education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

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.

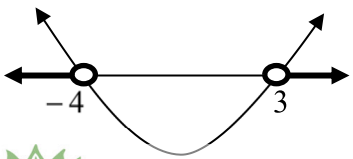
TAKE NOTE:

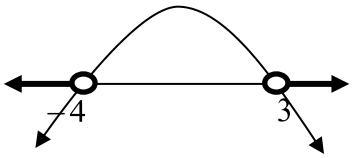
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guideline.
- Assuming values/answers in order to solve a problem is unacceptable.

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	$\sqrt{x-2}+4=x$ $\sqrt{x-2}=x-4$ $\left(\sqrt{x-2}\right)^2=(x-4)^2$ $x-2=x^2-8x+16$ $x^2-9x+18=0$ $(x-6)(x-3)=0$ $x=6 \text{ or } x\neq 3$	✓rewrite and squaring /herskryf en kwadrering ✓standard form / standaard vorm ✓factors / faktore ✓both answers with exclusion / beide antwoorde met uitsluiting (4)
1.1.4	$3^{4x}-8.3^{2x}-9=0$ $(3^{2x}-9)(3^{2x}+1)=0$ $3^{2x}=9 \text{ or } 3^{2x}=-1$ $2x=2$ 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)

	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	$x-y=3 \text{ and } x^2-xy-2y^2=10$ $x=y+3$ ....(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/invervanging ✓ standard form / standaard vorm ✓ factorising/faktorisering ✓ both y-values / beide y-waardes ✓ both values of x /beide x-waardes (6) ✓ $y=x-3$ ✓ substitution/inervanging ✓ standard form / standaard vorm ✓ factorising/faktorisering ✓ both x-values / beide x-waardes ✓ both values of y-values /beide y-waardes (6)

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/isoleer a^2+b^2 ✓expansion / uitbreiding ✓answer/antwoord (4)
		[26]

QUESTION 2 / VRAAG 2

2.1.1	181 … 9 5 1 -4 -4 $T_n=a+(n-1)d$ $=181+(n-1)(-4)$ $=185-4n$	✓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	$181+\ldots+17+13\quad(+9+5+1)$ $\therefore n=46-3=43$ terms $S_n=\frac{n}{2}(a+l)$ $=\frac{43}{2}(181+13)$ $=4\,171$ **OR/OF** $S_n=\frac{n}{2}[2a+(n-1)d]$ $=\frac{43}{2}[2(181)+(43-1)(-4)]$ $=4171$	✓ 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)

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

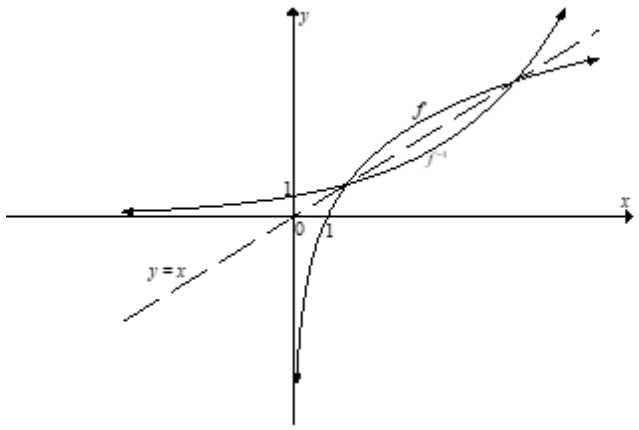
	$27-27\left(\frac{2}{3}\right)^n > 25$ $-27\left(\frac{2}{3}\right)^n > -2$ $\left(\frac{2}{3}\right)^n > \frac{2}{27}$ $n\log\left(\frac{2}{3}\right) > \log\left(\frac{2}{27}\right)$ $n > \log\left(\frac{2}{27}\right) \div \log\left(\frac{2}{3}\right)$ $n > 6{,}419\ldots$ $n = 7$	✓ >25 ✓ simplification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

QUESTION 4 / VRAAG 4

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

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 om ✓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)

		[14]

