



Province of the
EASTERN CAPE
EDUCATION

**NASIONALE
SENIOR SERTIFIKAAT**

GRAAD 11

NOVEMBER 2018

**TEGNIESE WISKUNDE V1
NASIENRIGLYN**

PUNTE: 150

Hierdie nasienriglyn bestaan uit 14 bladsye.

NOTA:

- As 'n kandidaat 'n antwoord TWEE keer beantwoord, merk slegs die EERSTE poging.
- Kontinue akkuraatheid is deurgaans van toepassing in ALLE aspekte van die memorandum, TENSY anders vermeld.
- Indien 'n kandidaat 'n poging kanselleer en dit nie oordoen nie, merk die gekanselleerde poging.
- Die punt vir vervanging word toegeken vir vervanging in die korrekte formule.

VRAAG 1				
1.1	1.1.1	$\left(\frac{2}{3^{-2}}\right)^{-1} = \frac{2^{-1}}{3^2}$ $= \frac{1}{9 \cdot 2}$ $= \frac{1}{18}$	✓ Distributiewe wet ✓ Positiewe eksponent ✓ $\frac{1}{18}$	
		OF $\left(\frac{2}{3^{-2}}\right)^{-1} = (2 \cdot 3^2)^{-1}$ $= (18)^{-1}$ $= \frac{1}{18}$	OF ✓ Positiewe eksponent ✓ Vereenvoudiging ✓ $\frac{1}{18}$	(3)
	1.1.2	$\left(3 - \frac{1}{x}\right)\left(9 + \frac{3}{x} + \frac{1}{x^2}\right)$ $= 27 - \frac{1}{x^3}$	✓ 27 ✓ $-\frac{1}{x^3}$	(2)
	1.1.3	$\frac{\sqrt{32} + \sqrt{8}}{6\sqrt{2}}$ $= \frac{\sqrt{2^5} + \sqrt{2^3}}{6\sqrt{2}}$ $= \frac{2^{\frac{5}{2}} + 2^{\frac{3}{2}}}{6 \cdot 2^{\frac{1}{2}}}$ $= \frac{2^{\frac{5}{2} - \frac{1}{2}} + 2^{\frac{3}{2} - \frac{1}{2}}}{6}$ $= \frac{2^2}{6} + \frac{2}{6}$ $= 1$	✓ Priemfaktore ✓ Eksponensiële vorm ✓ Delingsreël ✓ 1	(4)

		OF $\frac{\sqrt{32} + \sqrt{8}}{6\sqrt{2}}$ $= \frac{\sqrt{2^5} + \sqrt{2^3}}{6\sqrt{2}}$ $= \frac{\sqrt{2^3}(\sqrt{2^2} + 1)}{6\sqrt{2}}$ $= \frac{\sqrt{2^3}(3)}{2 \cdot 3\sqrt{2}}$ $= \frac{\sqrt{2^3}}{2\sqrt{2}} = \frac{\sqrt{2^3}}{\sqrt{2^3}}$ $= 1$	OF ✓ Priemfaktore ✓ Eksponeansiële vorm ✓ Vereenvoudiging ✓ 1	
		OF $\frac{\sqrt{32} + \sqrt{8}}{6\sqrt{2}}$ $= \frac{\sqrt{16 \cdot 2} + \sqrt{4 \cdot 2}}{6\sqrt{2}}$ $= \frac{4\sqrt{2} + 2\sqrt{2}}{6\sqrt{2}}$ $= \frac{6\sqrt{2}}{6\sqrt{2}}$ $= 1$	OF ✓ Produk van priemfaktore ✓ Vereenvoudiging ✓ Som ✓ 1	
	1.1.4	$\frac{3 \cdot 3^x - 4 \cdot 3^{x+2}}{2 \cdot 3^x - 3^{x+1}}$ $= \frac{3 \cdot 3^x - 4 \cdot 3^x \cdot 3^2}{2 \cdot 3^x - 3^x \cdot 3^1}$ $= \frac{3^x(3 - 4 \cdot 3^2)}{3^x(2 - 3)}$ $= \frac{-33}{-1}$ $= 33$	✓ Faktore in die teller ✓ Faktore in die noemer ✓ Vereenvoudiging ✓ 33	(4)
	1.2	1.2.1 $\log \left(\frac{9c^3}{100} \right)$ $= \log 9 + \log c^3 - \log 100$ $= 2 \log 3 + 3 \log c - 2 \log 10$ $= 2 \log 3 + 3 \log c - 2$	✓ $\log 9 + \log c^3 - \log 100$ ✓ $2 \log 3 + 3 \log c - 2$	(2)

