



education

Department of
Education
FREE STATE PROVINCE

PREPARATORY EXAMINATION
VOORBEREIDENDE EKSAMEN

GRADE/*GRAAD* 12

MATHEMATICS P1
WISKUNDE V1

SEPTEMBER 2025

MARKS/*PUNTE*: 150

MARKING GUIDELINES
NASIENRIGLYNE

These marking guidelines consist of 17 pages.
Hierdie nasienriglyne bestaan uit 17 bladsye.

NOTE:

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

NOTA:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas.*
- *Om antwoorde/waardes aan te neem om 'n probleem op te los, is ONAANVAARBAAR.*

QUESTION/VRAAG 1

1.1.1	$x(x+3) = 28$ $x^2 + 3x - 28 = 0$ $(x+7)(x-4) = 0$ $x = -7 \text{ or } x = 4$	✓ Standard form ✓ Factors ✓ Answers (3)
1.1.2	$2x^2 + 7x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-7 \pm \sqrt{(7)^2 - 4(2)(-1)}}{2(2)}$ $x = 0,14 \quad \text{or} \quad x = -3,64 \quad \text{answer only } \frac{3}{3}$	 ✓ substitution into correct formula ✓ $x = -3,64$ ✓ $x = 0,14$ (3)
1.1.3	$(x+4)(5-x) \geq 0$ c/v: -4 and/en 5 $-4 \leq x \leq 5$	 ✓ Critical values ✓✓ answers (combo marks) (3)
1.1.4	$2\sqrt{x+4} - 3 = x+1$ $2\sqrt{x+4} = x+4$ $4(x+4) = (x+4)^2$ $x^2 + 8x + 16 - 4x - 16 = 0$ $x^2 + 4x = 0$ $x(x+4) = 0$ $x = 0 \text{ or/of } x = -4$	 ✓ isolating surd ✓ squaring both sides ✓ standard form ✓ factors ✓ answers (5)

1.2	$y - x = -7$ $x^2 + 3xy = -27$ $y = x - 7$ $x^2 + 3x(x - 7) = -27$ $x^2 + 3x^2 - 21x + 27 = 0$ $4x^2 - 21x + 27 = 0$ $(x - 3)(4x - 9) = 0$ $x = 3 \text{ or } x = \frac{9}{4}$ $y = x - 7$ $y = 3 - 7$ $y = -4$ $y = \frac{9}{4} - 7$ $y = -\frac{19}{4}$	✓ $y = x - 7$ ✓ substitution ✓ standard form ✓ factors ✓ both x values ✓ both y values (independent) (6)
1.3	$\sqrt[n]{\frac{2^n \cdot 5^n + 2^n \cdot 2^2}{5^n \cdot 5^n + 4 \cdot 5^n}}$ $= \sqrt[n]{\frac{2^n (5^n + 4)}{5^n (5^n + 4)}}$ $= \sqrt[n]{\frac{2^n}{5^n}}$ $= \sqrt[n]{\left(\frac{2}{5}\right)^n}$ $= \frac{2}{5}$	✓ Expansion ✓ factors ✓ Simplification ✓ Answer (4)
		[24]

QUESTION/VRAAG 2

2.1	10; 16	✓ 10; ✓ 16 (2)
2.2	$2a = 4$ $a = 2$ $3a + b = 2$ $3(2) + b = 2$ $b = -4$ $a + b + c = 8$ $2 + (-4) + c = 8$ $c = 10$	✓ $2a = 4$ ✓ $3(2) + b = 2$ ✓ $2 + (-4) + c = 8$ (3)
2.3	$2n^2 - 4n + 10 = 3050$ $n^2 - 2n - 1520 = 0$ $(n - 40)(n + 38) = 0$ $n = 40$ or/of $n \neq -38$	✓ Equating (A) ✓ Factors ✓ $n = 40$ with rejection (3)
		[8]

