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

JUNE/*JUNIE* 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*
AO	Answer Only/*Antwoord alleenlik*

This marking guideline consists of 13 pages. /
Hierdie nasienriglyn bestaan uit 13 bladsye.

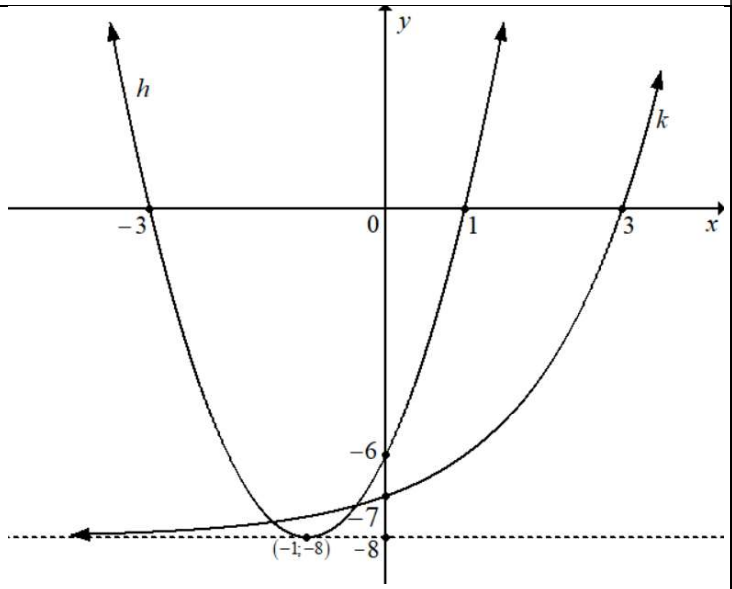
QUESTION/*VRAAG* 1			
1.1	1.1.1	$x(x+5)=0$ $x=0$ or $x=-5$	✓ $x=0$ **A** ✓ $x=-5$ **A** (2)
	1.1.2	$(x+1)(x-3)=2x$ $x^2+x-3x-3-2x=0$ $x^2-4x-3=0$ $x=\frac{-(-4)\pm\sqrt{(-4)^2-4(1)(-3)}}{2(1)}$ $x=4,6$ or/*of* $x=-0,6$	✓ standard form / *standaardvorm* **A** ✓ **SF** **CA** **R** ✓ each solution / *elke oplossing* **CA** ✓ each solution / *elke oplossing* **CA** (4)
	1.1.3	$2x^2-x-3<0$ $(2x-3)(x+1)<0$ **OR/*OF*** $x=\frac{-(-1)\pm\sqrt{(-1)^2-4(2)(-3)}}{2(2)}$ $-1<x<\frac{3}{2}$	✓ factors/ *faktore* / substitution / *vervanging* **A** ✓ critical values / *kritieke waardes* **CA** ✓ notation / *notasie* **A** (3)
1.2		$3y-2+x=0$ ……(1) $y^2-y=xy-x$ ……....(2) $x=2-3y$……(3) $y^2-y=(2-3y)y-(2-3y)$ $y^2-y=2y-3y^2-2+3y$ $4y^2-y-2y-3y+2=0$ $4y^2-6y+2=0$ $2y^2-3y+1=0$ $(2y-1)(y-1)=0$ $y=1$ or/*of* $y=\frac{1}{2}$ $x=2-3(1)$ or/*of* $x=2-3\left(\frac{1}{2}\right)$ $x=-1$ or/*of* $x=\frac{1}{2}$	✓ method / *metode* **M** ✓ substitution / *vervanging* **CA** ✓ standard form / *standaardvorm* **CA** ✓ $y=1$ **CA** ✓ $y=\frac{1}{2}$ **CA** ✓ both x values / *beide x waardes* **CA** (6)

