



education

MPUMALANGA PROVINCE
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE
NASIONALE
SENIOR SERTIFIKAAT**

GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE V1
SEPTEMBER 2026
MARKING GUIDELINE/NASIENRIGLYNE

MARKS/PUNTE: 150

The marking guideline consists of 10 pages/Die nasienriglyn bestaan uit 10 bladsye.

TAKE NOTE:

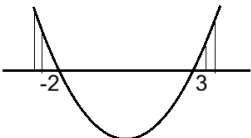
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

LET WEL:

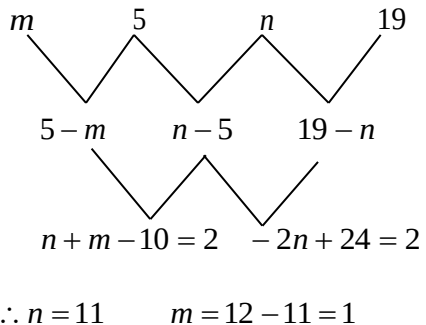
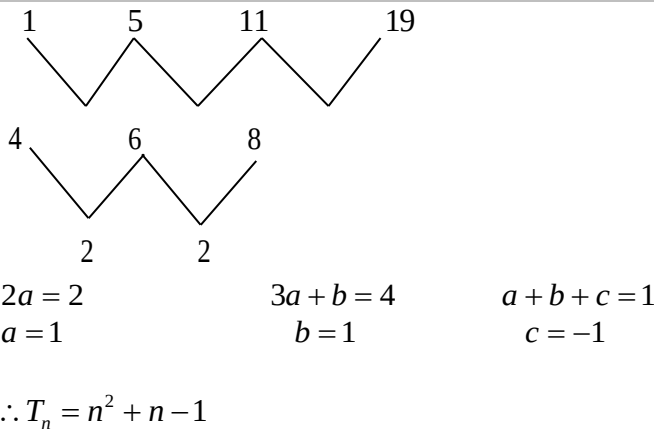
- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyn van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde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

QUESTION 1/VRAAG 1

1.1.1	$(2x+5)(x-1)=0$ $x = -\frac{5}{2}$ or $x = 1$	✓✓ answers (2)
1.1.2	$-3x^2 - 4x + 5 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(-3)(5)}}{2(-3)}$ $x = -2,12$ and $x = 0,79$	✓ standard form ✓ substitution ✓✓ answers (4)
1.1.3	$3^{2x} - 3^x - 6 = 0$ $(3^x - 3)(3^x + 2) = 0$ $(3^x - 3) = 0$ or $(3^x + 2) = 0$ $3^x = 3$ or $3^x \neq -2$ $x = 1$ No Sol OR/OF Let $3^x = k$ $k^x - k - 6 = 0$ $(k - 3)(k + 2) = 0$ $k = 3$ or $k = -2$ $3^x = 3$ or $3^x \neq -2$ $\therefore x = 1$	✓ breaking to prime factors ✓ factoring ✓✓ solutions with rejection (4)
1.1.4	$(2^5)^{\frac{1}{3}} = (2^3)^{3x} \cdot 2^{6x}$ $2^{\frac{5}{3}} = 2^{9x} \cdot 2^{6x}$	✓ exponential form