QUESTION/VRAAG 3

3.1.1	$r = 2$	✓ Answer (1)
3.1.2	No, r is not between -1 and 1/ <i>Nee, r is nie tussen -1 en 1 nie</i>	✓ No ✓ reason (2)
3.1.3	$T_n = ar^{n-1}$ $2304 = \frac{9}{2}(2)^{n-1}$ $2^{n-1} = 2^9$ $n = 10$	✓ substitution ✓ simplification ✓ answer (3)
3.1.4	$S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{\frac{9}{2}(2^{10} - 1)}{2 - 1}$ $= 4603,5$	✓ substitution ✓ answer (2)
3.2.1	$T_2 = 21$ (accept 21, 24 - but order important) $T_3 = 24$	✓ 21 ✓ 24 (2)
3.2.2	$99 = 18 + (n - 1)3$ $3n = 84$ $n = 28$ $S_{28} = \frac{28}{2}(18 + 99)$ $= 1638$	✓ $T_n = 3n - 15$ ✓ $T_n = 99$ ✓ Value of n ✓ Substitution into the sum formula ✓ Answer (5)

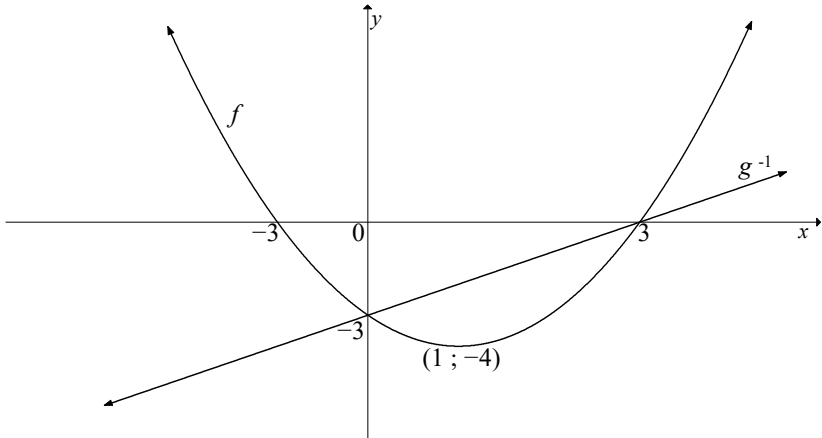
3.2.3	$18 + 24 + 30 + \dots + 96$ $96 = 18 + (n-1)6$ $6n = 84$ $n = 14$ $S_{14} = \frac{14}{2}(18 + 96)$ $= 798$ $\therefore S_n = 1638 - 798$ $= 840$ OR/OF $21 + 27 + 33 + \dots + 99$ $99 = 21 + (n-1)(6)$ $6n = 84$ $n = 14$ $\therefore S_n = \frac{n}{2}(a + l)$ $\therefore S_{14} = \frac{14}{2}(21 + 99)$ $\therefore S_{14} = 840$	✓ Series ✓ equating ✓ value of n ✓ Substitution into the sum formula ✓ Answer ✓ Series ✓ equating ✓ value of n ✓ Substitution into the sum formula ✓ Answer (5)
		[20]

QUESTION/VRAAG 4

4.1	$p = 2$ $q = -1$ i.t.o x and $y \quad \frac{0}{2}$	$\checkmark \quad p = 2$ $\checkmark \quad q = -1$ (2)
4.2	$g(x) = \frac{a}{x+p} + q$ $0 = \frac{a}{-6+2} - 1$ $1 = \frac{a}{-4}$ $a = -4$ $g(x) = \frac{-4}{x+2} - 1$	$\checkmark$ Substitution of $(-6; 0)$ $\checkmark$ Value of a $\checkmark$ Answer (3)
4.3	$y = -x + c$ $-1 = -(-2) + c$ $\therefore c = -3$ $\therefore y = -x - 3$ $\therefore x = -y - 3$ $\therefore y = -x - 3$	$\checkmark$ substitution $\checkmark$ Equation $\checkmark$ Swop x and y $\checkmark$ Equation (4)
4.4	$y = -4$	$\checkmark$ Answer (1)
4.5	$f(x) = b^x - 4$ $5 = b^2 - 4$ $b^2 = 9$ $b = 3$ $\therefore f(x) = 3^x - 4$	$\checkmark$ substitution $(2 ; 5)$ $\checkmark$ value of b $\checkmark$ equation (3)
4.6	$h(x) = f(x) + 4$ $= 3^x - 4 + 4$ $\therefore h(x) = 3^x$ Answer only $\frac{2}{2}$	$\checkmark$ substitution $\checkmark$ answer (2)

