Province of the EASTERN CAPE EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE / *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

SEPTEMBER 2025

TECHNICAL MATHEMATICS P1 /*TEGNIESE WISKUNDE V1* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS / *PUNTE:* **150**

MARKING CODES/*NASIENKODES*	
A	Accuracy/*Akkuraatheid*
CA	Consistent accuracy/*Volgehoue akkuraatheid*
M	Method/*Metode*
R	Rounding/*Afronding*
NPR	No penalty for rounding/*Geen penalisering vir afronding nie*
NPU	No penalty for units omitted/*Geen penalisering vir eenhede weggelaat nie*
S	Simplification/*Vereenvoudiging*
SF	Substitution in correct formula/*Vervanging in korrekte formule*

This marking guideline consists of 14 pages/
Hierdie nasienriglyn bestaan uit 14 bladsye.

QUESTION/*VRAAG* 1

1.1.1	$2x(1-x)=0$ $x=0$ or/*of* $x=1$	✓ $x=0$ ✓ $x=1$	**A** **A** (2)
1.1.2	$x-6=-3x^2$ $3x^2+x-6=0$ $x=\frac{-1\pm\sqrt{(1)^2-4(3)(-6)}}{2\times 3}$ $x=1,26$ or/*of* $x=-1,59$	✓ standard form/*standaardvorm* ✓ SF ✓ ✓ $x=-1,59$	**A** **CA** **CA** **CA** (4)
1.1.3	$x^2-6x-16\leq 0 \quad (x\in N, x\geq 4)$ CVs / KWs $(x-8)(x+2)=0$ OR/OF $x=\frac{-(-6)\pm\sqrt{(-6)^2-4(1)(-16)}}{2(1)}$ $x=8$ or/*of* $x=-2$ $-2\leq x\leq 8$ $x\in\{4;5;6;7;8\}$	✓ factors/substitution/*faktore / vervanging* ✓ critical values /*kritiese waardes* ✓ notation/*notasie* ✓ $x\in\{4;5;6;7;8\}$	**A** **CA** **A** **CA** (4)
1.2	$x=1-y$ en $x^2+y^2=25$ $(1-y)^2+y^2=25$ $1-2y+y^2+y^2=25$ $2y^2-2y-24=0$ $y^2-y-12=0$ $(y-4)(y+3)=0$ $y=4$ or/*of* $y=-3$ $x=1-4$ or/*of* $x=1-(-3)$ $x=-3$ or/*of* $x=4$ **OR/ *OF***	✓ substitution/*vervanging* ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ both *y*-values/*beide y-waardes* ✓ both *x*-values/*beide x-waardes* **OR/ *OF***	**CA** **CA** **CA** **CA** **CA**

	$y = 1 - x$ $x^2 + (1 - x)^2 = 25$ $x^2 + 1 - 2x + x^2 - 25 = 0$ $2x^2 - 2x - 24 = 0$ $x^2 - x - 12 = 0$ $(x + 3)(x - 4) = 0$ $x = -3$ or/*of* $x = 4$ $y = 1 - (-3)$ or/*of* $y = 1 - 4$ $y = 4$ or/*of* $y = -3$	✓ substitution/*vervanging* ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ both *x*-values/*beide x-waardes* ✓both *y*-values/*beide y-waardes*	**CA** **CA** **CA** **CA** **CA** (5)
1.3.1	$I = \frac{b.h^3}{12}$ $12I = bh^3$ $b = \frac{12I}{h^3}$	✓ $12I$ subject/*onderwerp* ✓ $b = \frac{12I}{h^3}$	**A** **CA** (2)
1.3.2	$b = \frac{12 \times 12\,000\ m^4}{(100\ mm)^3}$ $b = 0{,}144\ mm$ **OR/*OF*** $12\,000 = \frac{b(100)^3}{12}$ $b = \frac{144\,000}{(100)^3}$ b = 0,144 mm	✓ substitution/*vervanging* ✓ $b = 0{,}144\ mm$ **OR/*OF*** ✓ substitution/*vervanging* ✓ Value of b/*waarde van b* **NPU**	**CA** **CA** **A** **CA** (2)
1.3.3	$1{,}44 \times 10^{-1}$	✓$1{,}44 \times 10^{-1}$	**CA** (1)
1.4.1	$1111011_2 = 2^0 + 2^1 + 2^3 + 2^4 + 2^5 + 2^6$ $=123$ $123 \div 3 = 41$	✓ 123 ✓ 41	**A** **CA** (2)
1.4.2	$41 = 101001_2$	✓ 101001_2	**CA** (1)
			[23]