	$2^{\frac{5}{3}} = 2^{15x}$ $\frac{5}{3} = 15x$ $x = \frac{1}{9}$	✓ adding exponents ✓ answer (3)
1.1.5	$-(x+2)(x-3) \leq 0$ $x = -2$ and $x = 3$ are critical values $x \leq -2$ or $x \geq 3$ 	✓ critical values ✓✓ $x \leq -2$ or $x \geq 3$ (3)
1.2	$y = 2 + x$ $2 + x - 2 = (x - 2)^2$ $2 + x - 2 = (x^2 - 4x + 4)$ $x = x^2 - 4x + 4$ $x^2 - 5x + 4 = 0$ $(x - 1)(x - 4) = 0$ $x = 1$ or $x = 4$ $y = 4 + 2$ or $y = 1 + 2$ $y = 6$ or $y = 3$	✓ $y = 2 + x$ ✓ substitution ✓ factors ✓ both values of x ✓ both values of y (5)
1.3	$3x^2 + (2k - 2)x - k = 0$ $\Delta = b^2 - 4ac$ $= (2k - 2)^2 - 4(3)(-k)$ $= 4k^2 + 4k + 4$ $k = \frac{-4 \pm \sqrt{(4)^2 - 4(4)(4)}}{2(4)}$ produces non-real solutions $\therefore$ There's no real value of k for which the discriminant can be equal to zero. Roots are non-real and are never equal.	✓ substitution $\checkmark = 4k^2 + 4k + 4$ $\checkmark k = \frac{-4 \pm \sqrt{(4)^2 - 4(4)(4)}}{2(4)}$ ✓ mathematical rational (4)
1.4	$\frac{5^{2006} - 5^{2004} + 24}{5^{2004} + 1}$ $= \frac{5^{2004}(5^2 - 1) + 24}{5^{2004} + 1}$ $= \frac{5^{2004}(24) + 24}{5^{2004} + 1}$ $= \frac{24(5^{2004} + 1)}{5^{2004} + 1}$ $= 24$	✓ common factor/ gemeenskaplike faktor ✓ common factor/ gemeenskaplike faktor ✓ answer/ antwoord (3)
		[28]

QUESTION 2/VRAAG 2

2.1.1	14	✓ answer (1)
2.1.2	$T_n = a + d(n-1)$ $= -2 + 4(n-1)$ $= 4n - 6$	✓ substitution ✓ answer (2)
2.1.3	$262 = 4n - 6$ $n = 67$ $S_n = \frac{67}{2} [2(-2) + 4(67-1)]$ $= 8\,710$	✓ equating to 262 ✓ n -value ✓ substitution ✓ answer (4)
2.2.1	 $n + m - 10 = 2$ $-2n + 24 = 2$ $\therefore n = 11$ $m = 12 - 11 = 1$	✓ second difference ✓ equating to 2 ✓ n -value ✓ m -value (4)
2.2.2	 $2a = 2$ $3a + b = 4$ $a + b + c = 1$ $a = 1$ $b = 1$ $c = -1$ $\therefore T_n = n^2 + n - 1$	✓ value of a and b ✓ value of c ✓ $T_n = n^2 + n - 1$ (3)
		[14]

