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.

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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

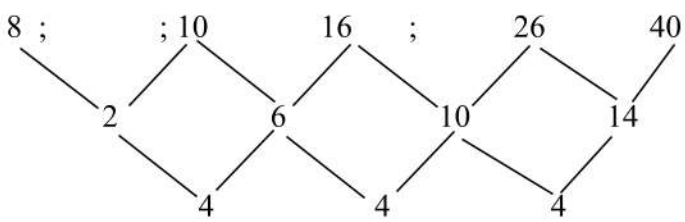
1.1.1	$x(x+3)=28$ $x^2+3x-28=0$ $(x+7)(x-4)=0$ $x=-7\ or\ x=4$	✓Standard form ✓Factors ✓Answers (3)
1.1.2	$2x^2+7x-1=0$ $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$ $=\dfrac{-7\pm\sqrt{(7)^2-4(2)(-1)}}{2(2)}$ $x=0,14$ or $x=-3,64$	✓ substitution into correct formula ✓ $x=-3,64$ ✓ $x=0,14$ (3)
1.1.3	$(x+4)(5-x)\geq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

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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 (6)
1.3	$\sqrt[n]{\frac{2^n.5^n + 2^n.2^2}{5^n.5^n + 4.5^n}}$ $= \sqrt[n]{\frac{2^n(5^n+4)}{5^n(5^n+4)}}$ $= \sqrt[n]{\frac{2^n}{5^n}}$ $= \sqrt[n]{\left(\frac{2}{5}\right)^n}$ $= \frac{2}{5}$	✓Expansion ✓ factors ✓Simplification ✓Answer (4)
		[24]

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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 ✓Factors ✓ $n = 40$ (3)
		[8]

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QUESTION/*VRAAG* 3

3.1.1	$r = 2$	✓ Answer (1)
3.1.2	No, r is not between -1 and 1/ *Nee, r is nie tussen -1 en 1 nie*	✓ 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	$T_2 = 21$ $T_3 = 24$	✓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)

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

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QUESTION/*VRAAG* 4

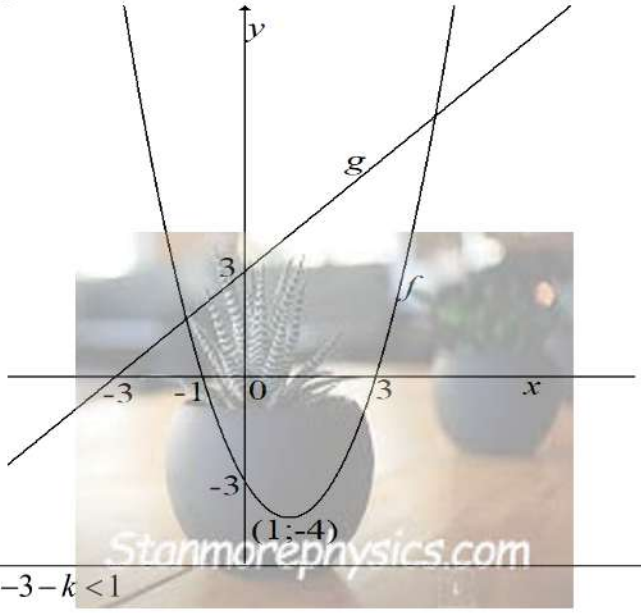
4.1	$p=2$ $q=-1$	✓ $p=2$ ✓ $q=-1$ (2)
4.2	$g(x)=\frac{a}{x+p}+q$ $0=\frac{a}{-6+2}-1$ $1=\frac{a}{-4}$ $a=-4$ $g(x)=\frac{-4}{x+2}-1$	✓Substitution of $(-6;0)$ ✓ Value of a ✓Answer (3)
4.3	$y=-x+c$ $-1=-(-2)+c$ $\therefore c=-3$ $\therefore y=-x-3$ $\therefore x=-y-3$ $\therefore y=-x-3$	✓ substitution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

