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**NATIONAL
SENIOR CERTIFICATE**

**NASIONALE SENIOR
SERTIFIKAAT**

GRADE 12 / GRAAD 12

MATHEMATICS P1 / WISKUNDE V1

SEPTEMBER 2025

MARKING GUIDELINE / NASIENRIGLYN

MARKS / PUNTE: 150

The marking guideline consists of 12 pages.

Die nasienriglyn bestaan uit 12 bladsye.



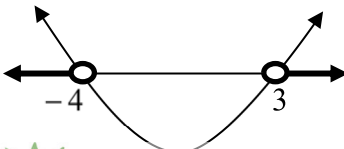
TAKE NOTE:

- 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 guideline.
- Assuming values/answers in order to solve a problem is unacceptable.

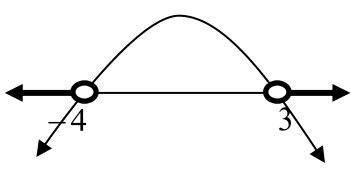
LET WEL:

- 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	$6x^2 - 2x = 0$ $2x(3x - 1) = 0$ $x = 0 \text{ or } x = \frac{1}{3}$	✓ factors/faktore ✓ both answers/albei antwoorde (2)
1.1.2	$2x^2 = 1 - 4x$ $2x^2 + 4x - 1 = 0$ $x = \frac{-(4) \pm \sqrt{(4)^2 - 4(2)(-1)}}{2(2)}$ $x = 0,22 \text{ or } x = -2,22$	✓ standard form /standaard vorm ✓ substitution into correct formula /vervanging in korrekte formule ✓ answers/antwoorde (3)
1.1.3	$\sqrt{x-2} + 4 = x$ $\sqrt{x-2} = x - 4$ $(\sqrt{x-2})^2 = (x-4)^2$ $x - 2 = x^2 - 8x + 16$ $x^2 - 9x + 18 = 0$ $(x-6)(x-3) = 0$ $x = 6 \text{ or } x \neq 3$	✓ rewrite and squaring /herskryf en kwadrering ✓ standard form / standaard vorm ✓ factors / faktore ✓ both answers with exclusion / beide antwoorde met uitsluiting (4)
1.1.4	$3^{4x} - 8 \cdot 3^{2x} - 9 = 0$ $(3^{2x} - 9)(3^{2x} + 1) = 0$ $3^{2x} = 9 \text{ or } 3^{2x} = -1$ $2x = 2 \quad \text{No real solution}$ $x = 1$	✓ factors / faktore ✓ both equations / beide vergelykings ✓ both answers with exclusion / beide antwoorde met uitsluiting (3)
1.1.5	$-x^2 - x + 12 < 0$ $x^2 + x - 12 > 0$ $(x+4)(x-3) > 0$ $x < -4 \text{ or } x > 3$	 ✓ standard form / standaard vorm ✓ critical values/kritieke waardes ✓✓ answer/antwoord (4)

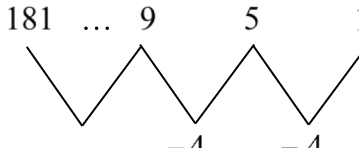
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	OR / OF $-x^2 - x + 12 < 0$ $(-x+3)(x+4) < 0$ $x < -4 \text{ or } x > 3$ 	✓ standard form / standaard vorm ✓ critical values/kritieke waardes ✓✓ answer/antwoord (4)
1.2	$x - y = 3$ and $x^2 - xy - 2y^2 = 10$ $x = y + 3$(1) $x^2 - xy - 2y^2 = 10$(2) $(y+3)^2 - (y+3)y - 2y^2 = 10$ subst. (1) in (2) $y^2 + 6y + 9 - y^2 - 3y - 2y^2 - 10 = 0$ $-2y^2 + 3y - 1 = 0$ $2y^2 - 3y + 1 = 0$ $(2y-1)(y-1) = 0$ $y = \frac{1}{2} \text{ or } y = 1$ $x = \frac{1}{2} + 3 \text{ or } x = 1 + 3$ $x = 3\frac{1}{2} \text{ or } x = 4$ OR/OF $x - y = 3$ $y = x - 3$ $x^2 - x(x-3) - 2(x-3)^2 = 10$ $x^2 - x^2 + 3x - 2(x^2 - 6x + 9) = 10$ $3x - 2x^2 + 12x - 18 = 10$ $-2x^2 + 15x - 28 = 0$ $2x^2 - 15x + 28 = 0$ $(2x-7)(x-4) = 0$ $x = \frac{7}{2} \text{ or } x = 4$ $y = \frac{1}{2} \text{ or } y = 1$	✓ $x = y + 3$ ✓ substitution/inervanging ✓ standard form / standaard vorm ✓ factorising/faktoriserings ✓ both y-values / beide y-waardes ✓ both values of x / beide x-waardes (6) ✓ $y = x - 3$ ✓ substitution/inervanging ✓ standard form / standaard vorm ✓ factorising/faktoriserings ✓ both x-values / beide x-waardes ✓ both values of y-values / beide y-waardes (6)