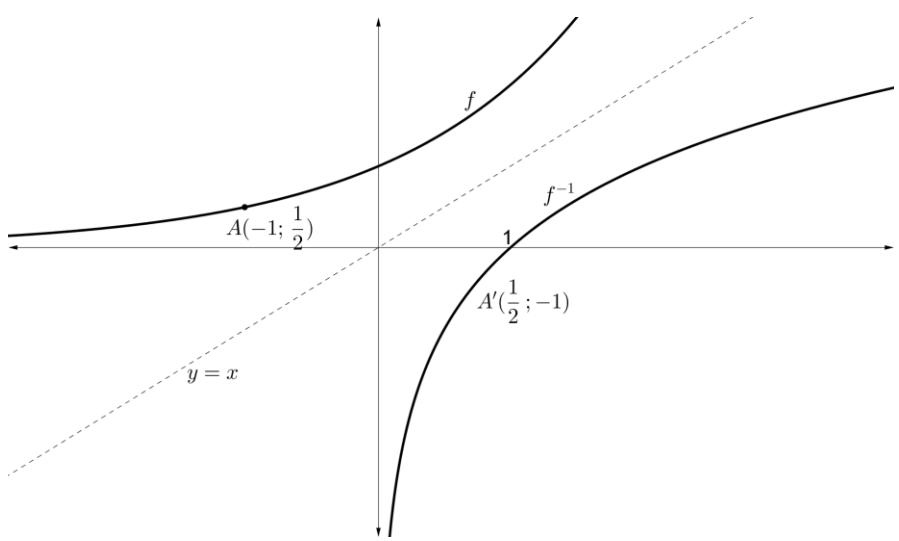
QUESTION 3/VRAAG 3																				
3.1.1	$r = -2$			✓ answer (1)																
3.1.2	No, for convergence $-1 < r < 1$, this is not the case here.			✓No ✓condition (2)																
3.1.3	$n = 21 - 3 + 1 = 19$ $S_{19} = \frac{-8x[(-2)^{19} - 1]}{-2 - 1}$ $= -1398104 x$			✓n- value ✓substitution ✓answer (3)																
3.2.1	<table border="1"><thead><tr><th>TERM</th><th>INCOME</th><th>EXPENSES</th><th>SAVINGS</th></tr></thead><tbody><tr><td>1</td><td>R150 000</td><td>R105 000</td><td>R45 000</td></tr><tr><td>2</td><td>R1635 00</td><td>R122 000</td><td>R41500</td></tr><tr><td>3</td><td>R177 000</td><td>R139 000</td><td>R38 000</td></tr></tbody></table> Savings series is $R45\,000 + R41500 + R38\,000 = \dots + 0$			TERM	INCOME	EXPENSES	SAVINGS	1	R150 000	R105 000	R45 000	2	R1635 00	R122 000	R41500	3	R177 000	R139 000	R38 000	✓income ✓expenses ✓savings ✓savings series (4)
TERM	INCOME	EXPENSES	SAVINGS																	
1	R150 000	R105 000	R45 000																	
2	R1635 00	R122 000	R41500																	
3	R177 000	R139 000	R38 000																	
3.2.2	Income = $150\,000 + 13\,000(n - 1)$ Expenses = $105\,000 + 17\,000(n - 1)$ To be left with nothing means INCOME = EXPENSES $150\,000 + 13\,000(n - 1) = 105\,000 + 17\,000(n - 1)$ $\therefore n = 13,85 / n = 14$ years OR/OF $0 = 45\,000 - 3500(n - 1)$ $\frac{45000}{3500} = n - 1$ $\therefore n = 13,85 / n = 14$ years			✓Income and Expenses formulae ✓equating ✓answer OR/OF ✓equation ✓simplification ✓answer (3)																
				[13]																

QUESTION 4/VRAAG 4

4.1	$y = \frac{a}{x-1} + 2$ $0 = \frac{a}{0-1} + 2 \quad 0 = -a + 2$ $a = 2$ $y = \frac{2}{x-1} + 2$	✓ substitution of asymptotes ✓ substituting a point (0; 0) ✓ value of a ✓ equation (4)
4.2	$0 = \left(\frac{5}{2} - 1\right)^2 + q$ $q = -\frac{9}{4}$	✓ substitution of x and y ✓ q - value (2)

4.3	$x = 2$ $y = -1$	✓ $x = 2$ ✓ $y = -1$ (2)
4.4	$L\left(-\frac{1}{2}; 0\right)$, Symmetry $LQ = \frac{5}{2} - \left(-\frac{1}{2}\right) = 3 \text{ units}$	✓ x-coordinate of L ✓ length (2)
4.5	$h(x) = -(x-1)^2 + \frac{9}{4}$	✓ answer (1)
4.6	$x \in (-\infty; 0) \cup (1; \infty)$ OR /OF $x < 0$ or $x > 1$	✓ 1 st Interval ✓ 2 nd Interval (2)
		[13]

QUESTION 5/VRAAG 5

5.1	$x = 2^y$ $\therefore y = \log_2 x$	✓ interchanging x & y ✓ answer (2)
5.2	$A'\left(\frac{1}{2}; -1\right)$	✓ answer
5.3		✓ shape ✓ x – intercept ✓ symmetry – axis ✓ another point (4)
5.4	$2^x = \left(\frac{1}{2}\right)^{x-1}$ $2^x = 2^{-x+1}$ $x = -x+1$ $x = \frac{1}{2}; y = \sqrt{2}$	✓ equating ✓ exponential laws ✓ x - coordinate ✓ y - coordinate (4)
		[11]