4.7	$h(x) = y = 3^x$ $x = 3^y$ $h^{-1}(x) = y = \log_3 x$	✓ swop x and y ✓ answer (2)
4.8	$x > -2$	✓✓ Answer (2)
		[19]

QUESTION/VRAAG 5

5.1	y -intercept of f : $(0; -3)$ / y -afsnit van f : $(0; -3)$ y -intercept of g : $(0;3)$ / y -afsnit van g : $(0;3)$	$\checkmark$ y intercept of f : $(0; -3)$ $\checkmark$ y intercept of g : $(0;3)$ (2)
5.2	$x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3$ or $x = -1$ $x = -\frac{b}{2a}$ $= -\frac{-2}{2(1)}$ $x = 1$ $y = 1^2 - 2(1) - 3$ $y = -4$ $TP(1; -4)$ $g(x) = x - 3$ $y = -3$ $x = 3$	Mark on graphs If no graphs but caculations, then give for x - and y -intercepts and tp  $\checkmark$ y - intercepts $\checkmark$ x - intercepts $\checkmark$ $TP(1; -4)$ $\checkmark$ Shape f $\checkmark$ increasing g^{-1} (5)
5.3	$0 < -3 - k < 1$ $\therefore -4 < k < -3$ Answer only: Full marks/ Slegs Antwoord: Volpunte	$\checkmark$ $0 < -3 - k < 1$ $\checkmark\checkmark$ $-4 < k < -3$ (3)
5.4	$2(2x - 2) \geq 0$ $4x - 4 \geq 0$ $4x \geq 4$ $x \geq 1$ (learners can draw it as well) Answer only: Full marks/ Slegs Antwoord: Volpunte	$\checkmark\checkmark$ $f'(x).f''(x) \geq 0$ $\checkmark$ Answer (3)
		[13]

QUESTION/VRAAG 6

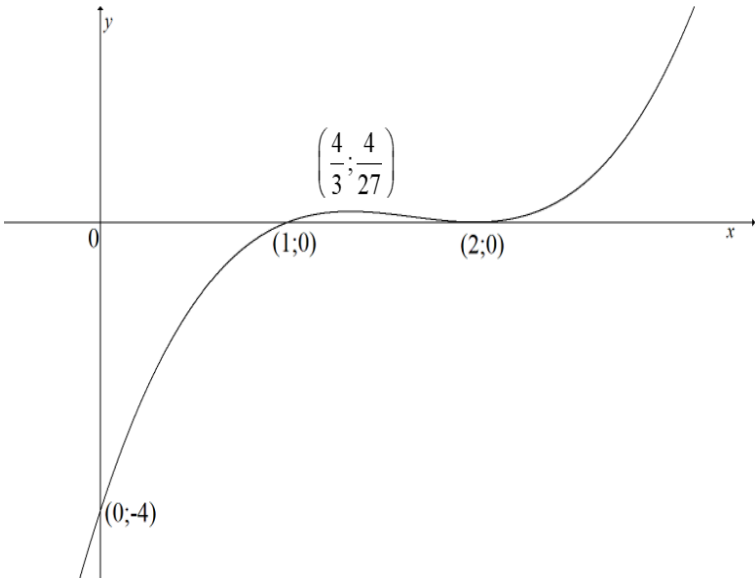
6.1	$A = P(1 + in)$ $100000 = 50000(1 + 0.085n)$ $2 = 1 + 0.085n$ $\therefore n = 11.7647\dots$ $n = 11 \text{ years and } 10 \text{ months}$	✓ correct substitution in correct formula ✓ Value of n ✓ Answer (3)
6.2.1	$A = P(1 + i)^n$ $A = 250000 \left(1 + \frac{0.15}{12}\right)^2$ $A = R256\,289.06$	✓ correct substitution in correct formula ✓ Answer (2)
6.2.2	$P_v = \frac{x[1 - (1 + i)^{-n}]}{i}$ $256289.06 = \frac{x \left[1 - \left(1 + \frac{0.15}{12}\right)^{-46}\right]}{\frac{0.15}{12}}$ $x = \frac{256289.06 \times \frac{0.15}{12}}{\left[1 - \left(1 + \frac{0.15}{12}\right)^{-46}\right]}$ $x = R7359.79$	✓ $n = 46$ ✓ correct substitution in correct formula ✓ Equating to 256289.06 ✓ Answer (4)
6.3	$x \left(1 + \frac{0.12}{12}\right)^{84} + 2x \left(1 + \frac{0.12}{12}\right)^{48} = R276558.75$ $x \left[\left(1 + \frac{0.12}{12}\right)^{84} + 2 \left(1 + \frac{0.12}{12}\right)^{48} \right] = R276558.75$ $x = \frac{276558.75}{\left(1 + \frac{0.12}{12}\right)^{84} + 2 \left(1 + \frac{0.12}{12}\right)^{48}}$ $x = R50\,000.00$ OR/OF	✓ 84 ✓ 48 ✓ $x \left(1 + \frac{0.12}{12}\right)^{84}$ ✓ $2x \left(1 + \frac{0.12}{12}\right)^{48}$ ✓ Equate to R276 558.75 ✓ Answer OR/OF

