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**NATIONAL
SENIOR CERTIFICATE /
NASIONALE
SENIOR SERTIFIKAAT**

GRADE/GRAAD 12

JUNE/JUNIE 2025

**TECHNICAL MATHEMATICS P1/TEGNIJSE 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.



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QUESTION/VRAAG 1			
1.1	1.1.1	$x(x+5)=0$ $x=0$ or $x=-5$	$\checkmark x=0$ A $\checkmark x=-5$ 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 $x=-0,6$	$\checkmark$ standard form / <i>standaardvorm</i> A $\checkmark$ SF CA R $\checkmark$ each solution / <i>elke oplossing</i> CA $\checkmark$ each solution / <i>elke oplossing</i> CA (4)
	1.1.3	$2x^2-x-3 < 0$ $(2x-3)(x+1) < 0$ OR/OF $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-3)}}{2(2)}$ $-1 < x < \frac{3}{2}$	$\checkmark$ factors/ <i>faktore</i> / substitution / <i>vervanging</i> A $\checkmark$ critical values / <i>kritieke waardes</i> CA $\checkmark$ notation / <i>notasie</i> 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 $x=\frac{1}{2}$	$\checkmark$ method / <i>metode</i> M $\checkmark$ substitution / <i>vervanging</i> CA $\checkmark$ standard form / <i>standaardvorm</i> CA $\checkmark y=1$ CA $\checkmark y=\frac{1}{2}$ CA $\checkmark$ both x values / <i>beide x waardes</i> 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 / <i>onderwerp</i> A ✓ $2ax + b$ subject / <i>onderwerp</i> CA ✓ squaring both sides / <i>kwadreeer beide kante</i> CA ✓ $c = \frac{(2ax + b)^2 \pm b^2}{\pm 4a}$ CA (4)
	1.3.2	$c = \frac{(2(3)(1) - 2)^2 \pm (-2)^2}{\pm 4(3)}$ $c = \frac{(6 - 2)^2 \pm 4}{\pm 12} = \frac{5}{3} \text{ or/of } -1$	✓ substitution / <i>vervanging</i> CA ✓ values of / <i>waardes van</i> 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	$\begin{array}{r} 11111_2 \\ \underline{1010_2} \\ 10101_2 = 21 \end{array}$	✓ 10101_2 A ✓ 21 CA (2)
			[24]



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

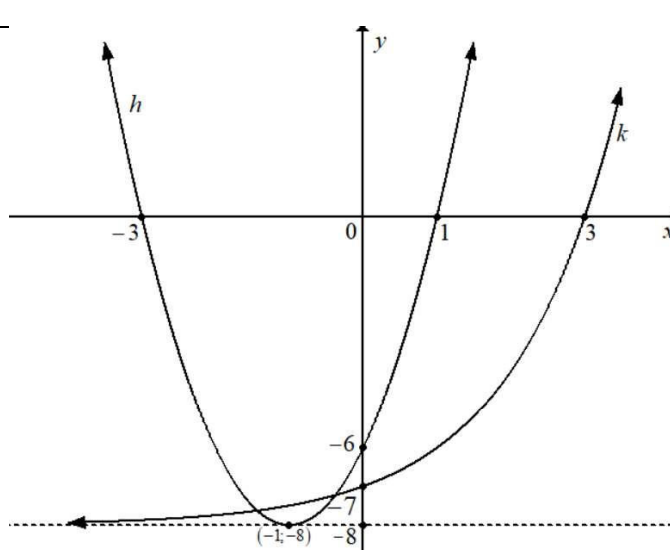


QUESTION/VRAAG 3				
3.1	3.1.1	$\left(\frac{7x}{25}-10\right)^0=1$	✓ 1	A (1)
	3.1.2	$\frac{2^{x-4}-5.2^{x-1}}{2^{x-2}}$ $=\frac{2^x.2^{-4}-5.2^x.2^{-1}}{2^x.2^{-2}}$ $=\frac{2^x\left(2^{-4}-5.2^{-1}\right)}{2^x.2^{-2}}$ $=\frac{2^{-4}-5.2^{-1}}{2^{-2}} \quad \text{OR / OF} \quad \frac{-\frac{39}{16}}{\frac{1}{4}}$ $=2^{-4+2}-5.2^{-1+2} \quad \text{OR / OF} \quad -\frac{39}{16} \times \frac{4}{1}$ $=2^{-2}-5.2$ $=-\frac{39}{4}$	✓ exponential property / <i>eksponensiële eienskap</i> A ✓ common Factor / <i>gemene factor</i> CA ✓ simplification / <i>vereenvoudiging</i> S ✓ answer / <i>antwoord</i> 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 / <i>priemfaktore</i> A ✓ simplification / <i>vereenvoudiging</i> CA ✓ answer / <i>antwoord</i> 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 / <i>dieselfde basis reël</i> A ✓ division rule / <i>delingsreël</i> A ✓ simplification / <i>vereenvoudiging</i> CA ✓ simplification / <i>vereenvoudiging</i> S (4)	