QUESTION/*VRAAG* 2

2.1	$\Delta < 0$ $12 - 3q < 0$ $q > 4$	✓ $\Delta < 0$ ✓ $q > 4$	**A** **CA** (2)
2.2.1	$\Delta = 0$	✓ $\Delta = 0$	**A** (1)
2.2.2	$(p-3)^2 - 4(1)(4) = 0$ $p^2 - 6p - 7 = 0$ $(p-7)(p+1) = 0$ $p = 7$ or/*of* $p = -1$	✓ substitution/*vervanging* ✓ factors/*faktore* ✓ values of/*waardes van p*	**A** **CA** **CA** (3)
			[6]

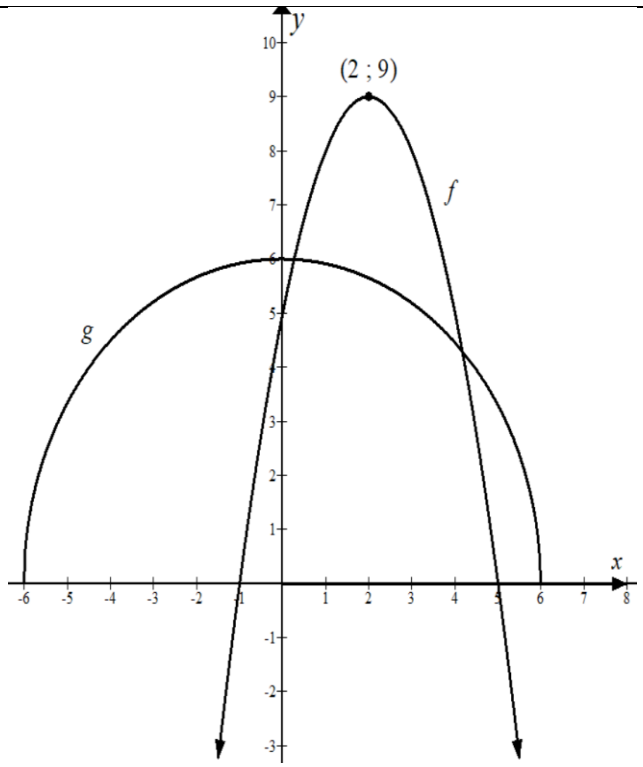
QUESTION/*VRAAG* 3		
3.1.1	$\frac{\left(2a^0\right)^{-1}}{4}$ $=\frac{1}{8}$	✓ $\frac{1}{8}$ **A** (1)
3.1.2	$\frac{3.2^{x+1}+2.2^{2x}}{2^{2x}+3.2^x}$ $=\frac{3.2^x.2+2.2^x.2^x}{2^x.2^x+3.2^x}$ $=\frac{2.2^x\left(3+2^x\right)}{2^x\left(2^x+3\right)}$ $=2$	✓ exponential property/ *eksponensiële eienskap* **A** ✓ common factor /*gemene faktor* **CA** ✓ answer/*antwoord* **CA** (3)
3.1.3	$\frac{\sqrt{243}-2\sqrt{12}}{\sqrt{75}}$ $=\frac{\sqrt{81\times3}-2\sqrt{4\times3}}{\sqrt{25\times3}}$ **OR/*OF*** $\frac{\sqrt{3^4\times3}-2\sqrt{2^2\times3}}{\sqrt{3\times5^2}}$ $=\frac{9\sqrt{3}-4\sqrt{3}}{5\sqrt{3}}$ $=\frac{5\sqrt{3}}{5\sqrt{3}}$ $=1$	✓ prime factors/*priemfaktore* **A** ✓ simplification / *vereenvoudig* **CA** ✓ answer /*antwoord* **CA** (3)
3.2.1	$x\log_3 2-\log 100=x\log_3 6$ $x\,log_3\,2-x\,log_3\,6=2$ $\therefore x\,log_3\frac{2}{6}=2$ $x\,log_3\frac{1}{3}=2$	✓ $\log 100=2$ **A** ✓ $x\log_3\frac{2}{6}$ **A** (2)

