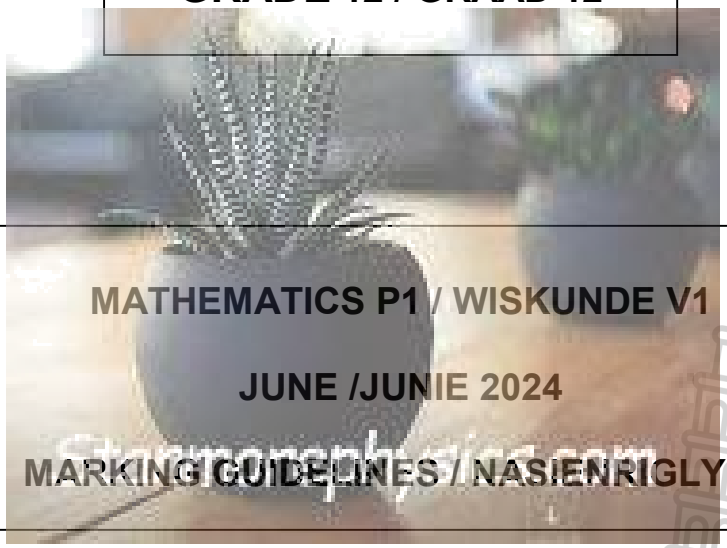
education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12 / GRAAD 12



MATHEMATICS P1 / WISKUNDE V1

JUNE /JUNIE 2024

MARKING GUIDELINES / NASIENRIGLYNE

MARKS / PUNTE: 150

The marking guideline consists of 11 pages.

Die nasienriglyne bestaan uit 11 bladsye.

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NSC / NSS Marking Guideline /Nasienriglyn

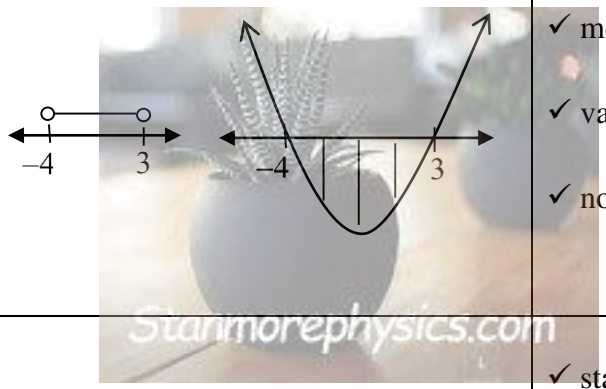
TAKE NOTE:

- 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	$x^2 - 49 = 0$ $(x+7)(x-7) = 0$ $x = -7 \text{ or } x = 7$	✓ factorisation/faktorisering ✓ answers (2)
1.1.2	$(x+4)(3-x) > 0$ $(x+4)(x-3) < 0$ $-4 < x < 3$ OR/OF $x \in (-4;3)$ 	✓ method/metode ✓ values/waardes ✓ notation/notasie (3)
1.1.3	$(x+4)(3-x) = 5$ $-x^2 - x + 12 = 5$ $-x^2 - x + 7 = 0$ $x^2 + x - 7 = 0$ $x = \frac{-1 + \sqrt{1^2 - 4(1)(-7)}}{2(1)}$ $x = \frac{-1 + \sqrt{29}}{2}$ $x = 2{,}193 \text{ or } x = -3{,}193$ −1 for rounding (3 decimals) −1 as nie afgerond tot 3 desimale	✓ standard form ✓ substitution into correct formula substitusie in regte formule ✓ 2,193 ✓ −3,193 (4)
1.2.1	$\sqrt{x+2} = x - 4$	