	1.2.2	$\log \left(\frac{9c^3}{100} \right) - 3 \log c$ $= 2 \log 3 + 3 \log c - 2 - 3 \log c$ $= 2 \log 3 - 2$ $= 2 \left(\frac{12}{25} \right) - 2$ $= -\frac{26}{25}$	\checkmark Vervang $2 \log 3 + 3 \log c - 2$ \checkmark Vervang $\frac{12}{25}$ $\checkmark -\frac{26}{25}$	(3)
1.3	$\begin{array}{r} 1111 \\ 10001_2 \\ - 1111_2 \\ \hline 10010_2 \end{array}$ $2^4, 2^3, 2^2, 2^1, 2^0$ $1 \quad 0 \quad 0 \quad 1 \quad 0$ $2^4 \times 1 + 2^3 \times 0 + 2^2 \times 0 + 2^1 \times 1 + 2^0 \times 0 = 18$ <p>Die kode DKDS kode = 18</p> <p>OF</p> $2^5, 2^4, 2^3, 2^2, 2^1, 2^0$ $1 + 0 + 0 + 0 + 0 + 1 = 33$ $2^3, 2^2, 2^1, 2^0$ $1 \quad 1 \quad 1 \quad 1 = 15$ $33 - 15 = \text{die kode DKDS kode} = 18$	\checkmark Bewys van lening \checkmark Binêre verskil \checkmark Produk van plekwaardes \checkmark DKDS = 18	<p>OF</p> \checkmark Metode \checkmark 33 \checkmark 15 \checkmark DKDS = 18	(4)
1.4	1.4.1	$\frac{x^2 + xy}{2x^3 - x^2y - 3xy^2} - \frac{1}{2x - 3y} = 0$ $LK = \frac{x(x + y)}{x(2x^2 - xy - 3y^2)} - \frac{1}{2x - 3y}$ $LK = \frac{x + y}{(2x - 3y)(x + y)} - \frac{1}{2x - 3y}$ $LK = \frac{1}{2x - 3y} - \frac{1}{2x - 3y}$ <p>LK = 0 = RK</p>	$\checkmark x(x + y)$ $\checkmark x(2x^2 - xy - 3y^2)$ $\checkmark \frac{1}{2x - 3y} - \frac{1}{2x - 3y}$	(3)

1.4.2	$LK = \log 6 + 2\log 20 - \log 3 - 3\log 2$ $= \log 6 + \log 400 - \log 3 - \log 8$ $= \log \left(\frac{6 \times 400}{3 \times 8} \right)$ $= \log 100$ $= \log 10^2$ $= 2\log 10$ $= 2 = RK$	$\checkmark \left\{ \begin{array}{l} \log 400 \\ \text{and} \\ \log 8 \end{array} \right\}$ $\checkmark \log \left(\frac{6 \times 400}{3 \times 8} \right)$ $\checkmark \left\{ \begin{array}{l} \log 100 \\ \text{OR} \\ \log 10^2 \end{array} \right\}$ $\checkmark 2\log 10$	
	OF $LK = \log 6 + 2\log 20 - \log 3 - 3\log 2$ $= \log (2.3) + 2\log (2^2.5) - \log 3 - 3\log 2$ $= \log 2 + \log 3 + 2\log 2^2 + 2\log 5 - \log 3 - 3\log 2$ $= \log 2 + 4\log 2 + 2\log 5 - 3\log 2$ $= 2\log 2 + 2\log 5$ $= 2\log 10$ $= 2$ $= RK$	OF $\checkmark \log (2.3)$ $\checkmark 2\log (2^2.5)$ $\checkmark \text{Vereenvoudiging}$ $\checkmark 2\log 10$	
	OF $LK = \log 6 + 2\log 20 - \log 3 - 3\log 2$ $= \log (2.3) + 2\log (2.10) - \log 3 - 3\log 2$ $= \log 2 + \log 3 + 2\log 2 + 2\log 10 - \log 3 - 3\log 2$ $= 2\log 10$ $= 2$ $= RK$	OF $\checkmark \log (2.3)$ $\checkmark 2\log (2.10)$ $\checkmark \text{Vereenvoudiging}$ $\checkmark 2\log 10$	
			(4)
			[29]

