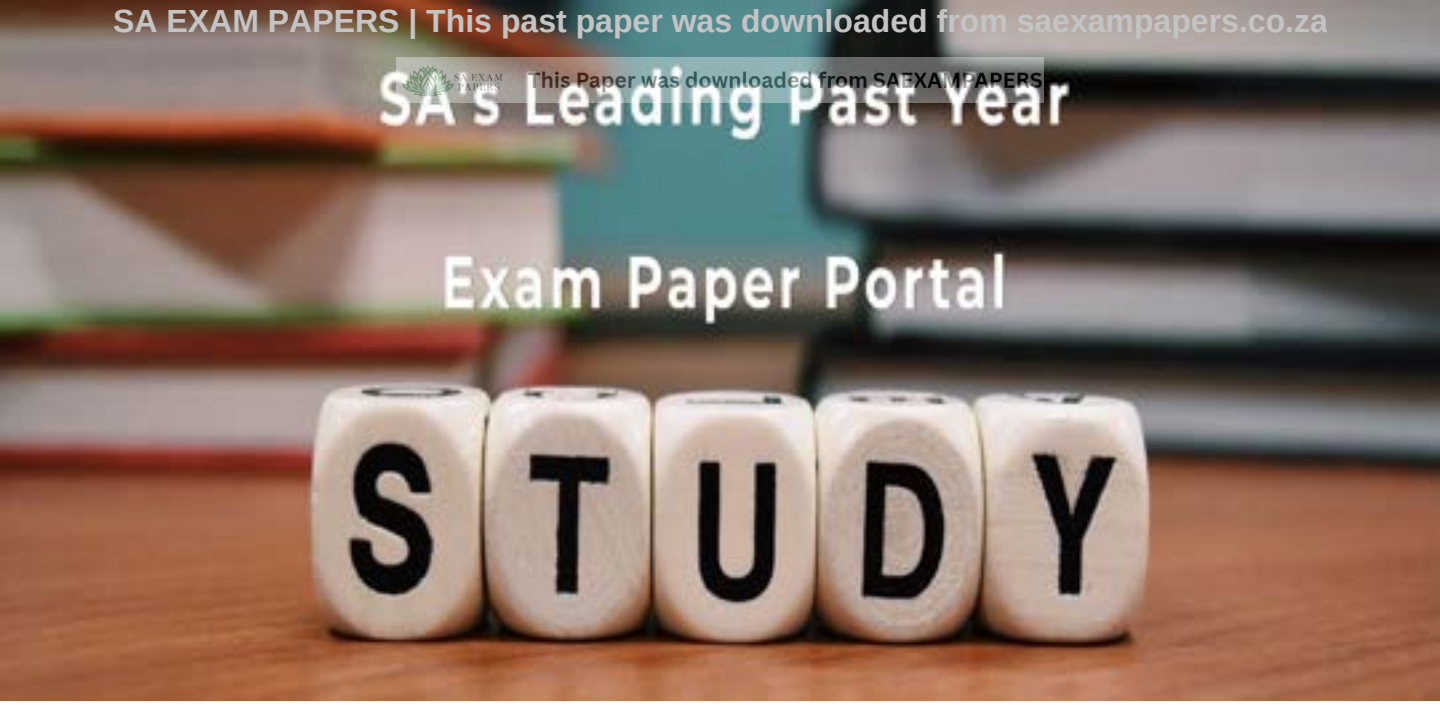


LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE / *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRADE* 12

MATHEMATICS P1/*WISKUNDE V1*
MARKING GUIDELINES/*NASIENRIGLYNE*
JUNE/*JUNIE* 2025

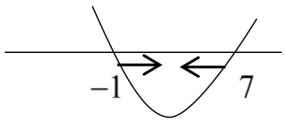
MARKS/*PUNTE* **: 150**

This marking guidelines consists of 15 pages/ ***Hierdie nasienriglyne bestaan uit 15 bladsye***

NOTE/*NOTA*:

- If a candidate answers a question TWICE, only mark the FIRST attempt/ *As 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging*
- Consistent accuracy applies in ALL aspects of the marking guidelines/ *Konsekwente akkuraatheid is van toepassing in ALLE aspekte van die nasienriglyne*

QUESTION 1/*VRAAG 1*

1.1	1.1.1	$x^2-121=0$ $(x-11)(x+11)=0$ $x=11$ or / *of* $x=-11$	✓factors/f*aktore* ✓ $x=11$ ✓ $x=-11$	(3)
	1.1.2	$x^2+3=5x$ $x^2-5x+3=0$ $x=\frac{5\pm\sqrt{(-5)^2-4(1)(3)}}{2(1)}$ $x=\frac{5\pm\sqrt{13}}{2}$ $x=4,30$ or/*of* $x=0,70$	✓standard form/*standaardvorm* ✓substitution/*vervanging* ✓ $x=4,30$ ✓ $x=0,70$	(4)
	1.1.3	$(x-1)(x-5)\le 12$ $x^2-6x-7\le 0$ $(x+1)(x-7)\le 0$ CV : $x=-1$ or / *of* $x=7$  Sol/*Opl*: $-1\le x\le 7$	✓standard form/*standaardvorm* ✓critical values/*kritieke waardes* ✓✓answer/*Antwoord*	(4)

	1.1.4	$2^x + 2^{x+2} = 40$ $2^x + 2^x.2^2 = 40$ $2^x(1+4) = 40$ $2^x = 8$ $2^x = 2^3$ $x = 3$	✓exponent laws/*eksponent wet* ✓common factor/ *gemeenskaplike faktor* ✓ $2^x = 2^3$ ✓answer/*Antwoord*	(4)
	1.1.5	$\sqrt{10-x^2} - x + 2 = 0$ $\sqrt{10-x^2} = x - 2$ $10 - x^2 = x^2 - 4x + 4$ $2x^2 - 4x - 6 = 0$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3$ or / *of* $x \neq -1$	✓isolating root/*isoleer wortel* ✓square both sides/*verhef beide kante* ✓standard form/*standaardvorm* ✓ $x = 3$ ✓ $x \neq -1$	(5)

1.2	$y-x=2$ $x^2+2xy-4=0$ $y=x+2$ $x^2+2x(x+2)-4=0$ $3x^2+4x-4=0$ $(3x-2)(x+2)=0$ $x=\frac{2}{3}$ or/*of* $x=-2$ $y=\frac{8}{3}$ or/*of* $y=0$ **OR/*OF*** $y-x=2$ $x^2+2xy-4=0$ $x=y-2$ $(y-2)^2+2y(y-2)-4=0$ $y^2-4y+4+2y^2-4y-4=0$ $3y^2-8y=0$ $y(3y-8)=0$ $y=0$ or/*of* $y=\frac{8}{3}$ $x=-2$ or /*of* $x=\frac{2}{3}$	✓ $y=x+2$ ✓substitution/*vervanging* ✓standard form/*standaardvorm* ✓ x – values/*waardes* ✓ y – values/*waardes* **OR/*OF*** ✓ $x=y-2$ ✓substitution/*vervanging* ✓standard form/*standaardvorm* ✓ y – values/*waardes* ✓ x – values/*waardes*	(5)

1.3	$f(x)=x(x+a)-b$ $f(a)=0$ $a(a+a)-b=0$ $2a^2-b=0$ $b=2a^2$ $g(x)=2x^2+b-dx$ $g(b)=0$ $2b^2+b-bd=0$ $b(1-d)=2b^2$ $1-d=2b$ $1-d=2(2a^2)$ $1-d=4a^2$	✓ $a(a+a)-b=0$ ✓ $b=2a^2$ ✓ $2b^2+b-bd=0$ ✓ $1-d=2b$ ✓subst/*vervang* $b=2a^2$	(5)
			[30]