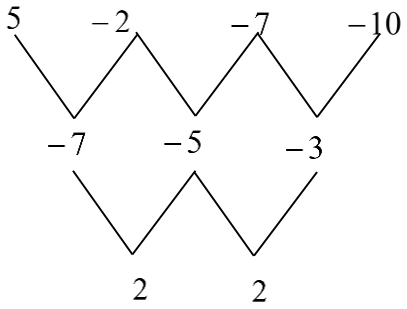
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	$x+2=(x-4)^2$ $x+2=x^2-8x+16$ $x^2-9x+14=0$ $(x-7)(x-2)=0$ $x=7 \text{ or } x\neq 2$	✓squaring both sides kwadreer beide kante ✓ standard form ✓ factors/faktore ✓ $x=7$ only (4)
1.2.2	$2x^{-\frac{5}{3}}=64$ $x^{-\frac{5}{3}}=32$ $\left(x^{-\frac{5}{3}}\right)^{-\frac{3}{5}}=\left(2^5\right)^{-\frac{3}{5}}$ $x=2^{-3}$ $x=\frac{1}{8}$	✓ divide by 2/ deel deur 2 ✓ exponential law eksponentwet ✓ answer (3)
1.3	$x=-1+2y$ $(-1+2y)^2-7-y^2=-y$ $1-4y+4y^2-7-y^2+y=0$ $3y^2-3y-6=0$ $y^2-y-2=0$ $(y-2)(y+1)=0$ $y=2 \quad or \quad y=-1$ $x=-1+2(2) \text{ or } x=-1+2(-1)$ $=3 \qquad\qquad =-3$	✓ $x=-1+2y$ ✓ substitution of x ✓ standard form ✓ factorising/faktorisering ✓ both y-values / beide y-waardes ✓ both values of x /beide x-waardes (6)
1.4	$2^x=1-2p$ $2^x>0$ For real solutions: $1-2p>0$ Vir reële oplossings: $-2p>-1$ $p<\frac{1}{2}$	✓$1-2p>0$ ✓answer (2)
1.5	$M=\sqrt{\frac{9-3p}{p+1}}$	
1.5.1	To be undefined / Om ongedefinieerd te wees : $p+1=0$	✓ $p=-1$ (1)

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	$p=-1$	
1.5.2	To be rational/Om rasionaal te wees $p=0 \quad (M=\sqrt{9}=3)$ OR $p=3 \quad \left(M=\sqrt{\frac{0}{4}}=0\right)$	✓ any of the 2 values of p enige van die 2 waardes van p (1)
		[26]

QUESTION 2 / VRAAG 2

2.1.1	 $2a=2 \quad 3(1)+b=-7 \quad a+b+c=5$ $a=1 \quad b=-10 \quad c=14$ $T_n=n^2-10n+14$	✓ $a=1$ ✓ $b=-10$ ✓ $c=14$ ✓ T_n answer (4)
2.1.2	$n^2-10n+14<-11$ $n^2-10n+25<0$ $(n^2-5)^2<0$ This is **not true** for any value of n, thus the sequence will not have a term less than –11.	✓ substituting -11 ✓ standard form ✓ factorise ✓ conclusion /gevolgtrekking (4)
2.2	$a=\frac{1}{181}; \quad d=\frac{1}{181}; \quad n=180$ ∴ The sequence is arithmetic/die ry is rekenkundig $S_{180}=\frac{180}{2}\left[2(\frac{1}{181})+\frac{1}{181}(179)\right]=90$	✓ a *and* d ✓ substitution/substitusie ✓ answer (3)
2.3.1	$r=1,1=\frac{11}{10}$ $T_{12}=1,21(1,1)^{11}$ $=3,452271214$	✓ $r=1,1$ ✓ substitution into T_n ✓ answer (3)