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1.3	$(a+b)(a-b) = 2b(8a-b), a > 0, b > 0$ $a^2 - b^2 = 16ab - 2b^2$ $a^2 + b^2 = 16ab$ $(a+b)^2 = a^2 + 2ab + b^2$ $= 16ab + 2ab$ $= 18ab$	✓ expansion/uitbreiding ✓ isolating/soleer $a^2 + b^2$ ✓ expansion / uitbreiding ✓ answer/antwoord (4)
		[26]

QUESTION 2 / VRAAG 2

2.1.1	 $T_n = a + (n-1)d$ $= 181 + (n-1)(-4)$ $= 185 - 4n$	✓ subst of a and d into correct formula / vervang a en d in korrekte formule ✓ T_n (2)
2.1.2	$1 = 185 - 4n$ $-184 = -4n$ $n = 46$	✓ substituting 1/ vervang 1 ✓ answer/antwoord (2)
2.1.3	$181 + \dots + 17 + 13 \quad (+9 + 5 + 1)$ $\therefore n = 46 - 3 = 43$ terms $S_n = \frac{n}{2}(a+l)$ $= \frac{43}{2}(181+13)$ $= 4\,171$ OR/OF $S_n = \frac{n}{2}[2a + (n-1)d]$ $= \frac{43}{2}[2(181) + (43-1)(-4)]$ $= 4\,171$	✓ 43 terms/terme ✓ correct subst into correct formula / korrekte invervanging in korrekte formule ✓ answer/antwoord (3)
2.1.4	$\sum_{n=1}^{43} (185 - 4n)$	✓ $\sum_{n=1}^{43}$ ✓ $(185 - 4n)$ (2)



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2.2	$T_n = an^2 - 5n + c$ $T_4 = a(4)^2 - 5(4) + c$ $= 16a - 20 + c = 18$ $T_3 = a(3)^2 - 5(3) + c$ $= 9a - 15 + c$ $T_2 = a(2)^2 - 5(2) + c$ $= 4a - 10 + c$ $9a - 15 + c = 4a - 10 + c + 5$ $5a = 10$ $a = 2$ $T_4 = 16(2)^2 - 20 + c = 18$ $c = -26$	✓ T_4 ✓ T_3 and/en T_2 ✓ equation/vergelyking ✓ value of a/waarde van a ✓ value of c/waarde van c (5)
		[14]

QUESTION 3 / VRAAG 3

3.1.1	$\frac{800}{4} + \left(\frac{800}{4}\right)\frac{1}{4} + \left(\frac{800}{4}\right)\frac{1}{4}\frac{1}{4} + \left(\frac{800}{4}\right)\frac{1}{4}\frac{1}{4}\frac{1}{4}$ $\frac{800}{4} + \left(\frac{800}{4}\right)\left(\frac{1}{4}\right) + \left(\frac{800}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right) + \left(\frac{800}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{1}{4}\right)$ $= 200 + 50 + 12,5 + 3,125$ $= 265,625 \text{ squared units / vierkante eenhede}$	✓ a ✓ r ✓ answer/antwoord (3)
3.1.2	$S_{\infty} = \frac{200}{1 - 0,25}$ $= \frac{800}{3}$ $= 266,67 \text{ squared units / vierkante eenhede}$	✓ substitution of a and r into correct formula / vervanging in korrekte formule ✓ answer/antwoord (2)
3.2	$a = 9, \quad r = \frac{6}{9} = \frac{2}{3}$ $S_n = \frac{9\left[1 - \left(\frac{2}{3}\right)^n\right]}{1 - \frac{2}{3}} > 25$ $27\left[1 - \left(\frac{2}{3}\right)^n\right] > 25$	✓ substitution into correct formula / vervanging in korrekte formule