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



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



	4.2.6	$x = -1$	✓ $x = -1$	A (1)
	4.2.7	$x > 3$	✓ critical values / <i>kritiese waardes</i> ✓ notation / <i>notasie</i>	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 / <i>vergelyking</i>	A A CA (3)
[28]				

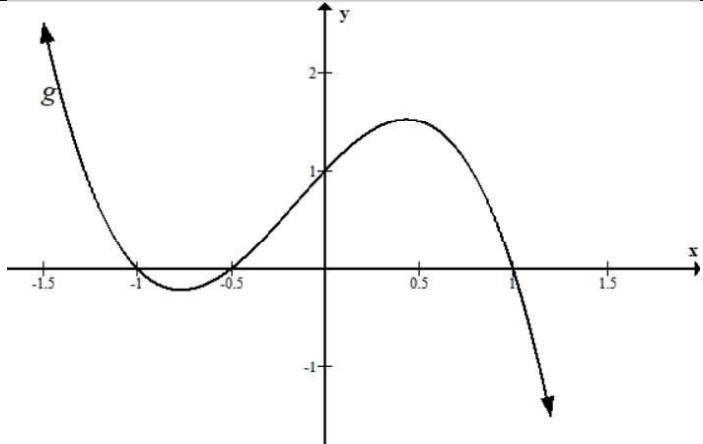


QUESTION/VRAAG 5			
5.1	9,5% of/van R500 = R47,50	✓ R47,50	A (1)
5.2	$A = P(1+i)^n$ $A = 500\left(1 + \frac{0,095}{12}\right)^{15}$ $A = R562,78$	✓ formula / formule ✓ substitute/vervang P ✓ substitute i and n / vervang i en n ✓ R562,78	F A A CA (4)
5.3	$A = P(1-in)$ $P = 2P(1-0,03 \times n)$ $0,5 =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



QUESTION/VRAAG 6			
6.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$		✓ definition / <i>definisie</i> ✓ substitution / <i>vervangings</i> A SF
	$f'(x) = \lim_{h \rightarrow 0} \frac{2(x+h) - 3 - (2x-3)}{h}$		
	$f'(x) = \lim_{h \rightarrow 0} \frac{2x+2h-3-2x+3}{h}$		✓ simplification / <i>vereenvoudiging</i> S
	$f'(x) = \lim_{h \rightarrow 0} \frac{2h}{h}$		✓ simplification / <i>vereenvoudiging</i> ✓ answer / <i>antwoord</i> S CA
	$f'(x) = 2$		(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 / <i>vereenvoudiging</i> ✓ simplification / <i>vereenvoudiging</i> ✓ $4x$ ✓ -3 A A CA CA (4)
	6.2.3	$xy = 1 - \sqrt{x}$ $xy = 1 - x^{\frac{1}{2}}$ $y = \frac{1}{x} - \frac{x^{\frac{1}{2}}}{x}$ $y = x^{-1} - x^{-\frac{1}{2}}$ $\frac{dy}{dx} = -x^{-2} + \frac{1}{2}x^{-\frac{3}{2}}$ or/of $= -\frac{1}{x^2} + \frac{1}{2\sqrt{x^3}}$	✓ exponential form / <i>eksponensiële vorm</i> A ✓ y subject / <i>onderwerp</i> 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 $f(-3) = 8$		✓ points / <i>punte</i> A
	Average gradient = $\frac{3-8}{2+3}$ <i>Gemiddelde gradiënt</i> = -1		✓ substitution / <i>vervangings</i> CA ✓ gradient / <i>gradiënt</i> 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 ✓ derivative of / afgeleide van g ✓ derivative of / afgeleide van $g = 0$ ✓ x-values at the turning point / x-waarde by draaipunt ✓ turning point / draaipunt	A CA A CA CA (5)
7.4		✓ shape / vorm ✓ x-intercepts / afsnitte ✓ y-intercept / afsnit ✓ turning points / draaipunte	A CA CA 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 ✓ $LHS / LK \neq RHS / RK$	A A (2)
[15]			



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



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