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2.3.2	$S_{12} = \frac{1{,}21(1{,}1^{12} - 1)}{1{,}1 - 1}$ $= 25{,}87498336$ $\approx 25{,}875$	✓ $a = 1{,}21$ ✓ substitution ✓ answer (3)
2.4	For the series $1 + 4 + 7 + 10 + \ldots\ldots\ldots + 22$ $T_n = 1 + 3(n-1)$ $= 3n - 2$ $22 = 3n - 2$ $\therefore n = 8$ For the series $3 + 9 + 27\ldots\ldots\ldots + 6561$ $T_n = 3(3)^{n-1} = 3^n$ Therefore the sum in sigma notation: $\sum_{k=1}^{8} \frac{3k-2}{3^k}$	✓ $T_n = 3n - 2$ ✓ $n = 8$ ✓ $T_n = 3^n$ ✓sigma notation (4)
2.5	$r = \frac{4x^2 - 16}{2x - 4}$ $= \frac{(2x-4)(2x+4)}{2x-4}$ $= 2x + 4$ $-1 < r < 1$ $-1 < 2x + 4 < 1$ $-\frac{5}{2} < x < -\frac{3}{2}$	✓ $r = 2x + 4$ ✓ $-1 < r < 1$ ✓ $-1 < 2x + 4 < 1$ ✓ $-\frac{5}{2} < x < -\frac{3}{2}$ (4)
		[25]

QUESTION 3 / VRAAG 3

3.1	$-4x^2 + 6 = 0$ $-4x^2 = -6$ $x^2 = \frac{3}{2}$ $x = \pm\sqrt{\frac{3}{2}}$ x-coordinate of A is $-\sqrt{\frac{3}{2}} = -1{,}22$	✓ $x^2 = \frac{3}{2}$ ✓x coordinate of A $-\sqrt{\frac{3}{2}} = -1{,}22$ (2)
3.2	Max / maks TP = (0; 6),	✓ Max TP

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	$\therefore f(x) \leq 6,\ \therefore f(x) \neq 8$	✓Answer (2)
3.3	Length of CBD $= -4x^2 + 6 - \left(-2\sqrt{-x}\right)$ $= -4x^2 + 6 + 2\sqrt{-x}$	✓ difference/verskil ✓ answer (2)
3.4	Max length: Derivate/afgeleide = 0 $CBD'(x) = -8x + \left(\frac{1}{2}\right)(2)(-x)^{-\frac{1}{2}}$ $-8x + (-x)^{-\frac{1}{2}} = 0$ $-8x = -(-x)^{-\frac{1}{2}}$ $64x^2 = (-x)^{-1} = -\frac{1}{x}$ $x^3 = -\frac{1}{64}$ $x = -\frac{1}{4}$ Max length $= -4\left(-\frac{1}{4}\right)^2 + 6 + \left[2\left(\sqrt{-\left(-\frac{1}{4}\right)}\right)\right]$ $= \frac{27}{4} = 6\frac{3}{4}$	✓ derivative/afgeleide ✓ equate to 0/stel gelyk aan 0 ✓simplification/vereenvoudiging ✓ answer for x ✓ substitution / substitusie ✓ answer (6)
3.5	$g(x) = -2\sqrt{-x}$ For inverse h: $x = -2\sqrt{-y}$ $x^2 = 4(-y)$ $y = -\frac{x^2}{4};\ \ x \leq 0$	✓ change x and y ruil x en y om ✓ simplification / vereenvoudig ✓ equation / vergelyking ✓ $x \leq 0$ (4)
3.6	$k(x) = -\left(-2\sqrt{-x}\right)$ $= 2\sqrt{-x};\ x \leq 0$	✓answer (1)
3.7	$-6 < k < 0$	✓ values/waardes ✓ notation/notasie (2)
		[19]

QUESTION 4 / VRAAG 4

4.1	$x = 3$ $y = 2$	✓ $x = 3$ ✓ $y = 2$ (2)