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4.7	$h(x) = y = 3^x$ $x = 3^y$ $h^{-1}(x) = y = \log_3 x$	✓ swopp 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)*	✓ *y* intercept of *f:* (0; -3) ✓ *y* intercept of *g*: (0;3) (2)
5.2	$x^2-2x-3=0$ $(x-3)(x+1)=0$ $x=3$ *or* $x=-1$ $x=-\frac{b}{2a}$ $=-\frac{-2}{2(1)}$ $x=1$ $y=1^2-2(1)-3$ $y=-4$ $TP(1;-4)$ $g(x)=x-3$ $y=-3$ $x=3$	✓ $f(x)=0$ ✓ *both x* values ✓ TP(1; -4)
		✓Shape *f* ✓Shape g (5)
5.3	$0<-3-k<1$ $\therefore -4<k<-3$	✓ $0<-3-4<1$ ✓✓ $-4<k<-3$ (3)
5.4	$2(2x-2)\geq 0$ $4x-4\geq 0$ $4x\geq 4$ $x\geq 1$ Answer only: Full marks/ *Slegs Antwoord: Volpunte*	✓✓ $f'(x).f''(x)\geq 0$ ✓ Answer (3)
		[13]

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QUESTION/*VRAAG* 6

6.1	$A = P(1 + in)$ $100000 = 50000(1 + 0.085n)$ $2 = 1 + 0.085n$ $\therefore n = 11.7647\ldots$ $n = 11$ years/10 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	$P_V = \frac{x\left[1-(1+i)^{-n}\right]}{i}$ $256289.06 = \frac{x\left[1-\left(1+\frac{0.15}{12}\right)^{-46}\right]}{\frac{0.15}{12}}$ $x = \frac{256289.06 \times \frac{0.15}{12}}{\left[1-\left(1+\frac{0.15}{12}\right)^{-46}\right]}$ $x = R7359.79$	✓ $n = 46$ ✓ correct substitution in correct formula ✓Equating to 256289.06 ✓ Answer (4)
6.3	$x\left(1+\frac{0.12}{12}\right)^{84} + 2x\left(1+\frac{0.12}{12}\right)^{48} = R276558.75$ $x\left[\left(1+\frac{0.12}{12}\right)^{84} + 2\left(1+\frac{0.12}{12}\right)^{48}\right] = R276558.75$ $x = \frac{276558.75}{\left(1+\frac{0.12}{12}\right)^{84} + 2\left(1+\frac{0.12}{12}\right)^{48}}$ $x = \text{R}50\ 000.00$ **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***