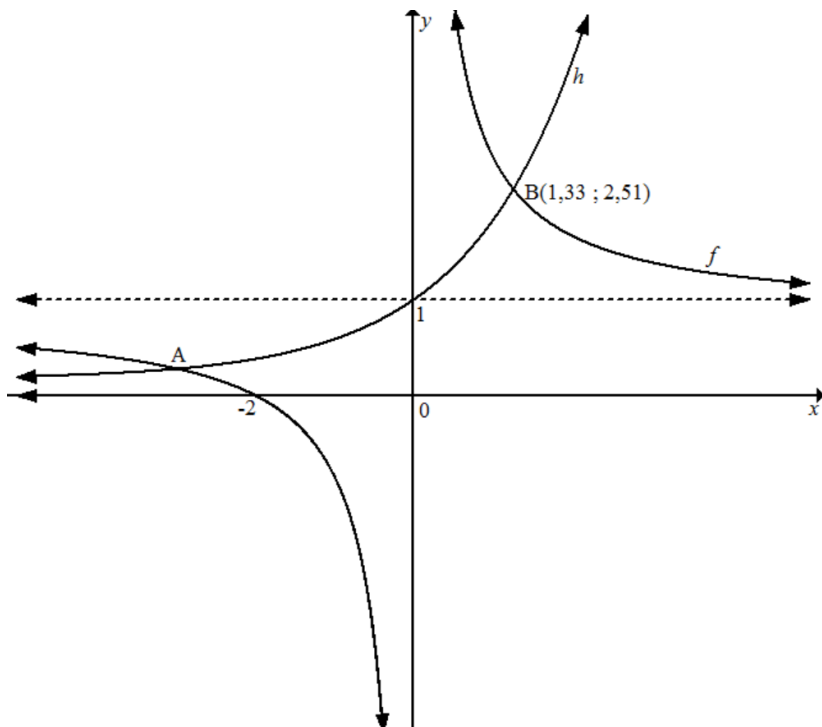
VRAAG 2				
2.1	2.1.1	$(\sqrt{x} + \sqrt{2})(\sqrt{x} - \sqrt{2}) = 0$ $x - x\sqrt{2} + x\sqrt{2} - 2 = 0$ $x - 2 = 0$ $x = 2$	✓Uitbreiding ✓ $x=2$	(2)
	2.1.2	$4x^{\frac{5}{2}} = 128$ $x^{\frac{5}{2}} = 32$ $\left(x^{\frac{5}{2}}\right)^{\frac{2}{5}} = \left(2^5\right)^{\frac{2}{5}}$ $x = 4$	✓Vereenvoudiging ✓ $\left(2^5\right)^{\frac{2}{5}}$ ✓ $x=4$	(3)
	2.1.3	$\frac{3^x + 3^{x+1}}{6^x \cdot 3} = \frac{2}{3}$ $\frac{3^x + 3^x \cdot 3}{3^x \cdot 2^x \cdot 3} = \frac{2}{3}$ $\frac{3^x(1+3)}{3^x \cdot 2^x \cdot 3} = \frac{2}{3}$ $\frac{4}{2^x \cdot 3} = \frac{2}{3}$ $4 = 2 \cdot 2^x$ $2^2 = 2^{x+1}$ $2 = x+1$ $x = 1$	✓Dieselfde basisreël ✓ $3^x \cdot 2^x$ ✓ $3^x(1+3)$ ✓ $4 = 2 \cdot 2^x$ OF $2^2 = 2^{x+1}$ ✓Gelykstel van eksponente ✓ $x=1$	(6)
	2.1.4	$\log_3 x + \log_3 4 = \log_7 \left(\frac{1}{49}\right)$ $\log_3 4x = \log_7 1 - \log_7 49$ $\log_3 4x = 0 - 2\log_7 7$ $\log_3 4x = -2$ $3^{-2} = 4x$ $x = \frac{1}{36}$	✓ $\log_3 4x$ ✓ $\log_7 1 - \log_7 49$ ✓ $\log 1 = 0$ ✓ $2\log_7 7$ ✓Eksponensiële vorm ✓ $x = \frac{1}{36}$	(6)

