	$m_{BD} = \frac{1 - (-5)}{7 - (-1)} = \frac{3}{4}$ $(3; -2) : -2 = \frac{3}{4}(3) + c \quad \text{OR/OF}$ $c = -\frac{17}{4}$ $\therefore y = \frac{3}{4}x - \frac{17}{4} / 4 \frac{1}{4}$	$m_{CD} = \frac{-2 - (-5)}{3 + 1} = \frac{3}{4}$ $y + 2 = \frac{3}{4}(x - 3)$ $y + 2 = \frac{3}{4}x - \frac{9}{4}$ $y = \frac{3}{4}x - \frac{17}{4}$	✓ m_{BD} ✓ equation/vergelyking (2)
4.4	$m_{AC} = \frac{-2 - 2}{3 - 0}$ $= -\frac{4}{3}$ $m_{BC} = \frac{3}{4}$ $m_{AE} \times m_{BC}$ $= -\frac{4}{3} \times \frac{3}{4}$ $= -1$ $\therefore AG \perp BD$ $\hat{A} = 90^\circ [\angle \text{ in semi-circle} / \angle \text{ in halwe sirkel}]$ $\therefore ABGD$ is a square.....diagonals bisect each other $\perp$ AND $\hat{A} = 90^\circ / ABGD$ is 'n vierkant... diagonale halveer mekaar $\perp$ EN $\hat{A} = 90^\circ$ Or/Of $ABGD$ is a parm. (diagonals bisect/diagonal halveer) $\hat{A} = 90^\circ [\angle \text{ in semi-circle} / \angle \text{ in halwe sirkel}]$ $\therefore ABGD$ is a rectangle / reghoek $AD = 5\sqrt{2}$ $AB = 5\sqrt{2}$ $\therefore AD = AB$ $\therefore ABGD$ is a rectangle / reghoek	✓ $m_{AC} = -\frac{4}{3}$ ✓ $m_{AE} \times m_{BC} = -1$ ✓ $\therefore m_{ACE} \perp m_{BCD}$ ✓ $\hat{A} = 90^\circ$ ✓ $ABGD$ is a parm. (diagonals bisect/diagonal halveer) ✓ $\hat{A} = 90^\circ$ ✓ $AD = 5\sqrt{2}$ ✓ $AB = 5\sqrt{2}$ (4)	

4.5	$m_{BD} = \frac{3}{4}$ $m_{\text{tangent}} = -\frac{4}{3}$ $(-1; -5): -5 = -\frac{4}{3}(-1) + c$ $c = \frac{31}{3}$ $\therefore y = -\frac{4}{3}x - \frac{19}{3}$ OR/OF $y + 5 = -\frac{4}{3}(x + 1)$ $y + 5 = -\frac{4}{3}x - \frac{4}{3}$ $y = -\frac{4}{3}x - \frac{19}{3}$	✓ $m_{\text{tangent}} = -\frac{4}{3}$ ✓ subst. correct coordinate D(-1;-5) /vervang korrekte koördinat ✓ equation/vergelyking ✓ $m_{\text{tangent}} = -\frac{4}{3}$ ✓ subst. correct coordinate D(-1;-5) /vervang korrekte koördinate ✓ equation/vergelyking (3)
4.6	$x^2 - 20x + y^2 - 10y + 116 = 0$ $(x - 10)^2 + (y - 5)^2 = 9$ Centre/middelpunt: (10 ; 5) Radius: 3 Distance between centers/afstand tussen middelpunte: $\sqrt{(10 - 3)^2 + (5 - (-2))^2} = 7\sqrt{2} \approx 9,9$ Sum of radii/som van radii: $5 + 3 = 8$ Since/aangesien $9.9 > 8$, the circles do not intersect/sny die sirkels mekaar nie.	✓ std form/standard vorm ✓ Centre: (10; 5) ✓ Radius: 3 ✓ Distance between centers = 9,9 ✓ Sum of radii = 8 ✓ answer/antwoord (6)

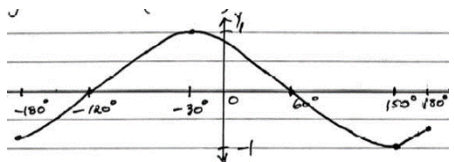
[22]