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$27 - 27\left(\frac{2}{3}\right)^n > 25$ $-27\left(\frac{2}{3}\right)^n > -2$ $\left(\frac{2}{3}\right)^n > \frac{2}{27}$ $n \log\left(\frac{2}{3}\right) > \log\left(\frac{2}{27}\right)$ $n > \log\left(\frac{2}{27}\right) \div \log\left(\frac{2}{3}\right)$ $n > 6,419\dots$ $n = 7$	$\checkmark > 25$ $\checkmark$ simplification / vereenvoudiging $\checkmark$ use of logs / gebruik van logs $\checkmark n > 6,419$ $\checkmark n = 7$ (6)
	[11]

QUESTION 4 / VRAAG 4

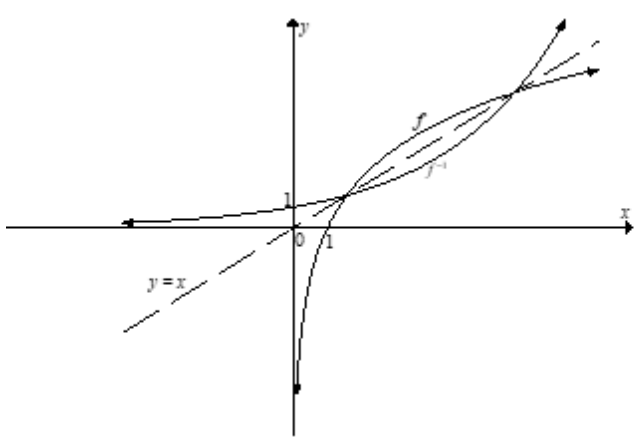
4.1	$f(x) = -x^2 - 4x + 3 = 0$ $x^2 + 4x - 3 = 0$ $x = \frac{-4 \pm \sqrt{(4)^2 - 4(1)(-3)}}{2(1)}$ $x = 0,645 \text{ or } x = -4,645$ $AB = 0,645 - (-4,645)$ $= 5,29 \text{ units}$	$\checkmark$ substitution into formula / vervanging in korrekte formule $\checkmark$ x-values / x - waardes $\checkmark$ length of / lengte van AB $\checkmark$ answer/antwoord (4)
4.2	$x = \frac{-4,645 + 0,645}{2} = -2 \quad \textbf{OR/OF} \quad f'(x) = -2x - 4 = 0$ $x = -2$ $f(-2) = -(-2)^2 - 4(-2) + 3$ $= 7$ $C(-2;7)$	$\checkmark$ x-value / x-waarde $\checkmark$ y-value / y-waarde $\checkmark C(-2;7)$ (3)
4.3	$10 = \frac{a}{0+2} + 7$ $a = 6$ $g(x) = \frac{6}{x+2} + 7; \quad x > -2$	$\checkmark$ substitution / vervanging $\checkmark a = 6$ $\checkmark$ equation / vergelyking $\checkmark x > -2$ (4)
4.4	$x < -2$	$\checkmark \checkmark$ answer/antwoord (2)



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4.5	Reflection in x -axis and translation of 12 units down. Refleksie in x -as en translasie van 12 eenhede af.	✓ reflection in x -axis / refleksie in x -as ✓ 12 units down / 12 eenhede af (2)
4.6	$-2 < x < 0,645$	✓ end points / eindpunte ✓ notation / notasie (2)
		[17]

QUESTION 5 / VRAAG 5

5.1.1	(1 ; 0)	✓ answer / antwoord (1)
5.1.2	$x = \log_{\frac{4}{3}} y$ $f^{-1}(x) = \left(\frac{4}{3}\right)^x$	✓ interchanging x and y / ruil x en y ✓ answer / antwoord (2)
5.1.3		✓ shape of f / vorm van f ✓ shape of f^{-1} / vorm van f^{-1} ✓ x - and y -intercepts / x en y afsnitte ✓ asymptotes / asimptote ✓ symmetry-axis and its equation / simmetrie as (5)
5.1.4	$-2 = \log_{\frac{4}{3}} x$ $x = \left(\frac{4}{3}\right)^{-2}$ $= \frac{9}{16}$ $e = \frac{9}{16}$	✓ substitution / vervanging ✓ answer / antwoord (2)
5.1.5	$x > 0, x \in R$	✓ answer / antwoord (1)
5.2.1	$t(x) = \left(\frac{2}{3}\right)^{-x} - 1$ OR/OF $t(x) = \left(\frac{3}{2}\right)^x - 1$	✓ $\left(\frac{2}{3}\right)^{-x}$ or $\left(\frac{3}{2}\right)^x$ ✓ -1 (2)
5.2.2	$y > -1, y \in R$	✓ answer / antwoord (1)