2.2	2.2.1	$F = \frac{k \cdot Q_1 \times Q_2}{r^2}$ $r^2 = \frac{k \cdot Q_1 \times Q_2}{F}$ $r = \sqrt{\frac{k \cdot Q_1 \times Q_2}{F}}$	✓ Kruisvermenigvuldiging ✓ r	(2)
	2.2.2	$r = \sqrt{\frac{(9 \times 10^9)(8 \times 10^{-7})(8 \times 10^{-7})}{8,64 \times 10^{-3}}}$ $r = 8,2 \times 10^{-1}$	✓ Vervanging ✓ $r = 8,2 \times 10^{-1}$	(2)
				[21]

VRAAG 3				
3.1	3.1.1	$x(x + 6) = 0$ $x = 0$ or $x = -6$	✓Faktore ✓Beide waardes van x	(2)
	3.1.2	$3x^2 - 5x = 2$ $3x^2 - 5x - 2 = 0$ $(3x + 1)(x - 2) = 0$ $x = -\frac{1}{3}$ or $x = 2$	✓Standaard kwadratiese vorm ✓Faktore ✓ $x = -\frac{1}{3}$ ✓ $x = 2$	(4)
		OF $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(3)(-2)}}{2 \times 3}$ $x = -\frac{1}{3}$ or $x = 2$	OF ✓Formule ✓Vervanging ✓ $x = -\frac{1}{3}$ ✓ $x = 2$	
	3.1.3	<div style="border: 1px solid black; padding: 5px; display: inline-block; text-align: center;"> -1 vir verkeerde afronding </div> $2x - \frac{1}{x} = 3$ $2x^2 - 1 = 3x$ $2x^2 - 3x - 1 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-1)}}{2 \times 2}$ $x = 1,8$ or $x = -0,3$	✓Maal met KGV ✓Standaardvorm ✓Korrekte formule ✓Vervanging ✓ $x = 1,8$ ✓ $x = -0,3$	(6)
	3.1.3	$x^2 - 7x + 10 < 0$ $(x - 2)(x - 5) < 0$ Test Values : $x = 2$ and $x = 5$ $2 < x < 5$	✓Faktore ✓Kritiese waardes ✓Korrekte notasie	(3)

