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.

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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.

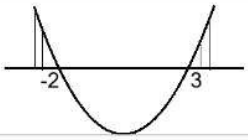
LET WEL:

- *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	$(2^5)^{\frac{1}{3}}=(2^3)^{3x}.2^{6x}$ $2^{\frac{5}{3}}=2^{9x}.2^{6x}$	✓ exponential form	

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	$2^{\frac{5}{3}} = 2^{15x}$ $\frac{5}{3} = 15x$ $x = \frac{1}{9}$	✓ adding exponents ✓ answer (3)
1.1.5	$-(x+2)(x-3) \le 0$ $x = -2$ and $x = 3$ are critical values $x \le -2$ or $x \ge 3$ 	✓critical values ✓✓ $x \le -2$ or $x \ge 3$ (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 ∴ 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 ✓ $= 4k^2 + 4k + 4$ ✓ $k = \frac{-4 \pm \sqrt{(4)^2 - 4(4)(4)}}{2(4)}$ ✓ 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]

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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	m 5 n 19 $5-m$ $n-5$ $19-n$ $n+m-10=2$ $-2n+24=2$ $\therefore n = 11$ $m = 12 - 11 = 1$	✓second difference ✓equating to 2 ✓n-value ✓m- value (4)
2.2.2	1 5 11 19 4 6 8 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]

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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	$n = 21 - 3 + 1 = 19$ $S_{19} = \frac{-8x\left[(-2)^{19} - 1\right]}{-2-1}$ $= -1398104\ x$	✓n- value ✓substitution ✓answer (3)
3.2.1	*TERM* | *INCOME* | *EXPENSES* | *SAVINGS* 1 | *R*150 000 | *R*105 000 | *R*45 000 2 | *R*1635 00 | *R*122 000 | *R*41500 3 | *R*177 000 | *R*139 000 | *R*38 000 Savings series is $R45\,000 + R41500 + R38\,000 = \ldots + 0$	✓income ✓expenses ✓savings ✓savings series (4)
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]

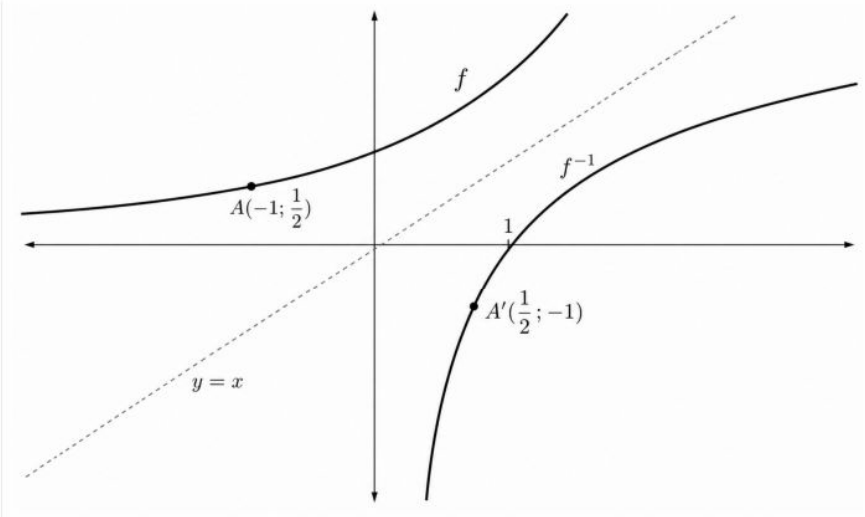
QUESTION 4/VRAAG 4

4.1	$y = \frac{a}{x-1} + 2$ $0 = \frac{a}{0-1} + 2\ \ 0 = -a + 2$ $a = 2$ $y = \frac{2}{x-1} + 2$	✓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)

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4.3	$x = 2$ $y = -1$	✓ $x = 2$ ✓ $y = -1$ (2)
4.4	$L\left(-\frac{1}{2};0\right)$, Symmetry $LQ = \frac{5}{2} - \left(-\frac{1}{2}\right) = 3 units$	✓ 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* $x > 1$	✓1st Interval ✓2nd 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]

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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]

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QUESTION 7/VRAAG 7

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

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QUESTION 8/VRAAG 8

8.1	$y = a(x - R_1)(x - R_2)(x - R_3)$ $y = -1(x+1)^2(x-2)$ $= -x^3 + 3x + 2$	✓ $a = -1$ ✓ $y = -1(x+1)^2(x-2)$ ✓ 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$(1;\ 4)$	✓ $f'(x) = 0$ ✓ $f'(x) = -3x^2 + 3$ ✓ x-values ✓ 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	✓ $f'(x) = -9$ ✓ substitution of 2 ✓ answer	(3)
8.4	C$'(4\ ;\ 4)$	✓ answer	(1)
8.5	$x \in (-\infty;-1) \cup (1;2)$ **OR** $x < -1$ *or* $1 < x < 2$	✓ 1st interval ✓ 2nd interval	(2)
8.6	$k \in (-\infty;0) \cup (4;\infty)$ **OR** $x < 0$ *or* $x > 4$	✓ 1st interval ✓ 2nd interval	(2)
			[15]

QUESTION 9/*VRAAG 9*

9.1	After t hours, $BF = 20t$ and $CD = 35t$ $\therefore BC = 80 - 35t$ $FC = \sqrt{(20t)^2 + (80 - 35t)^2}$ $= \sqrt{400t^2 + 6400 - 5600t + 1225t^2}$ $= \sqrt{1625t^2 - 5600t + 6400}$	✓ $BF = 20t$ and $CD = 35t$ ✓ $BC = 80 - 35t$ ✓ substitution ✓ simplification	(4)

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9.2	**Closest** means minimum distance between the two. FC is minimum if FC^2 is minimum. $FC^2 = 1625t^2 - 5600t + 640$ $\frac{dFC^2}{dt} = 3250t - 5600$ $3250t - 5600 = 0$,for minimum distance $\therefore t = \frac{5600}{3250} = 1{,}72hrs$	✓ $FC^2 = 1625t^2 - 5600t + 640$ ✓ $\frac{dFC^2}{dt}$ ✓equating to 0 ✓answer (4)
9.3	$FC = \sqrt{1625(1.72)^2 - 5600(1.72) + 6400}$ $= 39{,}69km$ apart	✓substitution ✓answer (2)
		[10]

QUESTION 10/*VRAAG 10*

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

TOTAL / TOTAAL: 150

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