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

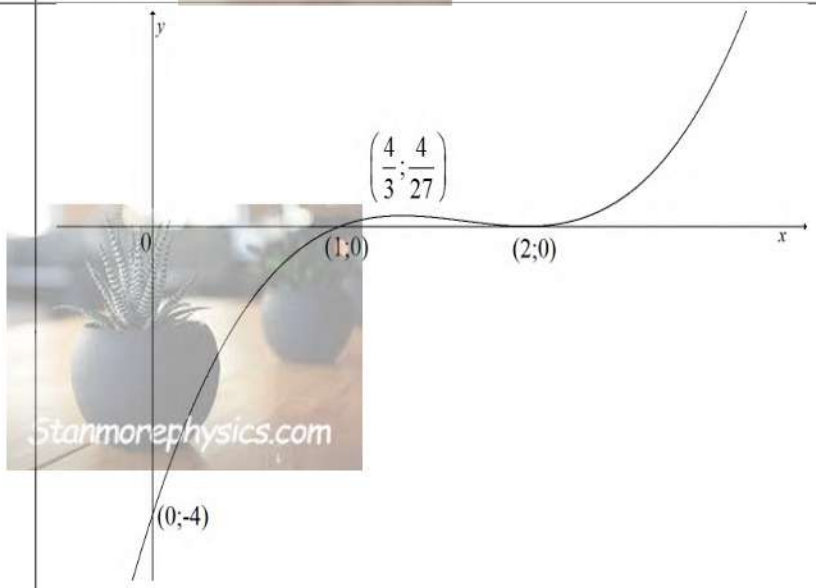


QUESTION/*VRAAG* 7

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

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QUESTION/*VRAAG* 8

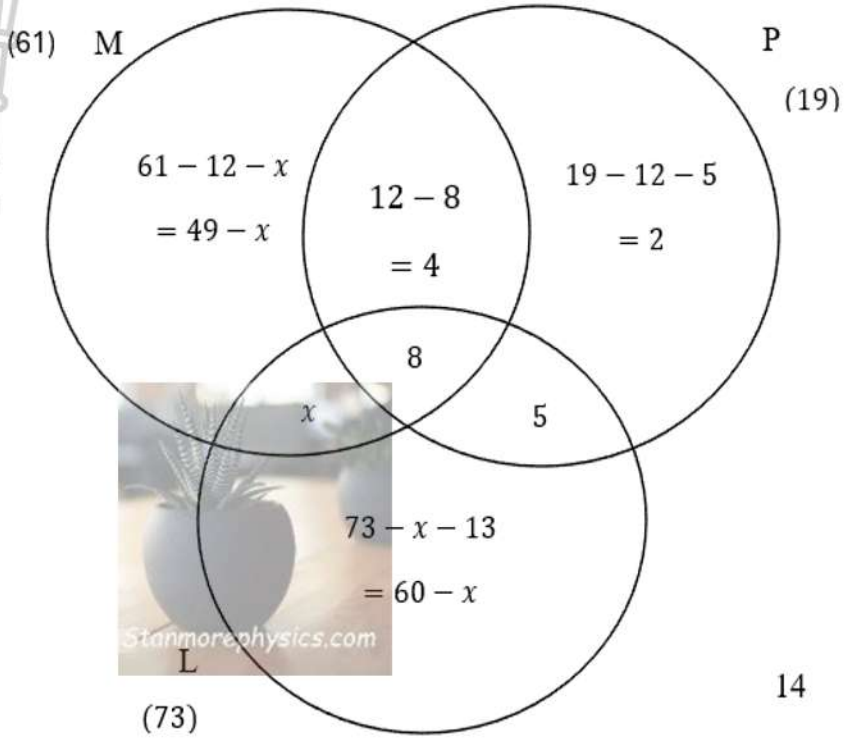
8.1	$f(x)=(x-1)(x^2-4x+4)$ $=x^3-5x^2+8x-4$ $f'(x)=3x^2-10x+8=0$ $(3x-4)(x-2)=0$ $x=\frac{4}{3}$ or $x=2$ $(2;0)$ $f\left(\frac{4}{3}\right)=\left(\frac{4}{3}\right)^3-5\left(\frac{4}{3}\right)^2+8\left(\frac{4}{3}\right)-4$ $=\frac{4}{27}$ $\left(\frac{4}{3};\frac{4}{27}\right)$	✓ $f'(x)=3x^2-10x+8$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

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QUESTION/*VRAAG* 9

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

QUESTION/*VRAAG* 10

10.1.1		✓ M ✓P ✓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/*Die getal leerders wat aan een vak voorkeur gee*: $=(49-x)+(60-x)+2$ $=7+18+2$ $=27$ $P(1\ subject)=\frac{27}{100}$	✓27 ✓$\frac{27}{100}$ (2)

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10.2	$n(E)=\frac{12!}{3!X2!X2!}=19958400$ $n(S)=\frac{13!}{2!X3!X2!X2!}=129729600$ $P(E)=\frac{n(E)}{n(S)}$ $=\frac{19958400}{129729600}$ $=\frac{2}{13}$	✓ $n(E)$ ✓ $n(S)$ ✓Formula ✓Substitution ✓Answer (5)
		[13]

TOTAL/*TOTAAL*: 150

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