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	$P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $800\,000 = \frac{57\,000\left[1-\left(1+\frac{0,13}{2}\right)^{-n}\right]}{\frac{0,13}{2}}$ $\frac{800000\left(\frac{0,13}{2}\right)}{57000}-1=-\left(1+\frac{0,13}{2}\right)^{-n}$ $\frac{5}{57}=\left(1+\frac{0,13}{2}\right)^{-n}$ $-n=\frac{\log\frac{5}{57}}{\log\left(1+\frac{0,13}{2}\right)}$ $=-38,64424163$ $n=38,64424163$ n = 39 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	$OB = \frac{57000\left[1-\left(1+\frac{0,13}{2}\right)^{-0,64424163}\right]}{\frac{0,13}{2}}$ $= R34\,865,59$	✓ 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)

6.3.1	$x = 765,5 \times 10 = 7\,655,00$ $F = \dfrac{7655\left[\left(1+\dfrac{0,074}{4}\right)^{17}-1\right]}{\dfrac{0,074}{4}}$ $= \text{R}151\,297,64$	✓ x ✓ substitution in correct formula / vervanging in korrekte formule $\dfrac{0,074}{4}$ and/en ✓ 17 ✓ R151 297,64 (4)
6.3.2	Profit/Wins = $151\,297,64 - (7655 \times 17)$ = R 21 162,64 % Profit /wins = $\dfrac{21\,162,64}{7655 \times 17} \times 100$ = 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	$f(x) = -\dfrac{4}{x}$ $f(x+h) = -\dfrac{4}{x+h}$ $f'(x) = \lim\limits_{h\to 0}\dfrac{f(x+h) - f(x)}{h}$ $= \lim\limits_{h\to 0}\dfrac{\dfrac{-4}{x+h} - (\dfrac{-4}{x})}{h}$ $= \lim\limits_{h\to 0}\dfrac{\dfrac{-4x+4x+4h}{x(x+h)}}{h}$ $= \lim\limits_{h\to 0}\dfrac{4h}{x(x+h)} \times \dfrac{1}{h}$ $= 4x^{-2} = \dfrac{4}{x^2}$	✓ correct substitution into formula and notation / korrekte vervanging in korrekte formule met notasie ✓ simplification / vereenvoudiging ✓ $\lim\limits_{h\to 0}\dfrac{4h}{x(x+h)} \times \dfrac{1}{h}$ ✓ answer/antwoord (4)
7.2.1	$f(x) = -\dfrac{5}{x^2} + (4x-1)\pi$ $= -5x^{-2} + 4\pi x - \pi$ $f'(x) = 10x^{-3} + 4\pi + 0$	✓ simplification / vereenvoudig ✓ $10x^{-3}$ ✓ 4π (3)

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

QUESTION 8 / VRAAG 8

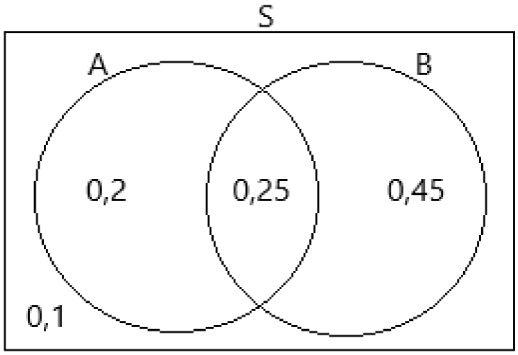
8.1	$x=-\frac{1}{3}$ *or* $x=1$	✓ ✓ x-values /waardes (2)
8.2	$x=\frac{1-\frac{1}{3}}{2}$ $x=\frac{1}{3}$	✓midpoint / middelpunt ✓ $x=\frac{1}{3}$ (2)
8.3	$x\in\left(-\frac{1}{3};1\right)$ OR $-\frac{1}{3}<x<1$	✓✓answer (2)
8.4	$y=a\left(x+\frac{1}{3}\right)(x-1)$ $1=a\left(\frac{1}{3}\right)(0-1)$ $a=-3$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

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

QUESTION 9 / VRAAG 9

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

QUESTION 10 / VRAAG 10

10.1.1		✓ 0,2 and 0,25 ✓ 0,45 ✓ 0,1 (3)

10.1.2	P(A′ and/en B) = 0,45	✓ answer/antwoord (1)
10.1.3	P(A′ or/of B) = 0,8	✓ answer/antwoord (1)
10.1.4	P(A and/en B) = 0,25 P(A) × P(B) = 0,45 × 0,7 = 0,315 P(A and/en B) ≠ P(A) × P(B) ∴ Not independent / nie onafhanklik	✓0,315 ✓ ≠ ✓ 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