QUESTION 2/*VRAAG 2*

2.1	2.1.1	T_{19} : $a+18d=11$ T_{31} : $a+30d=5$ $12d=-6$ $d=-\frac{1}{2}$ $a+18\left(-\frac{1}{2}\right)=11$ $a-9=11$ $a=20$ 20 ; $\frac{39}{2}$; 19	✓ $d=-\frac{1}{2}$ ✓substitution/*vervanging* ✓ 20 ✓ $\frac{39}{2}$ ✓ 19	(5)

	2.1.2	$T_n = a+(n-1)d$ $= 20+(n-1)\left(-\frac{1}{2}\right)$ $= 20-\frac{n}{2}+\frac{1}{2}$ $= \frac{41}{2}-\frac{n}{2}$	✓substitution/*vervanging* ✓ answer/*antwoord*	(2)
	2.1.3	$S_n = \frac{n}{2}\left[2a+(n-1)d\right]$ $S_{81} = \frac{81}{2}\left[2(20)+(81-1)\left(-\frac{1}{2}\right)\right]$ $= \frac{81}{2}(40-40)$ $= 0$	✓substitution/*vervanging* ✓simplify/*vereenvoudig* ✓ answer/*antwoord*	(3)
2.2	2.2.1	37 and / *en* 50	✓37 ✓50	(2)
	2.2.2	2 5 10 17 26 3 5 7 9 2 2 2 $2a = 2$ $a = 1$ $3a+b = 3$ $3(1)+b = 3$ $b = 0$ $a+b+c = 2$ $1+0+c = 2$ $c = 1$ $T_n = n^2+1$	✓second difference/*tweede verskil* ✓$2a = 2$ ✓$3a+b = 3$ ✓$a+b+c = 2$	(4)

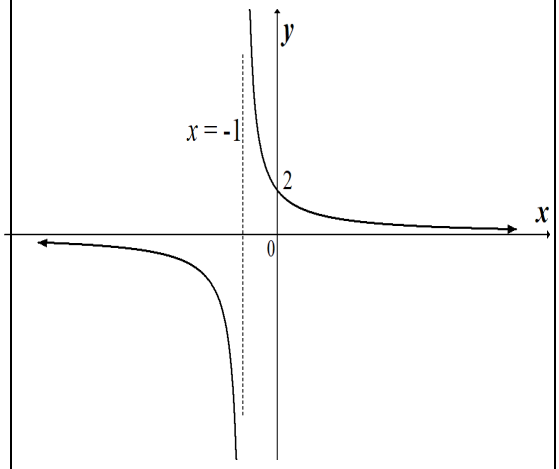
	2.2.3	$n^2+1=290$ $n^2=289$ $n=17$ $T_{17}=290$	✓equating/*gelykstel* ✓standard form/*standaardvorm* ✓ answer/*antwoord*	(3)
	2.2.4	$3+(n-1)2=25$ $3+2n-2=25$ $2n=24$ $n=12$ between T_{12} and T_{13} / *tussen* T_{12} *en* T_{13} $T_{12}=12^2+1=145$ $T_{13}=13^2+1=170$ **OR/*OF*** $T_{n+1}-T_n=25$ $(n+1)^2+1-(n^2+1)=25$ $n^2+2n+1+1-n^2-1=25$ $2n+1=25$ $2n=24$ $n=12$ $T_{12}=12^2+1=145$ $T_{13}=13^2+1=170$	✓$3+(n-1)2=25$ ✓$3+2n-2=25$ ✓$n=12$ ✓145 ✓170 **OR/*OF*** ✓$(n+1)^2+1-(n^2+1)=25$ ✓$2n+1=25$ ✓$n=12$ ✓145 ✓170	(5)
				[24]