QUESTION 6/VRAAG 6

6.1.1	$A = P(1 + in)$ $x = R15000(1 + 0,075 \times 5)$ $x = R20625$	✓ substitution into linear formula ✓ answer (2)
6.1.2	$A = P(1 + i)^n$ $R20625 = R10000(1 + i)^5$ $\frac{R20625}{R10000} = (1 + i)^5$ $\sqrt[5]{\frac{R20625}{R10000}} - 1 = i$ $\therefore i = 15,58\%$	✓ substitution of A and P ✓ $n = 5$ ✓ simplification ✓ answer (4)
6.2.1	$R20625 \times 2 = R41250$	✓ answer (1)
6.2.2	$R70000 - R41250 = R28750$	✓ answer (1)
6.2.3	$R28750 = \frac{x \left[\left(1 + \frac{0,11}{12} \right)^{5 \times 12} - 1 \right]}{\frac{0,11}{12}}$ $x = R361,55$	✓ substitution into F correctly ✓ $i = \frac{0,11}{12}$ ✓ $n = 60$ ✓ answer (4)
6.3.	$OB = \frac{588,32 \left[1 - \left(1 + \frac{0,13}{12} \right)^{-1,5 \times 12} \right]}{\frac{0,13}{12}}$ $OB = R9574,34$ OR $OB = 15000 \left(1 + \frac{0,13}{12} \right)^{12} - \frac{588,32 \left[\left(1 + \frac{0,13}{12} \right)^{12} - 1 \right]}{\frac{0,13}{12}}$ $OB = R9574,34$	✓ substitution ✓ $n = 18$ ✓ answer (3) OR/OF ✓ substitution ✓ $n = 12$ ✓ answer (3)
		[15]

QUESTION 7/VRAAG 7

7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-\pi(x+h)^2 - (-\pi x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-\pi(x^2 + 2xh + h^2) + \pi x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-\pi x^2 - 2\pi xh - \pi h^2 + \pi x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-2\pi xh - \pi h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2\pi x - \pi h)}{h}$ $= \lim_{h \rightarrow 0} -2\pi x - \pi h$ $= -2\pi x$	✓ substitute $f(x+h)$ ✓ correct substitution into formula and notation ✓ simplification ✓ factorisation ✓ answer (5)
7.2	$y = (1 - \sqrt{x})(1 - \sqrt{x})$ $= 1 - 2\sqrt{x} + x$ $= 1 - 2x^{\frac{1}{2}} + x$ $\frac{dy}{dx} = -x^{-\frac{1}{2}} + 1$	✓ expansion ✓ writing in exponent form ✓ answer (3)
7.3	$g(x) = \frac{x(x^2 - 100) - x^2 + 100}{x - 1}$ $= \frac{x(x^2 - 100) - (x^2 - 100)}{x - 1}$ $= \frac{(x - 1)(x^2 - 100)}{x - 1}$ $= x^2 - 100$ $g'(x) = 2x$	✓ common negative ✓ taking out common bracket ✓ simplification ✓ answer (4)
7.4	$h(x) = 7 - 2x^{-3}$ $h'(x) = 6x^{-4}$ $h'(2) + 4 = 6(2)^{-4} + 4$ $= \frac{35}{8}$	✓ $h'(x) = 6x^{-4}$ ✓ substitution ✓ answer (3)
		[15]