QUESTION 6 / VRAAG 6

6.1.	$A = P(1-i)^n$ $= 27\,000(1-0,1371)^7$ $= R9\,618,05$	✓ substitution into correct formula / vervanging in korrekte formule ✓ answer/antwoord (2)
6.2.1	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $800\,000 = \frac{57\,000 \left[1 - \left(1 + \frac{0,13}{2} \right)^{-n} \right]}{\frac{0,13}{2}}$ $\frac{800\,000 \left(\frac{0,13}{2} \right)}{57\,000} - 1 = - \left(1 + \frac{0,13}{2} \right)^{-n}$ $\frac{5}{57} = \left(1 + \frac{0,13}{2} \right)^{-n}$ $-n = \frac{\log \frac{5}{57}}{\log \left(1 + \frac{0,13}{2} \right)}$ $= -38,64424163$ $n = 38,64424163$ $n = 39 \text{ payments/betalings}$	✓ substitution into correct formula / vervang in korrekte formule ✓ simplification / verrenvoudiging ✓ correct use of logs / korrekte gebruik van logs ✓ 38,644... ✓ 39 payments / betalings (5)
6.2.2	$OB = \frac{57\,000 \left[1 - \left(1 + \frac{0,13}{2} \right)^{-0,64424163} \right]}{\frac{0,13}{2}}$ $= R34\,865,59$	✓ substitution into correct formula / vevang in korrekte formule ✓ answer/antwoord (2)
6.2.3	Final payment / Finale betaling $= 34\,865,59 \left(1 + \frac{0,13}{2} \right)^1$ $= R37\,131,85$	✓ answer/antwoord (1)



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6.3.1	$x = 765,5 \times 10 = 7\,655,00$ $F = \frac{7655 \left[\left(1 + \frac{0,074}{4} \right)^{17} - 1 \right]}{0,074}$ $= R151\,297,64$	✓ x ✓ substitution in correct formula / vervanging in korrekte formule $\frac{0,074}{4}$ and/en ✓ 17 ✓ R151 297,64 (4)
6.3.2	Profit/Wins = $151\,297,64 - (7655 \times 17)$ = R 21 162,64 % Profit /wins = $\frac{21\,162,64}{7655 \times 17} \times 100$ = 16,26%	✓ profit = total accumulated – total paid / Wins = totaal geakkumuleer – totaal betaal ✓ $7\,655 \times 17$ ✓ answer/antwoord (3)
		[17]

QUESTION 7 / VRAAG 7

7.1	$f(x) = -\frac{4}{x}$ $f(x+h) = -\frac{4}{x+h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{-4}{x+h} - \left(\frac{-4}{x}\right)}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{-4x + 4x + 4h}{x(x+h)}}{h}$ $= \lim_{h \rightarrow 0} \frac{4h}{x(x+h)} \times \frac{1}{h}$ $= 4x^{-2} = \frac{4}{x^2}$	✓ correct substitution into formula and notation / korrekte vervanging in korrekte formule met notasie ✓ simplification / vereenvoudiging ✓ $\lim_{h \rightarrow 0} \frac{4h}{x(x+h)} \times \frac{1}{h}$ ✓ answer/antwoord (4)
7.2.1	$f(x) = -\frac{5}{x^2} + (4x-1)\pi$ $= -5x^{-2} + 4\pi x - \pi$ $f'(x) = 10x^{-3} + 4\pi + 0$	✓ simplification / vereenvoudig ✓ $10x^{-3}$ ✓ 4π (3)



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7.2.2	$D_x \left[\frac{\sqrt[4]{x^3} - 2x^5}{x} \right]$ $= D_x \left[\frac{x^{\frac{3}{4}} - 2x^5}{x} \right]$ $= D_x \left[x^{-\frac{1}{4}} - 2x^4 \right]$ $= -\frac{1}{4} x^{-\frac{5}{4}} - 8x^3$	$\checkmark \sqrt[4]{x^3} = x^{\frac{3}{4}}$ $\checkmark x^{-\frac{1}{4}} - 2x^4$ $\checkmark -\frac{1}{4} x^{-\frac{5}{4}}$ $\checkmark -8x^3$ (4)
7.2.3	$y = \frac{x^2 - x - 6}{x - 3}$ $= \frac{(x-3)(x+2)}{x-3}$ $= x + 2$ $\frac{dy}{dx} = 1$	$\checkmark$ factorisation/faktorisering $\checkmark$ derivative/afgeleide (2)
		[13]