QUESTION 3/*VRAAG 3*

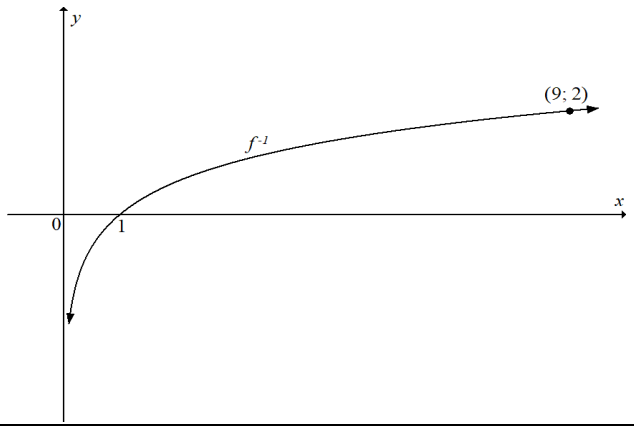
3.1	$A=\sqrt{2^2+2^2}=\sqrt{8}=2\sqrt{2}$	✓✓ $2\sqrt{2}$	(2)
3.2	Area / *Opv* $C=8\times 8=64$	✓✓64	(2)
3.3	$a=4$ $r=4$ $S_n=\frac{a(r^n-1)}{r-1}$ $S_{10}=\frac{4(4^{10}-1)}{4-1}$ $=1\ 398\ 100$	✓ $a=4$ ✓ $r=4$ ✓substitution/*vervanging*	(3)
3.4	$2\sqrt{2}\quad ;\quad 4\sqrt{2}\quad ;\quad 8\sqrt{2}$ $a=2\sqrt{2}$ $r=\frac{4\sqrt{2}}{2\sqrt{2}}=2$ $T_n=ar^{n-1}$ $=2\sqrt{2}(2)^{n-1}$ $=\sqrt{2}(2)^n$	✓ $4\sqrt{2}$ ✓ $8\sqrt{2}$ ✓ $r=2$ ✓substitution/*vervanging*	(4)
3.5	$\sqrt{2}(2)^n=256\sqrt{2}$ $2^n=256$ $2^n=2^8$ $n=8$	✓equating/*gelykstel* ✓simplify/*vereenvoudig* ✓ $2^n=2^8$ ✓ $n=8$	(4)
			[15]

QUESTION 4/*VRAAG 4*

4.1	4.1.1	$g(x)=x^2-3x-10$ $g'(x)=0$ $2x-3=0$ OR/*OF* $x=-\frac{(-3)}{2(1)}$ $x=\frac{3}{2}$ $=\frac{3}{2}$ $y=\left(\frac{3}{2}\right)^2-3\left(\frac{3}{2}\right)-10$ $=\frac{9}{4}-\frac{9}{2}-10$ $=-\frac{49}{4}$ $\text{T}\left(\frac{3}{2};\frac{-49}{4}\right)$	✓ $2x-3=0$ or / *of* $x=-\frac{(-3)}{2(1)}$ ✓ $x=\frac{3}{2}$ ✓substitution/*vervanging* ✓answer/*antwoord*	(4)
	4.1.2	Range / *waardevers* : $y\in\left[-\frac{49}{4};\infty\right)$ OR / *OF* $y\geq-\frac{49}{4}$	✓✓answer/*antwoord*	(2)
	4.1.3	$x^2-3x-10=0$ $(x+2)(x-5)=0$ $x=-2$ or / *of* $x=5$ $\text{C}(5;0)$	✓ $y=0$ ✓ $x=5$	(2)
	4.1.4	$C(5;0)$ $y=mx-10$ $5m-10=0$ $5m=10$ $m=2$ $y=2x-10$ **OR/*OF*** $C(5;0)$ $B(0;-10)$ $m_{BC}=\frac{-10}{-5}=2$ $y=mx-10$ $y=2x-10$	✓ $B(0;-10)$ ✓substitute/*vervang* $C(5;0)$ ✓ $m=2$ ✓ $y=2x-10$ **OR/*OF*** ✓ $B(0;-10)$ ✓ $m=2$ ✓substitute/*vervang* -10 ✓ $y=2x-10$	(4)