QUESTION 8/VRAAG 8

8.1	$y = a(x - R_1)(x - R_2)(x - R_3)$ $y = -1(x + 1)^2(x - 2)$ $= -x^3 + 3x + 2$	$\checkmark a = -1$ $\checkmark y = -1(x + 1)^2(x - 2)$ $\checkmark$ expansion (3)
8.2	$f'(x) = 0$ $f'(x) = -3x^2 + 3$ $3x^2 = 3$ $x = \pm 1$ $f(1) = -(1)^3 + 3(1) + 2 = 4$ $C(1; 4)$	$\checkmark f'(x) = 0$ $\checkmark f'(x) = -3x^2 + 3$ $\checkmark$ x-values $\checkmark$ coordinates of C (4)
8.3	$-3x^2 + 3 = -9$ $-3x^2 = -12$ $x = \pm 2$ $-(2)^3 + 3(2) + 2 = 0$ $\therefore (2; 0)$ is the point of tangency	$\checkmark f'(x) = -9$ $\checkmark$ substitution of 2 $\checkmark$ answer (3)
8.4	$C'(4; 4)$	$\checkmark$ answer (1)
8.5	$x \in (-\infty; -1) \cup (1; 2)$ OR $x < -1$ or $1 < x < 2$	$\checkmark$ 1 st interval $\checkmark$ 2 nd interval (2)
8.6	$k \in (-\infty; 0) \cup (4; \infty)$ OR $x < 0$ or $x > 4$	$\checkmark$ 1 st interval $\checkmark$ 2 nd interval (2)
		[15]

QUESTION 9/VRAAG 9

9.1	After t hours, $BF = 20t$ and $CD = 35t$ $\therefore BC = 80 - 35t$ $FC = \sqrt{(20t)^2 + (80 - 35t)^2}$ $= \sqrt{400t^2 + 6400 - 5600t + 1225t^2}$ $= \sqrt{1625t^2 - 5600t + 6400}$	$\checkmark BF = 20t$ and $CD = 35t$ $\checkmark BC = 80 - 35t$ $\checkmark$ substitution $\checkmark$ simplification (4)
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9.2	Closest means minimum distance between the two. FC is minimum if FC^2 is minimum. $FC^2 = 1625t^2 - 5600t + 640$ $\frac{dFC^2}{dt} = 3250t - 5600$ $3250t - 5600 = 0, \text{ for minimum distance}$ $\therefore t = \frac{5600}{3250} = 1,72 \text{ hrs}$	✓ $FC^2 = 1625t^2 - 5600t + 640$ ✓ $\frac{dFC^2}{dt}$ ✓ equating to 0 ✓ answer (4)
9.3	$FC = \sqrt{1625(1.72)^2 - 5600(1.72) + 6400}$ $= 39,69 \text{ km apart}$	✓ substitution ✓ answer (2)
		[10]

QUESTION 10/VRAAG 10

10.1	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,7 = 0,4 + k - P(A \text{ and } B)$ $\therefore P(A \text{ and } B) = k - 0,3$ For independent events: $P(A \text{ and } B) = P(A) \times P(B)$ $k - 0,3 = 0,4 \times k$ $k = 0,5$	✓ substitution into addition rule ✓ $P(A \text{ and } B) = k - 0,3$ ✓ substitution into $P(A \text{ and } B) = P(A) \times P(B)$ ✓ answer (4)
10.2.1	$7! = 5040$	✓ $7!$ ✓ answer (2)
10.2.2	$3! \times 5! = 720$	✓ $3!$ ✓ $5!$ ✓ 720 (3)
10.3.1	$\underline{3} \times \underline{9} \times \underline{9} \times \underline{4} = 972$	✓ <u>3</u> in first position ✓ <u>4</u> in last position ✓ 9×9 (3)
10.3.2	$9 \times 9 \times 9 \times 9 = 6561$ Total sample space) $9 \times 9 \times 9 \times 1 = 729$ (number of passwords divisible by 5) $P(\text{Multiple of 5}) = \frac{729}{6561} = 0.11$	✓ total sample space ✓ number of passwords divisible by 5 ✓ ✓ answer (4)
		[16]

TOTAL / TOTAAL: 150