1.3	1.3.1	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $2ax = -b \pm \sqrt{b^2 - 4ac}$ $2ax + b = \pm\sqrt{b^2 - 4ac}$ $(2ax + b)^2 = \pm(b^2 - 4ac)$ $\therefore c = \frac{(2ax + b)^2 \pm b^2}{\pm 4a}$	✓ $2ax$ subject / *onderwerp* **A** ✓ $2ax + b$ subject / *onderwerp* **CA** ✓ squaring both sides / *kwadreer beide kante* **CA** ✓ $c = \frac{(2ax + b)^2 \pm b^2}{\pm 4a}$ **CA** (4)
	1.3.2	$c = \frac{(2(3)(1) - 2)^2 \pm (-2)^2}{\pm 4(3)}$ $c = \frac{(6-2)^2 \pm 4}{\pm 12} = \frac{5}{3}$ or/*of* -1	✓ substitution / *vervanging* **CA** ✓ values of / *waardes van* c **CA** (2)
1.4	1.4.1	$11111_2 = 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 16 + 8 + 4 + 3 = 31$	✓ 31 **A** (1)
	1.4.2	11111_2 1010_2 $10101_2 = 21$	✓ 10101_2 **A** ✓ 21 **CA** (2)
			[24]

QUESTION/*VRAAG* 2				
2.1	2.1.1	$a = 4$; $b = -3$ and/*en* $c = -7$.	✓ $a = 4$; $b = -3$ and/*en* $c = -7$	**A** (1)
	2.1.2	$b^2 - 4ac = (-3)^2 - (4)(4)(-7)$ $= 121$	✓ **SF** ✓ 121	**A** **CA** (2)
	2.1.3	Roots are real, rational and unequal. / *Wortels is reël, rasionaal en ongelyk*	✓ rational / *rasionaal*	**A** (1)
2.2	$b^2 - 4ac < 0$ $9 - 4(m)(2) < 0$ $m > \frac{9}{8}$		✓ substitution / *vervanging* ✓ notation / *notasie* ✓ m values / *waardes*	**A** **A** **CA** (3)
				[7]

QUESTION/*VRAAG* 3				
3.1	3.1.1	$\left(\frac{7x}{25}-10\right)^{0}=1$	✓ 1	**A** (1)
	3.1.2	$\frac{2^{x-4}-5.2^{x-1}}{2^{x-2}}$ $=\frac{2^{x}.2^{-4}-5.2^{x}.2^{-1}}{2^{x}.2^{-2}}$ $=\frac{2^{x}\left(2^{-4}-5.2^{-1}\right)}{2^{x}.2^{-2}}$ $=\frac{2^{-4}-5.2^{-1}}{2^{-2}}$ OR /*OF* $\frac{-\frac{39}{16}}{\frac{1}{4}}$ $=2^{-4+2}-5.2^{-1+2}$ OR / *OF* $-\frac{39}{16}\times\frac{4}{1}$ $=2^{-2}-5.2$ $=-\frac{39}{4}$	✓ exponential property / *eksponensiële eienskap* **A** ✓ common Factor / *gemene factor* **CA** ✓ simplification / *vereenvoudiging* **S** ✓ answer / *antwoord* **CA** (4)	
	3.1.3	$\frac{\sqrt{45}-\sqrt{20}}{2\sqrt{5}}$ $=\frac{\sqrt{3^{2}.5}-\sqrt{2^{2}.5}}{2\sqrt{5}}$ $=\frac{3\sqrt{5}-2\sqrt{5}}{2\sqrt{5}}$ $=\frac{1}{2}$	✓ prime factors / *priemfaktore* **A** ✓ simplification / *vereenvouding* **CA** ✓ answer / *antwoord* **CA** (3)	
3.2		$log_a a\,.log_x\left(\frac{x}{y}\right)+log_x y=1$ $1.log_x\left(\frac{x}{y}\right)+log_x y=1$ $log_x x-log_x y+log_x y$ $1=\text{RHS}/RK=\text{LHS}/LK$ **OR/*OF***	✓ same base rule / *dieselfde basis reël* **A** ✓ division rule / *delingsreël* **A** ✓ simplification / *vereenvoudiging* **CA** ✓ simplification / *vereenvoudiging* **S** (4)	