QUESTION/VRAAG 5

5.1.1	$\sin 2\theta$ $= -\frac{\sqrt{11}}{6}$  $y^2 = 6^2 - (-5)^2$ $\therefore y = -\sqrt{11}$ Answer only: full marks Slegs antwoord: Vol punte	$\checkmark$ Diagram in the 3 rd quadrant/3 ^{de} kwadrant $\checkmark$ $y = -\sqrt{11}$ $\checkmark$ $-\frac{\sqrt{11}}{6}$ answer/antwoord (3)
5.1.2	$\sin^2 \theta$ $\cos 2\theta = 1 - 2\sin^2 \theta$ $-\frac{5}{6} = 1 - 2\sin^2 \theta$ $-\frac{11}{6} = 1 - 2\sin^2 \theta$ $\sin^2 \theta = \frac{11}{12}$	$\checkmark$ $1 - 2\sin^2 x$ $\checkmark$ subst/vervang $-\frac{5}{6}$ $\checkmark$ $\frac{11}{12}$ (3)
5.2	$\sin(A+B) = \cos[90^\circ - (A+B)]$ $= \cos[(90^\circ - A) - B]$ $= \cos(90^\circ - A)\cos B + \sin(90^\circ - A)\sin B$ $= \sin A \cos B + \cos A \sin B$	$\checkmark$ $\cos[90^\circ - (A+B)]$ $\checkmark$ $\cos[(90^\circ - A) - B]$ $\checkmark$ $\cos(90^\circ - A)\cos B +$ $\sin(90^\circ - A)\sin B$ $\checkmark$ $\sin A \cos B + \cos A \sin B$ (4)
5.3	$\frac{\cos(90^\circ + x) \cdot \sin(x - 180^\circ) - \cos^2(180^\circ - x)}{\cos(-2x)}$ $= \frac{(-\sin x)(-\sin x) - (-\cos x)^2}{\cos 2x}$ $= \frac{\sin^2 x - \cos^2 x}{(\cos^2 x - \sin^2 x)}$ $= \frac{-(\cos^2 x - \sin^2 x)}{\cos^2 x - \sin^2 x}$ $= -1$	$\checkmark$ $(-\sin x)$ $\checkmark$ $(-\sin x)$ $\checkmark$ $(-\cos x)^2$ $\checkmark$ $\cos 2x = (\cos^2 x - \sin^2 x)$ $\checkmark$ nominator: $-(\cos^2 x - \sin^2 x)$ $\checkmark$ -1 (6)

5.4.1	$LHS = \frac{\sin^2 \theta - 2\sin\theta\cos\theta + \cos^2 \theta}{\cos^2 \theta}$ $= \frac{1 - 2\sin\theta\cos\theta}{\cos^2 \theta}$ $RHS = \frac{1}{\cos^2 \theta} - \frac{2\sin\theta}{\cos\theta}$ $= \frac{1 - 2\sin\theta\cos\theta}{\cos^2 \theta}$ $LHS = RHS$ OR/OF $\frac{(\sin\theta - \cos\theta)^2}{1 - \sin^2 \theta} = \frac{1}{\cos^2 \theta} - 2\tan\theta$ $LHS = \frac{(\sin\theta - \cos\theta)^2}{1 - \sin^2 \theta}$ $= \frac{\sin^2 \theta - 2\sin\theta\cos\theta + \cos^2 \theta}{\cos^2 \theta}$ $= \frac{1 - 2\sin\theta\cos\theta}{\cos^2 \theta}$ $= \frac{1}{\cos^2 \theta} - \frac{2\sin\theta\cos\theta}{\cos^2 \theta}$ $= \frac{1}{\cos^2 \theta} - \frac{2\sin\theta}{\cos\theta}$ $RHS = \frac{1}{\cos^2 \theta} - 2\tan\theta$	$\checkmark \sin^2 \theta - 2\sin\theta\cos\theta + \cos^2 \theta$ $\checkmark \sin^2 \theta + \cos^2 \theta = 1$ $\checkmark \cos^2 \theta$ $\checkmark \tan\theta = \frac{\sin\theta}{\cos\theta}$ $\checkmark \frac{1 - 2\sin\theta\cos\theta}{\cos^2 \theta}$ $\checkmark \sin^2 \theta - 2\sin\theta\cos\theta + \cos^2 \theta$ $\checkmark \sin^2 \theta + \cos^2 \theta = 1$ $\checkmark \cos^2 \theta$ $\checkmark \frac{1}{\cos^2 \theta} - \frac{2\sin\theta\cos\theta}{\cos^2 \theta}$ $\checkmark \frac{2\sin\theta}{\cos\theta}$
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(5)