3.2.2	$x\log_3\frac{1}{3}=2$ $\therefore x\log_3 3^{-1}=2$ $\therefore -x\log_3 3=2$ $\therefore -x(1)=2$ $\therefore x=-2$	✓ $\log_3 3^{-1}$ ✓ power law/*mag wet* ✓ $x=-2$	**CA** **CA** **CA** (3)
3.3.1	$z=-3-i$	✓ -3 ✓ $-i$	**A** **A** (2)
3.3.2	$\|r\|=\sqrt{(-3)^2+(-1)^2}$ $\|r\|=\sqrt{10}$	✓ **SF** ✓ modulus	**CA** **CA** (2)
3.3.3	$\theta_{ref}=\tan^{-1}\left(\frac{1}{3}\right)$ $\theta_{ref}\approx 18,43°$ $\theta=180°+18,43°$ $\theta=198,43^o$ **OR/*OF*** $\theta=180°+tan^{-1}\left(\frac{1}{3}\right)$ $\theta=198,43°$	✓ reference angle/ *verwysingshoek* ✓ correct quadrant/ *korrekte kwadrant* ✓ $\theta=198,43°$ **OR/*OF*** ✓ $tan^{-1}\left(\frac{1}{3}\right)$ ✓ correct quadrant ✓ $\theta=198,43°$	**A** **A** **CA** **A** **A** **CA** (3)
3.3.4	$z=\sqrt{10}cis198,43°$ or/*of* $z=\sqrt{10}(cos\,198,43°+i\,sin\,198,43°)$	✓ answer/*antwoord*	**CA** (1)

3.4	Solve for x and y if $x-4yi=\frac{3}{i}$ $x-4yi=\frac{3}{i}\times\frac{-i}{-i}$ $x-4yi=\frac{-3i}{-i^2}$ $x-4yi=\frac{-3i}{-(-1)}$ $x-4yi=-3i$ $x=0$ or/*of* $-4yi=-3i$ $y=\frac{3}{4}$ **OR/*OF*** $xi-4yi^2=3$ $xi-4y(-1)=3$ $xi+4y=3$ $x=0$ or/*of* $y=\frac{3}{4}$	✓ method/*metode* ✓ -1 ✓ $x=0$ ✓ $y=\frac{3}{4}$ **OR/*OF*** ✓ method/*metode* ✓ -1 ✓ $x=0$ ✓ $y=\frac{3}{4}$	**A** **A** **CA** **CA** **A** **A** **CA** **CA** (4)
			[24]

QUESTION/*VRAAG* 4

4.1.1	$B(-2;0)$ $y = 3^{-0} + 1$ $y = 2$ $C(0;2)$	✓ B (−2 ; 0) ✓ $x_C = 0$ ✓ $y_C = 2$	**A** **A** **CA** (3)
4.1.2	$m = \frac{0-2}{-2-0}$ $m = 1$ $y = x + 2$ **OR/*OF*** $y - 2 = (x - 0)$ $y = x + 2$	✓ substitution/*vervanging* ✓ $m = 1$ ✓ $y = x + 2$	**A** **CA** **CA** (3)
4.1.3	$y = 1$	✓ $y = 1$	**A** (1)
4.1.4	$y = 3^{-(-2)} + 1$ $y = 10$ $AB = 10 - 0$ $AB = 10$ **OR/*OF*** $A(-2; 10)$ $AB = \sqrt{(-2-(-2))^2 + (10-0)^2}$ $AB = 10$ units/*eenhede*	✓ substitution/*vervanging* ✓ *y* value/*waarde* ✓ AB = 10 units /*eenhede* **OR/*OF*** ✓ A (−2; 10) ✓ substitution/*vervanging* ✓ AB = 10 units/*eenhede*	**A** **CA** **CA** **A** **CA** **CA** (3)
4.1.5	$p(x) = 3^{-(-x)} + 1$ $= 3^x + 1$	✓ $p(x) = 3^x + 1$	**A** (1)
4.2.1	T.P (2 ; 9)	✓✓ (2 ; 9)	**A** (2)
4.2.2	$f(x) = -(x-2)^2 + 9$ $= -(x^2 - 4x + 4) + 9$ $f(x) = -x^2 + 4x + 5$	✓ $f(x) = -x^2 + 4x + 5$	**A** **CA** (1)
4.2.3	$y = 5$ $x^2 - 4x - 5 = 0$ $(x-5)(x+1) = 0$ $x = 5$ or/*of* $x = -1$	✓ $y = 5$ ✓ factors/*faktore* ✓ both values/*beide waardes*	**A** **CA** **CA** (3)

4.2.4	$0 \leq y \leq 6$	✓ critical values/*kritiese waardes* ✓ notation/*notasie*	**A** **A** (2)
4.2.5		*f* : ✓ shape/*vorm* ✓ all intercepts/*alle afsnitte* ✓ turning point/*draaipunt* *g* : ✓ shape/*vorm* ✓ intercepts/*afsnitte*	**A** **CA** **CA** **A** **CA** (5)
4.2.6	$-6 \leq x \leq -1 \text{or/} of\ 5 \leq x \leq 6$	✓ notation/*notasie* ✓ critical values/*kritiese waardes* ✓ notation/*notasie* ✓ critical values/*kritiese waardes*	**A** **CA** **A** **CA** (4)