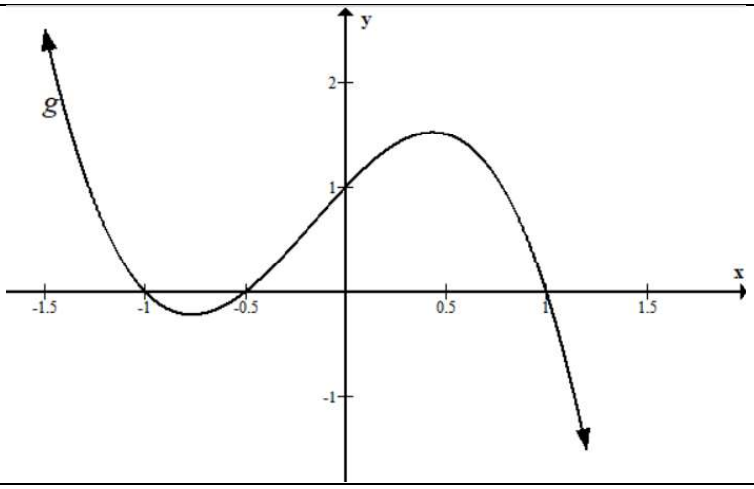
		$log_a a \,.\, log_x \left(\frac{x}{y}\right) + log_x y$ RHS/*RK* = $1.log_x \frac{x}{y}$ x y $= 1.\ log_x x$ $= 1.1$ $= 1$ RHS/*RK* = LHS/*LK*	✓ same base rule / *dieselfde basis reël* **A** ✓ $log_x \frac{x}{y}$ x y **A** ✓ simplification / *vereenvoudiging* **CA** ✓ further simplification / *verdere vereenvoudiging* **S** (4)
3.3	3.3.1	$\overline{z} = 2 + 3i$	✓ real part / *reële deel* **A** ✓ imaginary part / *imaginêre deel* **A** (2)
	3.3.2	$\|z\| = \sqrt{2^2 + (-3)^2}$ $\|z\| = \sqrt{13}$ Ref. $\angle\, \theta = tan^{-1}\left(\frac{3}{2}\right)$ Ref. $\angle\, \theta = 56{,}31°$ $\theta = 360° - 56{,}31° = 303{,}69°$ $z = \sqrt{13}cis303{,}69°$ *or* $z = \sqrt{13}(\cos 303{,}69° + i\sin 303{,}69°)$	✓ **SF** **A** ✓ modulus **CA** ✓ tan ratio / *verhouding* **CA** ✓ argument **CA** ✓ polar form / *polêre vorm* **CA** (5)
3.4	$x + 2i = 3 - iy$ $x = 3$ and/*en* $y = -2$		✓ $x = 3$ **A** ✓ $y = -2$ **A** (2)
			[21]

QUESTION/*VRAAG* 4			
4.1	4.1.1	A (0 ; − 3) and / *en* B (3 ; 0)	✓ A (0 ; − 3) **A** ✓ B (3 ; 0) **A** (2)
	4.1.2	$AB=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$ $AB=\sqrt{(0-3)^2+\left((-3)-0\right)^2}$ $AB=\sqrt{9+9}$ $AB=3\sqrt{2}$	✓ formula /*formule* **F** ✓ substitution / *vervanging* **A** ✓ length /*lengte* **CA** (3)
	4.1.3	$-3 \le y \le 0$ or/*of* $y \in [-3;0]$	✓ critical values / *kritiese waardes* **CA** ✓ notation / *notasie* **A** (2)
	4.1.4	$0 < x < 3$ or/*of* $x \in (0;3)$	✓ critical values / *kritiese waardes* **CA** ✓ notation / *notasie* **A** (2)
4.2	4.2.1	$y = -8$	✓ $y = -8$ **A** (1)
	4.2.2	$0 = 2^x - 8$ $8 = 2^x$ $2^3 = 2^x$ $x = 3$	✓ $x = 3$ **A** ✓ $y = 0$ **A** (2)
	4.2.3	$h(x) = 2(0-1)(0+3) = -6$	✓ −6 (1)
	4.2.4	$0 = 2(x-1)(x+3)$ $x = 1$ or/*of* $x = -3$	✓ $y = 0$ **A** ✓ $x = 1$ **A** ✓ $x = -3$ **A** (3)
	4.2.5		✓ shape of/ *vorm van h* **A** ✓ all intercepts / *alle afsnitte* **CA** ✓ turning point / *draaipunt* **CA** ✓ shape of/ *vorm van k* **A** ✓ intercepts / *afsnitte* **CA** (5)