	$x\left(1 + \frac{0.12}{12}\right)^{36} = 1.430768784x$ $\therefore 3.430768784x\left(1 + \frac{0.12}{12}\right)^{48} = 5.5311749x$ $\therefore 5.5311749x = 276\,558.75$ $\therefore x = R50\,000$	$\checkmark x\left(1 + \frac{0.12}{12}\right)^{36}$ $\checkmark 1.430768784x$ $\checkmark 3.430768784x\left(1 + \frac{0.12}{12}\right)^{48}$ $\checkmark 5.5311749x$ $\checkmark R276\,558.75$ $\checkmark x = R50\,000$ (6)
		[15]

QUESTION/VRAAG 7

7.1	$f(x) = -\frac{1}{x}$ $f'(x) = \lim_{h \rightarrow 0} \frac{\frac{-1}{x+h} - \left(-\frac{1}{x}\right)}{h}$ $= \lim_{h \rightarrow 0} \frac{-x + x + h}{x(x+h)} \times \frac{1}{h}$ $= \lim_{h \rightarrow 0} \frac{1}{x(x+h)}$ $= \frac{1}{x^2}$	✓ $f(x+h)$ ✓ Substitution into the correct formula ✓ LCD: add fractions ✓ Simplification ✓ answer (5)
7.2.1	$D_x[(4x+3)(2x-5)]$ $D_x[8x^2 - 14x - 15]$ $= 16x - 14$	✓ expansion ✓ $16x$ ✓ -14 (3)
7.2.2	$\frac{dy}{dx} \text{ if } y = \frac{\sqrt[4]{x^{-5}} + 2x^{-3} - x}{x^{-3}}$ $y = \frac{x^{-\frac{5}{4}}}{x^{-3}} + \frac{2x^{-3}}{x^{-3}} - \frac{x}{x^{-3}}$ $y = x^{\frac{7}{4}} + 2 - x^4$ $\frac{dy}{dx} = \frac{7}{4}x^{\frac{3}{4}} - 4x^3$	✓ simplification ✓ $x^{\frac{7}{4}}$ ✓ 2 ✓ $-x^4$ ✓ $\frac{7}{4}x^{\frac{3}{4}}$ ✓ $-4x^3$ (6)
7.3	$f(x) = 2x^3 - 2x^2 + 4x - 1$ $f'(x) = 6x^2 - 4x + 4$ $f''(x) = 12x - 4 \geq 0$ $12x \geq 4$ $\therefore x > \frac{1}{3}$	✓ $f'(x)$ ✓ $f''(x) = 0$ ✓ x value ✓ Answer (4)
		[18]