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4.2	$y = 2^0 + 1 = 2$ *y*-intercept / *y*-afsnit: (0; 2)	✓ $x = 0$ ✓ (0; 2) (2)
4.3	$0 = \frac{a}{-1+3} + 2$ $-2 = \frac{a}{2}$ $a = -4$ $f(x) = -\frac{4}{x+3} + 2$	✓ substitution of *p* and *q* ✓ substitution of $(-1;0)$ ✓ value of *a* ✓ equation (4)
4.4	$y = -(x+3) + 2$ $y = -x - 1$	✓ substitution ✓ equation (2)
4.5	domain of / definisieversameling van $4f(x-2)$ $x \in R;\ x \neq -1$	✓✓ $x \neq -1$ (2)
4.6	$h(x) = 2^x$	✓ equation (1)
4.7	$h^{-1}(x) = \log_2 x$	✓✓ log equation (2)
4.8	$y \in R$	✓ answer (1)
4.9	$-3 < x \leq -1$	✓values ✓notation (2)
		[18]

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QUESTION 5 / VRAAG 5

5.1	$A = P(1-i.n)$ $0 = x(1-0{,}125.n)$ $0{,}125n = 1$ $n = 8\ years$/ jaar	✓ substitution into correct formula ✓ *n* value (2)
5.2.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m$ $1 + 0{,}073 = (1 + \frac{i_{nom}}{4})^4$ $\sqrt[4]{1{,}073} - 1 = \frac{i_{nom}}{4}$ $0{,}017770\ldots = \frac{i_{nom}}{4}$ $i_{nom} = 0{,}07108\ldots$ Rate = 7,108%	✓ Substitution into correct formula ✓ Use of surd ✓ $i_{nom} = 0{,}07108\ldots$ ✓ Rate (4)

5.2.2	$A = 25000(1+0{,}073)^{5{,}5}$ (66 months = $5{,}5\,years$) $= R36833{,}12$	✓ substitution into correct formula ✓ 5,5 years ✓ answer (3)
5.3	$x = 100000\left(1+\frac{0{,}06}{12}\right)^{-60} + 100000(1+\frac{0{,}06}{12})^{-36}$ $= R157701{,}71$ $\approx$ R157 700	✓ first bracket substitution ✓ second bracket substitution ✓ R157 701,71 ✓ R157 700 (4)
5.4	$A = 5000\left(1+\frac{0{,}084}{4}\right)^{8}\left(1+\frac{0{,}079}{2}\right)^{10}$ = R 86 980,30	✓8 and 10 ✓$\left(1+\frac{0{,}084}{4}\right)^{8}$ ✓$\left(1+\frac{0{,}079}{2}\right)^{10}$ ✓answer (4)
		[17]

QUESTION 6 / VRAAG 6

6.1	$f(x) = 2-3x^2$ $f(x+h) = 2-3(x+h)^2$ $f(x+h) = 2-3(x^2+2xh+h^2)$ $= 2-3x^2-6xh-3h^2$ $f'(x) = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $f'(x) = \lim_{h\to 0}\frac{[2-3x^2-6xh-3h^2-(2-3x^2)]}{h}$ $f'(x) = \lim_{h\to 0}\frac{2-3x^2-6xh-3h^2-2+3x^2}{h}$ $f'(x) = \lim_{h\to 0}\frac{-6xh-3h^2}{h}$ $f'(x) = \lim_{h\to 0}\frac{h(-6x-3h)}{h}$ $= -6x$	✓ substitute/ vervang $f(x+h)$ ✓ correct substitution into formula and notation ✓ simplification ✓ common factor gemeenskaplike faktor ✓ answer (5)

6.2.1	$f(x)=\frac{x^4}{2}+x^0-\pi t^2$ $f'(x)=2x^3+0-0$ $=2x^3$	✓ $2x^3$ ✓ 0 (2)
6.2.2	$D_x\left[\frac{-3x^3+\sqrt[5]{x^2}}{x^2}\right]$ $=D_x\left[-\frac{3x^3}{x^2}+\frac{x^{\frac{2}{5}}}{x^2}\right]$ $=D_x\left[-3x+x^{\frac{-8}{5}}\right]$ $=-3-\frac{8}{5}x^{\frac{-13}{5}}$	✓ $\sqrt[5]{x^2}=x^{\frac{2}{5}}$ ✓ $-\frac{8}{5}x^{-\frac{13}{5}}$ ✓ 3 ✓ $-\frac{8}{5}x^{-\frac{13}{5}}$ (4)
6.2.3	$y=\frac{8x^3-125}{2x-5}$ $=\frac{(2x-5)(4x^2+10x+25)}{2x-5}$ $=4x^2+10x+25$ $\frac{dy}{dx}=8x+10$	✓factorisation/faktorisering ✓answer ✓derivative/afgeleide (3)
		[14]