5.4.2	$1 - \sin^2 \theta = 0$ OR / OF $\cos^2 \theta = 0$ $\theta = 90^\circ; 270^\circ$ $\therefore \theta = 90^\circ; 270^\circ$	✓ $1 - \sin^2 \theta = 0$ or / of $\cos^2 \theta = 0$ ✓ $\theta = 90^\circ; 270^\circ$ (2)
5.5	$k(x) = \sin 60^\circ \cos x + \cos 60^\circ \sin x$ $= \sin(60^\circ + x)$ OR/OF $k(x) = \cos 30^\circ \cos x + \sin 30^\circ \sin x$ $= \cos(30^\circ + x)$  $y \in [-1; 1]$ OR $-1 \leq y \leq 1$	✓ $\sin(60^\circ - x)$ or / of $\cos(30^\circ + x)$ ✓ $y \in [-1; 1]$ Penalise 1 mark for incorrect notation (2)

[25]

QUESTION/VRAAG 6

6.1	720°	✓ answer/antwoord (1)
6.2	$AB = \cos \frac{\alpha}{2} - \cos(\alpha - 30^\circ)$ at $\alpha = 150^\circ$ $AB = \cos 75^\circ - \cos 120^\circ$ $= 0,76$	✓ $\cos 75^\circ - \cos 120^\circ$ ✓ answer/antwoord (2)
6.3	$f(\alpha) - g(\alpha) = 0$ $\therefore f(\alpha) = g(\alpha)$ $\cos \frac{\alpha}{2} = \cos(\alpha - 30^\circ)$ $\frac{\alpha}{2} = \alpha - 30^\circ$ $\frac{\alpha}{2} = \alpha - 30^\circ + k \cdot 360^\circ$ $\frac{\alpha}{2} = 360^\circ - (\alpha - 30^\circ) + k \cdot 360^\circ$ $\alpha = 2\alpha - 60^\circ + k \cdot 720^\circ$ $\alpha = 360^\circ - \alpha + 30^\circ + k \cdot 360^\circ$ $-\alpha = -60^\circ + k \cdot 720^\circ$ $\alpha = 60^\circ + k \cdot 720^\circ$ $k \in \mathbb{Z}$ $\therefore \alpha = 20^\circ; 60^\circ; 260^\circ$	✓ $\cos \frac{\alpha}{2} = \cos(\theta - 30^\circ)$ ✓ $\frac{\alpha}{2} = \alpha - 30^\circ + k \cdot 360^\circ$ ✓ $\frac{\alpha}{2} = 360^\circ - (\alpha - 30^\circ) + k \cdot 360^\circ$ ✓ $\alpha = 60^\circ + k \cdot 720^\circ$ & ✓ $\alpha = 260^\circ + k \cdot 240^\circ$ ✓ $\alpha = 20^\circ; 60^\circ; 260^\circ$ together with $k \in \mathbb{Z}$ (6)
6.4	$[-180^\circ; 20^\circ)$	✓ values/waardes ✓ notation/notasie (2)

6.5	$h(\alpha) = -\cos(\alpha - 30^\circ + 30^\circ)$ $h(\alpha) = -\cos(\alpha)$	✓ $+30^\circ$ ✓ $h(\alpha) = -\cos(\alpha)$ (2)
6.6	$\alpha = 0^\circ \therefore \cos \frac{\alpha}{2} = 1$ $\alpha = 180^\circ \therefore \cos \frac{\alpha}{2} = 0$ $\alpha = 360^\circ \therefore \cos \frac{\alpha}{2} = -1$ $\sum_{\alpha=0^\circ}^k = 0$ <i>if/as</i> $k = 360^\circ$	✓✓ answer/antwoord (2)

[15]