4.3.1	$p = 4$ $q = 2$	✓ $p = 4$ ✓ $q = 2$	**A** **A** (2)
4.3.2	$y = \frac{a}{x-4} + 2$ $3 = \frac{a}{5-4} + 2$ $a = 1$ $y = \frac{1}{x-4} + 2$	✓ substitute/*vervang* (5 ; 3) ✓ $a = 1$ ✓ $y = \frac{1}{x-4} + 2$	**A** **CA** **CA** (3)
			[33]

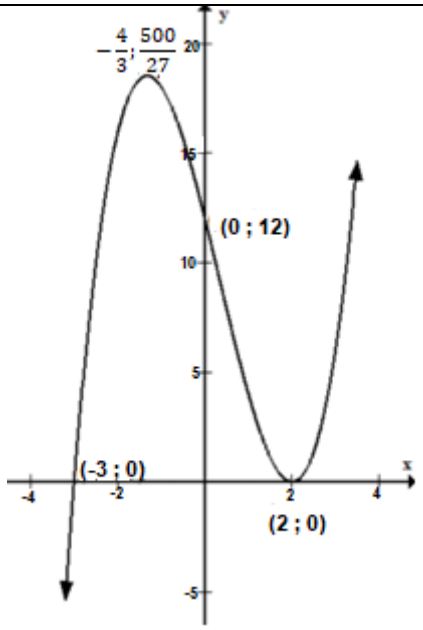
QUESTION/*VRAAG* 5

5.1	$i_{eff} = \left(1+\frac{i_{nom}}{m}\right)^{m} - 1$ $i_{eff} = \left(1+\frac{0,03}{4}\right)^{4} - 1$ $i_{eff} = 3,03\%$	✓ substitution/*vervanging* ✓ $i_{eff} = 3,03\%$	**A** **CA** **CA** (3)
5.2.1	6,7 % of/*van* R1 500 = R100,50	✓ R100,50	**A** (1)
5.2.2	Loan amount/*leningsbedrag* = R1 500 – R100,50 = R1 399,50	✓ method/*metode* ✓ R1 399,50	**A** **CA** (2)
5.2.3	$A = P(1+in)$ $= R1399,5(1+0,15\times 0,5)$ $A = R1\ 504,4625$ Actual amount paid/*Werklike bedrag betaal* = R1 504,4625 + R100,50 = R1 604,96	✓ substitution/*vervanging* ✓ $A = R1\ 504,46$ ✓ R1 604,96	**A** **CA** **CA** **CA** (3)
5.2.4	monthly repayments/*maandelikse betalings* $= \frac{1504,46}{6} = R250,74$	✓ method/*metode* ✓ R250,74	**CA** (2)
5.3	$A = R8000\left(1+\frac{0,06}{4}\right)^{4\times 1,5}\left(1+\frac{0,075}{12}\right)^{12\times 3,5}$ $A = R11364,07$ **OR / *OF*** $A_1 = R8000\left(1+\frac{0,06}{4}\right)^{4\times 1,5}$ $A_1 = R8\ 747,546112$ $A = R8\ 747,546112\left(1+\frac{0,075}{12}\right)^{12\times 3,5}$ $A = R11\ 364,07$	✓ $\frac{0,06}{4}$ ✓ 1,5 × 4 = 6 ✓ $\frac{0,075}{12}$ ✓ 12×3,5 = 42 ✓ $A = R11\ 364,07$ **OR / *OF*** ✓ 4 × 1,5 ✓ R8 747,54 6112 ✓ $\frac{0,075}{12}$ ✓ 12 × 3,5 ✓ R11 364, 07	**A** **A** **A** **A** **CA** **A** **CA** **A** **A** **CA** (5)
			[16]