	4.2.6	$x = -1$	✓ $x = -1$	**A** (1)
	4.2.7	$x > 3$	✓ critical values / *kritiese waardes* ✓ notation / *notasie*	**A** **A** (2)
4.3	4.3.1	$x \in R; x \neq 0$	✓ $x \neq 0$	**A** (1)
	4.3.2	$m(x) = -\frac{2}{x} + 5$	✓ $a = -2$ ✓ $b = 5$ ✓ equation / *vergelyking*	**A** **A** **CA** (3)
				[28]

QUESTION/*VRAAG* 5		
5.1	9,5% of/*van* R500 = R47,50	✓ R47,50 **A** (1)
5.2	$A = P(1+i)^n$ $A = 500\left(1+\frac{0,095}{12}\right)^{15}$ $A = R562,78$	✓ formula / *formule* **F** ✓ substitute/*vervang P* **A** ✓ substitute *i* and *n* / *vervang i en n* **A** ✓ R562,78 **CA** (4)
5.3	$A = P(1-in)$ $P = 2P(1-0,03\times n)$ $0,5 = 1-0,03\times n$ $-0,5 = -0,03\times n$ $n = 16,67$ minutes/ *minute*	✓ formula / *formule* **F** ✓ substitution / *vervanging* **SF** ✓ simplification / *vereenvoudiging* **S** ✓ answer / *antwoord* **CA** (4)
5.4	$A = 600000(1+0,065\times 3)\left(1+\frac{0,06}{12}\right)^{2\times 12}$ $A = R808\ 173,56$ **OR/*OF*** $A_1 = 600000(1+0,065\times 3)$ $= R717\ 000$ $A_2 = R717\ 000\left(1+\frac{0,06}{12}\right)^{2\times 12}$ $= R808\ 173,56$	✓ *P* **A** ✓ SI **A** ✓ CI **A** ✓ *in* **A** ✓ amount / *bedrag* **CA** ✓ conclusion / *gevolgtrekking* **CA** (6)
		[15]

QUESTION/*VRAAG* 6			
6.1	$f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{2(x+h)-3-(2x-3)}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{2x+2h-3-2x+3}{h}$ $f'(x)=\lim\limits_{h\to 0}\dfrac{2h}{h}$ $f'(x)=2$		✓ definition / *definisie* **A** ✓ substitution / *vervanging* **SF** ✓ simplification / *vereenvoudiging* **S** ✓ simplification / *vereenvoudiging* **S** ✓ answer / *antwoord* **CA** (5)
6.2	6.2.1	$f'(x)=0$	✓ $f'(x)=0$ **A** (1)
	6.2.2	$D_x\,(2x+1)(x-2)$ $=D_x\,(2x^2-4x+x-2)$ $=D_x\,(2x^2-3x-2)$ $=4x-3$	✓ simplification / *vereenvoudiging* **A** ✓ simplification / *vereenvoudiging* **A** ✓ $4x$ **CA** ✓ -3 **CA** (4)
	6.2.3	$xy=1-\sqrt{x}$ $xy=1-x^{\frac{1}{2}}$ $y=\dfrac{1}{x}-\dfrac{x^{\frac{1}{2}}}{x}$ $y=x^{-1}-x^{-\frac{1}{2}}$ $\dfrac{dy}{dx}=-x^{-2}+\dfrac{1}{2}x^{-\frac{3}{2}}$ or/*of* $=-\dfrac{1}{x^2}+\dfrac{1}{2\sqrt{x^3}}$	✓ exponential form / *eksponensiële vorm* **A** ✓ y subject / *onderwerp* **A** ✓ $-x^{-2}$ **CA** ✓ $\frac{1}{2}x^{-\frac{3}{2}}$ or/*of* $\frac{1}{2\sqrt{x^3}}$ **CA** (4)
6.3	$f(2)=3$ and/*en* $f(-3)=8$ Average gradient $=\dfrac{3-8}{2+3}$ *Gemiddelde gradiënt* $=-1$		✓ points / *punte* **A** ✓ substitution / *vervanging* **CA** ✓ gradient / *gradiënt* **CA** (3)
			[17]