QUESTION/VRAAG 7

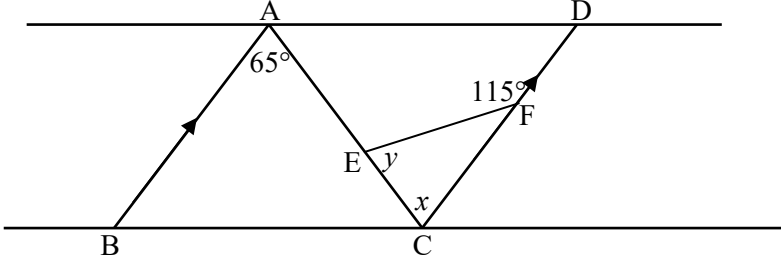
7.1.1	$\hat{P}SQ = 90^\circ \dots \angle^s$ in a semi-circle / sirkel $RQS = 90^\circ + \theta \dots \text{ext } \angle \text{ of } \Delta / \text{buite } \angle \Delta$	✓ $\hat{P}SQ = 90^\circ$ ✓ R (2)
7.1.2	$RS^2 = QR^2 + QS^2 - 2(QR)(QS)\cos \hat{Q}_2$ $RS^2 = (2x)^2 + x^2 - 2(2x)(x)\cos(90^\circ + \theta)$ $RS^2 = 4x^2 + x^2 + 4x^2\sin\theta$ $RS^2 = 5x^2 + 4x^2\sin\theta$ $RS^2 = x^2(5 + 4\sin\theta)$	✓ correct subst of cosine rule <i>korrekte subst in die cosinus-reël</i> ✓ $-\sin\theta$ ✓ $2x^2$ (comm factor / gem faktor) (3)
7.2	$A = \frac{1}{2}(QR)(QS)\sin(90^\circ + \theta)$ $= \frac{1}{2} \times (2 \times 2)(2) \times \cos 30^\circ$ $= 4 \times \frac{\sqrt{3}}{2}$ $= 2\sqrt{3} \text{ units}^2 / \text{eenhede}^2$	✓ Setting up area rule/Instel van oppervlakte-reël ✓ correct subst of area rule/ <i>korrekte subst in die oppervlakte-reël</i> ✓ $\cos 30^\circ$ ✓ answer/antwoord (4)

[9]

GEOMETRY/MEETKUNDE

Please read carefully through the following table before marking **QUESTION 8–10/**

*Lees asseblief sorgvuldig deur die volgende tabel alvorens **VRAE 8–10** nagesien word.*

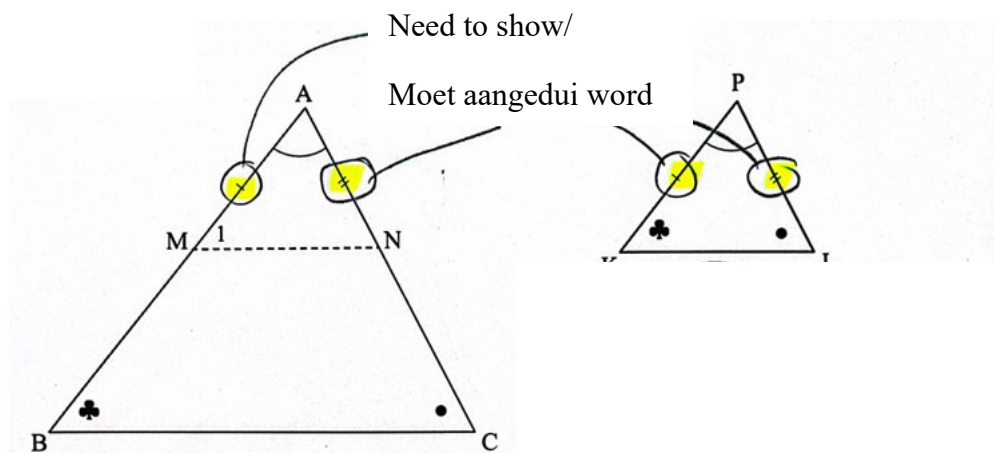
	The order in which the candidate answers a geometry question must follow logically/ <i>Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.</i> Example/Voorbeeld Given/Gegee $AB \parallel CD$ and/en $\angle EFD = 115^\circ$  The candidate first needs to calculate x BEFORE he/she can calculate y/Die kandidaat moet eerste vir x bereken VOORDAT hy/sy vir y kan bereken.
S	A mark for a correct statement (A statement mark is independent of a reason)
	<i>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)</i>
R	A mark for the correct reason (A reason mark may only be awarded if the statement is correct)
	<i>'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is)</i>
S/R	Award a mark if the statement AND reason are both correct (Both MUST be correct to get one mark)
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is (Beide MOET korrek wees om een punt te kry)</i>