QUESTION 8 / VRAAG 8

8.1	$x = -\frac{1}{3} \text{ or } x = 1$	$\checkmark \checkmark$ x-values /waardes (2)
8.2	$x = \frac{1 - \frac{1}{3}}{2}$ $x = \frac{1}{3}$	$\checkmark$ midpoint / middelpunt $\checkmark x = \frac{1}{3}$ (2)
8.3	$x \in \left(-\frac{1}{3}; 1\right)$ OR $-\frac{1}{3} < x < 1$	$\checkmark \checkmark$ answer (2)
8.4	$y = a \left(x + \frac{1}{3}\right)(x-1)$ $1 = a \left(\frac{1}{3}\right)(0-1)$ $a = -3$ $y = -3 \left(x + \frac{1}{3}\right)(x-1)$ $g'(x) = -3x^2 + 2x + 1$	$\checkmark$ substitution / vervanging $\checkmark$ substituting / vervang (0;1) $\checkmark$ value of a / waarde van a $\checkmark$ answer/antwoord (4)



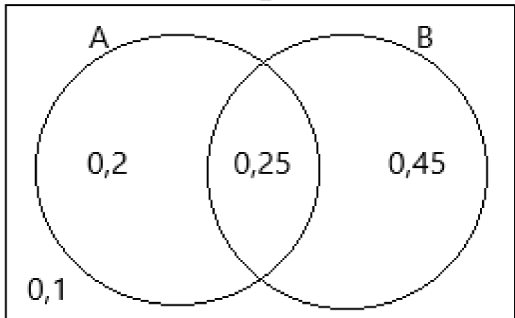
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8.5	$g(x) + 1 = ax^3 + bx^2 + cx + d + 1$ $0 = a(0)^3 + b(0)^2 + c(0) + d + 1$ $0 = d + 1$ $d = -1$ $g(x) = ax^3 + bx^2 + cx - 1$ $g'(x) = 3ax^2 + 2bx + c$ $= -3x^2 + 2x + 1$ $\therefore 3a = -3 \quad 2b = 2 \quad c = 1$ $a = -1 \quad b = 1$	$\checkmark g(x) + 1$ $\checkmark$ substitute / vervang (0 ; 0) $\checkmark g'(x) = 3ax^2 + 2bx + c$ $\checkmark$ equating derivatives / vergelyking van afgeleides $\checkmark$ equating coefficients vergelyking van koëffisiënte (5)
		[15]

QUESTION 9 / VRAAG 9

9.1	Breadth of the rectangle / breedte van reghoek $CD = -4p + 8 - (4p - 8)$ $= -8p + 16$ $Area = l \times b$ $= p(-8p + 16)$ $A(p) = -8p^2 + 16p$	$\checkmark$ difference / verskil $\checkmark$ breadth in terms of p / breedte in terme van p $\checkmark$ Substitution / vervanging (3)
9.2	$A'(p) = 0$ $-16p + 16 = 0$ $\therefore p = 1$ $A(1) = -8(1)^2 + 16(1)$ $= 8 \text{ units}^2 / \text{vierkante eenhede}$	$\checkmark A'(p) = 0$ $\checkmark -16p + 16$ $\checkmark$ value of p $\checkmark$ substitution $\checkmark$ answer (5)
		[8]

QUESTION 10 / VRAAG 10

10.1.1		$\checkmark$ 0,2 and 0,25 $\checkmark$ 0,45 $\checkmark$ 0,1 (3)
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10.1.2	$P(A' \text{ and/en } B) = 0,45$	✓ answer/antwoord (1)
10.1.3	$P(A' \text{ or/of } B) = 0,8$	✓ answer/antwoord (1)
10.1.4	$P(A \text{ and/en } B) = 0,25$ $P(A) \times P(B) = 0,45 \times 0,7 = 0,315$ $P(A \text{ and/en } B) \neq P(A) \times P(B)$ $\therefore$ Not independent / nie onafhanklik	✓ 0,315 ✓ $\neq$ ✓ conclusion / gevolgtrekking (3)
10.2.1	$\frac{9!}{4! 3! 2!} = 1\,260$	✓ numerator/teller ✓ denominator/noemer ✓ answer/antwoord (3)
10.2.2	$\frac{3 \times 7! \times 2}{4! 2!} = 630$	✓ numerator/teller ✓ denominator/noemer ✓ answer/antwoord (3)
10.2.3	$\frac{630}{1260} = \frac{1}{2}$	✓ answer/antwoord (1)
		[15]

TOTAL / TOTAAL: 150