	4.1.5	$x^2-3x-10=-6$ $x^2-3x-4=0$ $(x+1)(x-4)=0$ $x=-1$ or / *of* $x=4$ E$(4:-6)$	✓equating/*gelykstel* ✓standard form/*standaardvorm* ✓x – values/*waardes* ✓ E$(4:-6)$	(4)
	4.1.6	$0<x<5$	✓✓ $0<x<5$	(2)
	4.1.7	$x^2-3x-10>0$ $(x-5)(x+2)>0$ Sol/*Opl*: $x<-2$ or/*of* $x>5$	✓✓ $x>5$ or / *of* $x<-2$	(2)
4.2	$f(x)=\frac{2}{x+1}$			
	4.2.1	$y=0$ $x+1=0$ $x=-1$	✓ $y=0$ ✓ $x=-1$	(2)
	4.2.2		✓ shape/*vorm* ✓y – intercept/*afsnit* ✓asymptotes/*asimptote*	(3)
	4.2.3	- translated 2 units up/*skuif 2 eenhede op* - translated 3 units to the right/*skuif 3 eenhede regs*	✓2 units up/*eenhede op* ✓3 units right/*eenhede regs*	(2)
				[27]

QUESTION 5/*VRAAG 5*

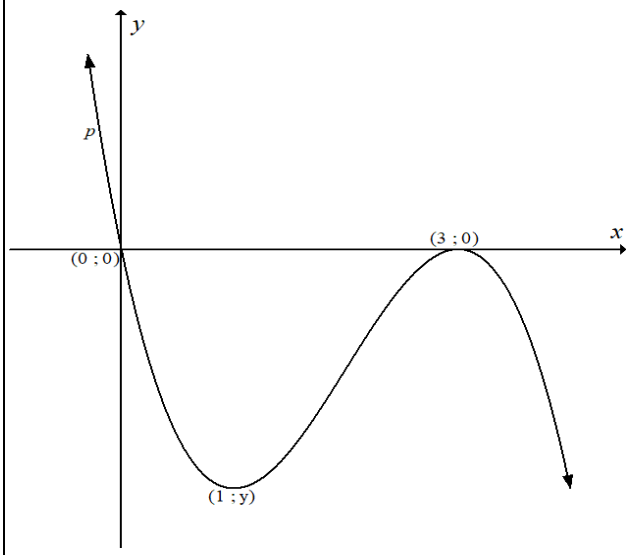
5.1	$f(x) = b^x + q$ $q = 0$ $b^2 = 9$ $b = 3$ $f(x) = 3^x$	✓ $q = 0$ ✓substitution/*vervanging* ✓ $b = 3$	(3)
5.2	$y = 3^x$ $x = 3^y$ $y = \log_3 x$	✓ interchange x and y/*ruil x en* y ✓ answer/*antwoord*	(2)
5.3		✓x – intercept/*afsnit* ✓ (9 ; 2) ✓shape/*vorm*	(3)
5.4	$\sum_{x=-2}^{5} f(x)$ $a = \frac{1}{9}$ $r = 3$ $n = 8$ $\sum_{x=1}^{10} g(x)$ $a = 1$ $d = 2$ $n = 10$ $p = \left[\frac{\frac{1}{9}\left[1-3^8\right]}{1-3}\right] - \left[\frac{10}{2}\left[2(1)-(10-1)2\right]\right]$ $= 264,44$	✓ $n = 8$ ✓ $n = 10$ ✓ $\frac{\frac{1}{9}\left[1-3^8\right]}{1-3}$ ✓ $\frac{10}{2}\left[2(1)-(10-1)2\right]$ ✓ 264,44	(5)
			[13]