QUESTION 7 / VRAAG 7

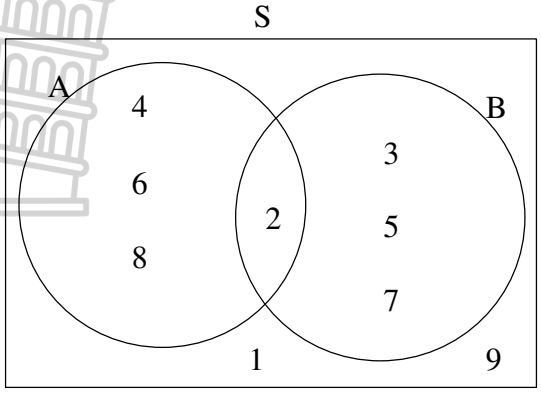
7.2	$(x^2-4x+4)(x+3)=0$ $(x-2)(x-2)(x+3)=0$ $x=2 \quad or \quad x=-3$ $B(2;0)$ $\therefore AB=5units$	✓ factorise/faktoriseer ✓ $(x-2)(x-2)(x+3)=0$ ✓ B(2; 0) ✓ AB is 5 units (4)
7.3	$f''(x)>0$ $6x-2>0$ $x>\frac{1}{3}$	✓ $f''(x)>0$ ✓ $6x-2>0$ ✓ $x>\frac{1}{3}$ (3)
7.4	$f\left(\frac{1}{3}\right)=\left(\frac{1}{3}\right)^3-\left(\frac{1}{3}\right)^2-8\left(\frac{1}{3}\right)+12$	✓ y- coordinate

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	$=\frac{250}{27}$ $f'\left(\frac{1}{3}\right)=3\left(\frac{1}{3}\right)^2-2\left(\frac{1}{3}\right)-8$ $=-\frac{25}{3}=m$ $y=-\frac{25}{3}x+c$ $\frac{250}{27}=-\frac{25}{3}\left(\frac{1}{3}\right)+c$ $c=\frac{325}{27}$ $y=-\frac{25}{3}x+\frac{325}{27}$	✓ gradient ✓substitution ✓equation
7.5	$k>18\frac{14}{27}\ or\ k<0$	✓✓two answers (2)
7.6	$x>-3,\ x\neq 2$	✓ $x>-3$ ✓ $x\neq 2$ (2)
		[19]

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QUESTION 8 / VRAAG 8

8.1.1		✓ 2 ✓ 4; 6; 8 ✓ 3; 5; 7 ✓ 1; 9 (4)
8.1.2	No, $A \cup B \neq 1$	✓ No ✓ reason (2)
8.1.3	$n(A \cup B)' = 2$	✓ answer (1)
8.1.4	$P(Even\ and\ prime) = \frac{1}{9}$	✓ answer (1)
8.2	P(Male and Speeding) = $\frac{398}{1000} = 0,398$ P(Male) × P(Speeding) = $\frac{615}{1000} \times \frac{603}{1000} = 0,37$ P(Male and Speeding) $\neq$ P(*Male*) × P(*Speeding*) ∴ Not independent / nie onafhanklik	✓ $\frac{398}{1000} = 0,398$ ✓ 0,37 ✓ $\neq$ ✓ conclusion / gevolgtrekking (4)
		[12]

TOTAL / TOTAAL: 150