QUESTION/VRAAG 8

8.1	$\hat{A}_1 = x$ [tan chord / <i>rklyn koordstelling</i>] $\hat{C}_2 = x$ [$\angle$ s in the same segment / $\angle$ e in dieselfde sirkel segment] $\hat{A}_2 = x$ [$\angle$ s opp. = sides / $\angle$ e teenoor = sye] $\hat{B}_2 = x$ [$\angle$ s in the same segment / $\angle$ e in dieselfde sirkel segment]	✓ S ✓ R ✓ S ✓ R ✓ S ✓ R ✓ S ✓ R (8)
8.2.1	$\hat{C}_1 = 90^\circ - x$ [$\angle^s$ on a straight line / $\angle^e$ op 'n reguitlyn] $\hat{D}_2 = 90^\circ$ [$\angle$ in semi circle. / $\angle$ in halfsirkel] $\hat{D}_3 = 90^\circ$ [$\angle^s$ on a straight line / $\angle^e$ op 'n reguitlyn] $\hat{F}_1 = 90^\circ - x$ [sum of Δ /som $\angle^e$ v Δ] of [ext $\angle$ / buite $\angle$] $\hat{C}_1 = \hat{F}_1$	✓ S ✓ S ✓ R ✓ S/R ✓ S/R (5)
8.2.2	In $\triangle FDA$ and/en $\triangle ADM$ is: $\hat{D}_3 = \hat{D}_2$ proven / bewys in 8.2 $\hat{A}_1 = \hat{A}_2 = x$.. proven / bewys in 8.1 AD = AD common / <i>gemeenskaplik</i> $\therefore \triangle FDA \equiv \triangle MDA$ RHS $\therefore FD = DM$	✓ S both/beide $\angle$ ✓ S ✓ S/R (3)

[16]