QUESTION 6/*VRAAG 6*

6.1		$f(x)=3x^2-2x$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\frac{3(x+h)^2-2(x+h)-(3x^2-2x)}{h}$ $=\lim_{h\to 0}\frac{3(x^2+2xh+h^2)-2x-2h-3x^2+2x}{h}$ $=\lim_{h\to 0}\frac{3x^2+6xh+3h^2-2h-3x^2}{h}$ $=\lim_{h\to 0}\frac{6xh+3h^2-2h}{h}$ $=\lim_{h\to 0}\frac{h(6x+3h-2)}{h}$ $=6x-2$	✓ $3(x+h)^2-2(x+h)$ ✓ $-(3x^2-2x)$ ✓ simplify/*vereenvoudig* ✓ common factor/ *gemeenskaplike faktor* ✓ $6x-2$	(5)
6.2	6.2.1	$\lim_{h\to 3}\frac{2x^2-11x+15}{3-x}$ $=\lim_{h\to 3}\left[\frac{(2x-5)(x-3)}{-(x-3)}\right]$ $=\lim_{h\to 3}[-(2x-5)]$ $=-2(3)+5$ $=-1$	✓ $(2x-5)(x-3)$ ✓ $-(x-3)$ ✓ answer/*antwoord*	(3)
	6.2.2	$g(x) = x^4-\frac{4}{x}$ $= x^4-4x^{-1}$ $g'(x)=4x^3+4x^{-2}$	✓ $-4x^{-1}$ ✓ $4x^3$ ✓ $4x^{-2}$	(3)
	6.2.3	$y=(x+3)(3-x)$ $=-(x+3)(x-3)$ $=-x^2+9$ $\frac{dy}{dx}=-2x$	✓ $-(x+3)(x-3)$ ✓ $-x^2+9$ ✓ $-2x$	(3)

	6.2.4	$D_x\left[\frac{3\sqrt{x}-4}{\sqrt{x}}\right]$ $D_x\left[3-\frac{4}{\sqrt{x}}\right]$ $D_x\left[3-4x^{-\frac{1}{2}}\right]$ $=2x^{-\frac{3}{2}}$	✓ 3 ✓ $-4x^{-\frac{1}{2}}$ ✓ $2x^{-\frac{3}{2}}$	(3)
6.3	$f(x)=x^2-2x+3$ $f(-2)=(-2)^2-2(-2)+3$ $=11$ $f'(x)=2x-2$ $f'(-2)=2(-2)-2$ $m=-6$ $y=mx+c$ $y=-6x+c$ $11=-6(-2)+c$ $c=-1$ $y=-6x-1$	✓ $f(-2)=11$ ✓ $m=-6$ ✓ $11=-6(-2)+c$ ✓ $c=-1$	(4)
			[21]

QUESTION 7/*VRAAG 7*

7.1	$f(x)=x^3-5x^2-8x+13$			
	7.1.1	$f'(x)=0$ $3x^2-10x-8=0$ $(3x+2)(x-4)=0$ $x=-\frac{2}{3}$ or / *of* $x=4$ $y=-36$ $\text{E}(4:-36)$	✓ $f'(x)=0$ ✓ $3x^2-10x-8=0$ ✓ $x=4$ ✓ $y=-36$	(4)
	7.1.2	$y=-36$	✓ $y=-36$	(1)
	7.1.3	$\text{TM}=12+36$ $=48$	✓ $\text{TM}=12+36$ ✓48	(2)
7.2			✓Shape/*vorm* ✓ $(0;0)$ ✓ $(3;0)$ ✓ $(1;y)$	(4)
				[11]

QUESTION 8/*VRAAG 8*

8.1	$2y+2x+\pi x=30$ $2y=30-2x-\pi x$ $y=\dfrac{30-2x-\pi x}{2}$ $=\dfrac{30-x(2+\pi)}{2}$	✓ $2y+2x$ ✓ πx ✓ standard form/*standaardvorm* ✓ $y=\dfrac{30-2x-\pi x}{2}$	(4)
8.2	$A=2x\left[\dfrac{30-2x+\pi x}{2}\right]+\dfrac{\pi x^2}{2}$ $=30x-2x^2-\pi x^2+\dfrac{\pi x^2}{2}$ $=60x-4x^2-2\pi x^2+\pi x^2$ $=60x-4x^2-\pi x^2$ $\dfrac{dy}{dx}=0$ $60-8x-2\pi x=0$ $30-4x-\pi x=0$ $x=\dfrac{30}{4+\pi}$	✓ $2x\left[\dfrac{30-2x+\pi x}{2}\right]$ ✓ $\dfrac{\pi x^2}{2}$ ✓ $60x-4x^2-\pi x^2$ ✓ $\dfrac{dy}{dx}=0$ ✓ $30-4x-\pi x=0$	(5)
			[9]

TOTAL/ *TOTAAL*: 150