QUESTION/VRAAG 8

8.1	$f(x) = (x-1)(x^2 - 4x + 4)$ $= x^3 - 5x^2 + 8x - 4$ $f'(x) = 3x^2 - 10x + 8 = 0$ $(3x-4)(x-2) = 0$ $x = \frac{4}{3} \text{ or } x = 2$ $(2; 0)$ $f\left(\frac{4}{3}\right) = \left(\frac{4}{3}\right)^3 - 5\left(\frac{4}{3}\right)^2 + 8\left(\frac{4}{3}\right) - 4$ $= \frac{4}{27}$ $\left(\frac{4}{3}; \frac{4}{27}\right)$	✓ $f'(x) = 3x^2 - 10x + 8$ ✓ $f'(x) = 0$ ✓ Both x values ✓ $(2; 0)$ ✓ $\frac{4}{27}$ (5)
8.2		✓ TPs ✓ x-intercepts ✓ $(0; -4)$ ✓ Shape (4)
8.3.1	$x < \frac{4}{3} \text{ or } x > 2$	✓ $x < \frac{4}{3}$ ✓ $x > 2$ (2)
8.3.2	$x < 0$ $\frac{4}{3} < x < 2$	✓ $x < 0$ ✓ $\frac{4}{3} < x < 2$ (2)
		[13]

QUESTION/VRAAG 9

9.	$SA = 2\pi r + 2\pi rh$ $\therefore A = 2\pi r + 2\pi rh$ $V = \pi r^2 h$ $2000\pi = \pi r^2 h$ $\therefore 2000 = r^2 h$ $\therefore h = \frac{2000}{r^2}$ $\therefore A(r) = 2\pi r^2 + 2\pi r \left(\frac{2000}{r^2} \right)$ $\therefore A(r) = 2\pi r^2 + \frac{4000\pi}{r}$ $A(r) = 2\pi r^2 + 4000r^{-1}$ $A'(r) = 4\pi r - 4000\pi r^{-2}$ $4\pi r - \frac{4000\pi}{r^2} = 0$ $4\pi r^3 - 4000\pi = 0$ $\therefore r^3 - 1000 = 0$ $\therefore r^3 = 1000$ $\therefore r = 10\text{cm}$ $\therefore h = \frac{2000}{r^2}$ $= \frac{2000}{10^2}$ $= 20\text{cm}$	✓ Substitution of V ✓ $h = \frac{2000}{r^2}$ ✓ Substitution of h in Area formula ✓ $A'(r) = 4\pi r - 4000\pi r^{-2}$ ✓ $A'(x) = 0$ ✓ $r = 10\text{cm}$ ✓ $h = 20\text{cm}$ (7)
		[7]

QUESTION/VRAAG 10

10.1.1	(61) M P (19) $= 49 - x$ $= 4$ $= 2$ x 8 5 $= 60 - x$ L 14 (73)	✓ whole M ✓ whole P ✓ whole L ✓ Outside (4)
10.1.2	$61 + 60 - x + 5 + 2 + 14 = 100$ $\therefore x = 42$	✓ Setting up the equation ✓ Answer (2)
10.1.3	The number of learners preferring one subject/ <i>Die getal leerders wat aan een vak voorkeur gee:</i> $= (49 - x) + (60 - x) + 2$ $= 7 + 18 + 2$ $= 27$ $P(1 \text{ subject}) = \frac{27}{100}$	✓ 27 ✓ $\frac{27}{100}$ (2)
10.2	$n(E) = \frac{12!}{3! \times 2! \times 2!} = 19958400$ $n(S) = \frac{13!}{2! \times 3! \times 2! \times 2!} = 129729600$ $P(E) = \frac{19958400}{129729600}$ $= \frac{2}{13}$	✓ numerator ✓ denominator ✓ $n(S)$ ✓ Substitution ✓ Answer(5)
		[13]

TOTAL/TOTAAL: 150