QUESTION/*VRAAG* 6

6.1	$f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{3-(x+h)-(3-x)}{h}$ $=\lim\limits_{h\to 0}\dfrac{3-x-h-3+x}{h}$ $=\lim\limits_{h\to 0}\dfrac{-h}{h}$ $=\lim\limits_{h\to 0}-1$ $f'(x)=-1$	✓ definition/*definisie* ✓ substitution/*vervanging* ✓ simplification/*vereenvoudiging* ✓ simplification/*vereenvoudiging* ✓ answer/*antwoord* (5)	**A** **A** **CA** **CA** **CA**
6.2.1	$x=2y+1$ $y=\dfrac{x}{2}-\dfrac{1}{2}$ $\dfrac{dy}{dx}=\dfrac{1}{2}$	**A** ✓ y-subject/*onderwerp* ✓ $\dfrac{1}{2}$ (2)	**CA**
6.2.2	$D_x\left[x\left(x^{\frac{1}{3}}+\dfrac{1}{x^2}-\dfrac{2}{x}\right)\right]$ $=D_x\left[x^{\frac{4}{3}}+\dfrac{1}{x}-2\right]$ $=D_x\left[x^{\frac{4}{3}}+x^{-1}-2\right]$ $=\dfrac{4}{3}x^{\frac{1}{3}}-x^{-2}$	✓ $x^{\frac{4}{3}}$ ✓ $\dfrac{1}{x}$ ✓ -2 ✓ x^{-1} ✓ $\dfrac{4}{3}x^{\frac{1}{3}}$ ✓ $-x^{-2}$ (6)	**A** **A** **A CA** **CA** **CA**
6.3	$g(-3)=2(-3)^2=18$ $y-18=-12(x+3)$ $y=-12x-18$	✓$g(-3)=2(-3)^2=18$ ✓ substitution /*vervanging* ✓ $y=-12x-18$ (3)	**A** **A** **CA**
			[16]

QUESTION/VRAAG 7

7.1	$f(x)=(x-2)(x-2)(x+3)$ $f(x)=(x-2)(x^2+x-6)$	✓ $(x-2)(x+3)$ ✓ x^2+x-6	**A** **A** (2)
7.2	$f(x)=x^3-x^2-8x+12$ $f'(x)=3x^2-2x-8$ $3x^2-2x-8=0$ $(3x+4)(x-2)=0$ **OR/*OF*** $x=\frac{-(-2)\pm\sqrt{(-2)^2-4(3)(-8)}}{2(3)}$ $x=-\frac{4}{3}$ or/*of* $x=2$ $f\left(-\frac{4}{3}\right)=\frac{500}{27}\approx 18,52$ $f(2)=0$ $\left(-\frac{4}{3};\frac{500}{27}\right)$ and/*en* (2;0)	✓ standard form/ *standaardvorm* ✓ derivative/*afgeleide f* ✓ derivative/*afgeleide f* = 0 ✓ factors/*faktore* ✓ both *x*-values at the turning points/*beide x-waardes van die draaipunte* ✓ both y-values of the turning point/*beide y-waardes van die draaipunt*	**A** **CA** **A** **CA** **CA** **CA** (6)
7.3	(0; 12)	✓ 0 ✓ 12	**A** **CA** (2)
7.4		✓ shape/*vorm* ✓ *x*-intercepts/*afsnitte* ✓ *y*-intercept/*afsnit* ✓ turning points/*draaipunte*	**A** **CA** **CA** **CA** (4)
7.5	$-\frac{4}{3}<x<2$	✓ critical values/*kritiese waardes* ✓ notation/*notasie*	**A** **A** (2)
			[16]

QUESTION/*VRAAG* 8

8.1	$v\,(0) = 9$ m/s	✓ 9 m/s	**A** (1)
8.2	$v(t) = 3t^2 - 12t + 9$ $v'(t) = 6t - 12$ $6t - 12 = 0$ $t = 2$ sec/*sek* $v(2) = 3(2)^2 - 12(2) + 9$ $v(2) = -3$ m/s	✓ $v'(t) = 6t - 12$ ✓ $6t - 12 = 0$ ✓ $t = 2$ seconds/*sekondes* ✓ $v(2) = 3(2)^2 - 12(2) + 9$ ✓ $v = -3$ m/s	**A** **A** **CA** **CA** (5)
			[6]

QUESTION/*VRAAG* 9

9.1.1	$\int(-4x + \pi)\,dx$ $= -2x^2 + \pi x + c$	✓ $-2x^2$ ✓ πx ✓ c	**A** **A** **A** (3)
9.1.2	$\int 3^{-2x} - 7x^{-1}\,dx$ $= \frac{3^{-2x}}{-2\ln 3} - 7\ln x + c$	✓ $\frac{3^{-2x}}{-2\ln 3}$ ✓ $-7\ln x + c$	**A** **A** (2)
9.2	$A = \int_1^3 (-x^3 + 2x)\,dx$ $= \left[-\frac{x^4}{4} + x^2\right]_1^3$ $= \left[-\frac{(3)^4}{4} + (3)^2\right] - \left[-\frac{(1)^4}{4} + (1)^2\right]$ $= 12$ square units/*vierkanteeenhede*	✓ area notation/*notasie* ✓ $-\frac{x^4}{4} + x^2$ ✓✓ substitution/*vervanging* ✓ A = 12	**A** **A** **A** **CA** (5)
			[10]
			TOTAL/*TOTAAL*: 150