QUESTION/VRAAG 9

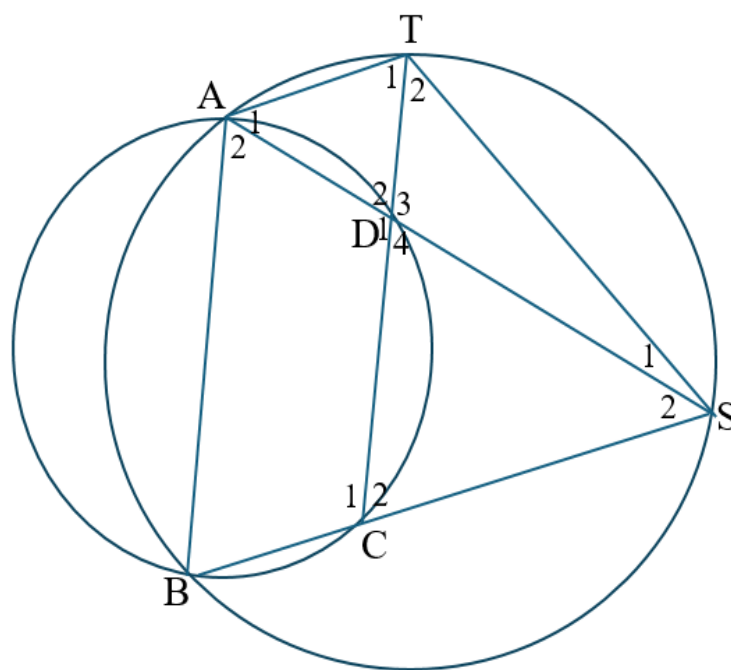


9.1	Konstruksie: Teken lyn MN, waar M en N punte op AB en AC onderskeidelik is. $AM = PK$ and $AN = PL$ Construction: Draw line MN, where M and N are points on AB and AC respectively. $AM = PK$ and $AN = PL$ In $\triangle AMN$ and/en $\triangle PKL$ is: $\hat{A} = \hat{P} \quad [\text{given / gegee}]$ $AM = PK \quad [\text{construction / konstruksie}]$ $AN = PL \quad [\text{construction / konstruksie}]$ $\therefore \triangle AMN \equiv \triangle PKL \quad [S \angle S]$ $\therefore \hat{M}_1 = \hat{K}$ But $\hat{B} = \hat{K} \quad [\text{given / gegee}]$ $\therefore \hat{M}_1 = \hat{B}$ $\therefore MN \parallel BC \quad [\text{corr } \angle^s = / \text{ooreenkomst } \angle^e =]$ $\frac{AB}{AM} = \frac{AC}{AN} \quad [\text{line } \parallel \text{ one side of a } \triangle / \text{lyn } \parallel \text{ een sy v } \triangle] \text{ or/of } MN \parallel BC$ But $AM = PK$ and/en $AN = PL$ $\therefore \frac{AB}{PK} = \frac{AC}{PL}$	✓ construction/konstruksie Need to show or write/ moet wys of uitskryf ✓ S/R EITHER/OF 3x $\equiv$ OR/OF $[S \angle S]$ ✓ S ✓ S/R ✓ S ✓ R (6)
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9.2.1	In $\triangle BPE$ and/en $\triangle BDA$: $\hat{B}_1$ is common / <i>gemeenskaplik</i> $\hat{P}_2 = \hat{D} = 90^\circ$ $\left[\text{given/gegee and / en } \angle^s \text{ in a semi-circle / } \angle \text{ in } \frac{1}{2} \square \right]$ $\hat{B}\hat{A}\hat{D} = \hat{E}_3$ $\left[3^{rd} \angle \text{ or / of sum/ som van } \angle^s \right]$ $\triangle BPE \parallel \triangle BDA$ $[\angle\angle\angle]$ $\therefore \frac{BP}{BD} = \frac{PE}{AD} = \frac{BE}{AB}$ $[\triangle BPE \parallel \triangle BDA]$ $\therefore \frac{BP}{BD} = \frac{PE}{AD}$	✓ S ✓ S ✓ S/R ✓ S/R (4)
9.2.2	$\hat{C} = \hat{D} = 90^\circ$ $\left[\angle^s \text{ in a semi-circle / } \angle \text{ in } \frac{1}{2} \square \right]$ $AB^2 = AC^2 + BC^2$ $[pyth]$ $AB^2 = AD^2 + BD^2$ $[pyth]$ $AC^2 + BC^2 = AD^2 + BD^2$	✓ S ✓ S ✓ S (3)

[13]

QUESTION/VRAAG 10



10.1	$\hat{B} + \hat{D} = 180^\circ$	$\left[\text{opp } \angle^s \text{ cyclic quad / teenoorst } \angle^e \text{ v kvh} \right]$	✓ S/R
	$\hat{D}_1 = \hat{D}_3$	$\left[\text{vert opp / regoorst } \angle^e \right]$	✓ S/R
	$\hat{B} + \hat{D}_3 = 180^\circ$		✓ S
	$\hat{B} + \hat{T}_1 + \hat{T}_2 = 180^\circ$	$\left[\text{opp } \angle^s \text{ cyclic quad / teenoorst } \angle^e \text{ v kvh} \right]$	✓ S/R
	$\hat{D}_3 = \hat{T}_1 + \hat{T}_2$		
	Or/of		
	$\hat{D}_1 = \hat{D}_3$	$\left[\text{vert opp } \angle / \text{ regoorst } \angle \right]$	✓ S/R
	$\hat{D}_1 = 180^\circ - B$	$\left[\text{opp } \angle^s \text{ cyclic quad / teenoorst } \angle^e \text{ v kvh} \right]$	✓ S/R
	$\therefore \hat{D}_3 = 180^\circ - B$		✓ S
	$180^\circ - B = \hat{T}_1 + \hat{T}_2$	$\left[\text{opp } \angle^s \text{ cyclic quad / teenoorst } \angle^e \text{ v kvh} \right]$	✓ S/R
	$\hat{D}_3 = \hat{T}_1 + \hat{T}_2$		(4)