QUESTION/*VRAAG* 7			
7.1	y-intercept of / *afsnit van* $g = 1$	✓ 1	**A** (1)
7.2	$x = -0,5$ or/*of* $x = 1$ or/*of* $x = -1$	✓ $x = -0,5$ ✓ $x = 1$ ✓ $x = -1$	**A** **A** **A** (3)
7.3	$g(x) = -(2x+1)(x-1)(x+1)$ $g(x) = -(2x+1)(x^2-1)$ $g(x) = -2x^3 + 2x - x^2 + 1$ $g'(x) = -6x^2 - 2x + 2 = 0$ $-3x^2 - x + 1 = 0$ $x = \frac{1 \pm \sqrt{(-1)^2 - 4(-3)(1)}}{-6}$ $x = -0,77$ or/*of* $x = 0,43$ $g(-0,77) = -0,23$ and/*en* $g(0,43) = 1,52$	✓ standard form / *standaardvorm* **A** ✓ derivative of / *afgeleide van g* **CA** ✓ derivative of / *afgeleide van* $g = 0$ **A** ✓ x-values at the turning point / *x-waarde by draaipunt* **CA** ✓ turning point / *draaipunt* **CA** (5)
7.4		✓ shape / *vorm* **A** ✓ x-intercepts / *afsnitte* **CA** ✓ y-intercept / *afsnit* **CA** ✓ turning points / *draaipunte* **CA** (4)
7.5	RHS/*RK* $= -2(-3)^3 + 2(-3) - (-3)^2 + 1$ $= 40$ LHS/*LK* $= 11$ LHS/*LK* $\neq$ RHS/*RK* $(-3; 11)$ does not lie on the graph / *lê nie op die grafiek nie*	✓ SF **A** ✓ LHS / *LK* $\neq$ RHS / *RK* **A** (2)	
			[15]

QUESTION/*VRAAG* 8			
8.1	Height / *Hoogte* = 0	✓ 0	**A** (1)
8.2	$H'(x) = 2t - 10 = 0$ $t = 5$ seconds / *sekondes*	✓ $H'(x) = 2t - 10$ ✓ $H'(x) = 0$ ✓ $t = 5$	**A** **A** **CA** (3)
8.3	$H(3) = 3^2 - 10(3)$ $H(3) = -21\ m$	✓ substitution / *vervanging* ✓ $-21\ m$	**A** **CA** (2)
8.4	$\text{Gradient} = \frac{\text{Change/}Verandering\ \text{in}\ y}{\text{Change/}Verandering\ \text{in}\ x}$ Gradiënt = 0	✓ gradient formula / *gradiënt formule* ✓ 0	**A** **A**
			[8]

QUESTION/*VRAAG* 9				
9.1	9.1.1	$\int (1)\ dx = x + c$	✓ x ✓ c	**A** **A** (2)
	9.1.2	$= \int x^{\frac{1}{2}} - x^{-2} + \pi\ dx$ $= \frac{2}{3}x^{\frac{3}{2}} + \frac{1}{x} + \pi x + c$	✓ $x^{\frac{1}{2}}$ ✓ $-x^{-2}$ ✓ $\frac{2}{3}x^{\frac{3}{2}}$ ✓ $\frac{1}{x}$ ✓ πx	**A** **CA** **A** **A** (5)
9.2	$\int_{-1}^{0} (x)\ dx$ $= \left[\frac{x^2}{2}\right]_{-1}^{0}$ $= \left[\frac{(0)^2}{2}\right] - \left[\frac{(-1)^2}{2}\right]$ $= -\frac{1}{2}$	✓ $\frac{x^2}{2}$ ✓ SF ✓ $-\frac{1}{2}$	**A** **A** **CA** (3)
9.3	$A = -\int_0^3 x(x-3)\ dx$ $A = -\int_0^3 x^2 - 3x\ dx$ $= -\left[\frac{x^3}{3} - \frac{3}{2}x^2\right]_0^3$ $= -\left[\left(\frac{(3)^3}{3} - \frac{3}{2}(3)^2\right) - 0\right]$ $= -\left(-\frac{9}{2}\right)$ $\text{A} = \frac{9}{2}$	✓ F ✓ $-\left[\frac{x^3}{3} - \frac{3}{2}x^2\right]_0^3$ ✓✓ SF ✓ $\text{A} = \frac{9}{2}$	**A** **CA** **CA** **CA** (5)
				[15]
				TOTAL/*TOTAAL*: 150