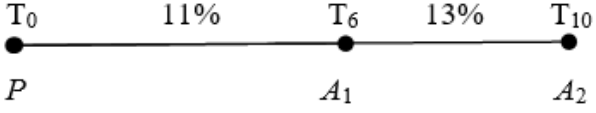
3.2	$y + 2x - 3 = 0 \dots\dots\dots(1)$ $y = x^2 + 2x + 3 \dots\dots\dots(2)$ $y = 3 - 2x \dots\dots\dots(3)$ Vervang (3) in (2) : $x^2 + 2x + 3 = 3 - 2x$ $x^2 + 4x = 0$ $x(x + 4) = 0$ $x = 0$ of $x = -4$ $y = 3 - 2(0)$ of $y = 3 - 2(-4)$ $y = 3$ of $y = -5$	✓Vergelyking (3) ✓Vervanging ✓Standaardvorm ✓Faktore ✓Beide waardes van x ✓Beide waardes van y	(6)
3.3	$A = l \times b$ $= 10 \times 3 = 30$ Then $2A = (10 + x)(3 + x)$ $2 \times 30 = 30 + 13x + x^2$ $60 = 30 + 13x + x^2$ $0 = -30 + 13x + x^2$ $0 = (x + 15)(x - 2)$ $x = -15$ or $x = 2$ \therefore The length must be increased by 2m	✓ $(10+x)(3+x)$ ✓60 ✓Standaardvorm ✓Faktore ✓ $x = -15$ of $x = 2$ ✓ $x = 2m$ of $x \neq -15m$ OF $x = 2m$	(6)
			[27]
VRAAG 4			
4.1	$\sqrt{-4}$ is imaginêr $\sqrt{6}$ is irrasionaal $-\sqrt{121}$ is rasionaal en heelgetal	✓ $\sqrt{-4}$ imaginêr ✓ $\sqrt{6}$ irrasionaal ✓ $-\sqrt{121}$ rasionaal ✓ $-\sqrt{121}$ heelgetal	(4)
4.2	$\Delta = b^2 - 4ac$ $= (5)^2 - 4(2)(3)$ $= 1$ Wortels is Rêel, Rasionaal en Ongelyk	✓Vervanging ✓ $\Delta = 1$ ✓Rasionaal ✓Rêel en Ongelyk	(4)

4.3	$h(x) = 2x^2 + px + 3$ $\Delta = b^2 - 4ac = 0$ $0 = (p)^2 - 4(2)(3)$ $24 = p^2$ $\therefore p = \pm 2\sqrt{6}$	✓ Diskriminant = 0 ✓ Vervanging ✓ $p = 2\sqrt{6}$ ✓ $p = -2\sqrt{6}$	(4)
			[12]
VRAAG 5			
5.1	Radius = OE = $\sqrt{9 - 0^2}$ Radius = 3 $q = -r = -3$	✓ $x = 0$ ✓ Radius = 3 ✓ $q = -3$	(3)
5.2	$a = m_{ED} = \frac{3}{3} = 1$	✓ $a = 1$	(1)
5.3	$f(x) = x - 3$	✓ Vervang $a = 1$ ✓ Vervang $q = -3$	(2)
5.4	$DE = \sqrt{OD^2 + OE^2}$ $DE = \sqrt{3^2 + 3^2}$ $DE = 3\sqrt{2} = 4,24$	✓ Pythagoras stelling/Afstand formule ✓ Vervanging ✓ $ED = 3\sqrt{2}$ of 4,24	(3)
			[9]

VRAAG 6				
6.1	$0 = -\frac{2}{x} - 1$ $x = -2$		$\checkmark f(x) = 0$ $\checkmark x = -2$	(2)
6.2	$h(0) = 2^0 = 1$		\checkmark Akkurate antwoord	(1)
6.3	$x = 0$ en $y = 1$		$\checkmark x = 0$ $\checkmark y = 1$	(2)
6.4			\checkmark Vorm van $f(x)$ \checkmark Asimptote \checkmark x -afsnit \checkmark Vorm van $h(x)$ \checkmark y -afsnit van $h(x)$	(5)
6.5	$x \in \mathbb{R}$ maar $x \neq 0$ O F $x < 0$ of $x > 0$ O F $-\infty < x < 0$ of $0 < x < \infty$ O F $x \in (-\infty; 0)$ of $(0; \infty)$		$\checkmark\checkmark$ Akkurate antwoord	(2)
6.6				
	6.6.1	Sien grafiek in 6.4	\checkmark Akkurate afmerking	(1)
	6.6.2	$x > 1,33$	$\checkmark\checkmark$ Akkurate waarde en notasie	(2)
6.7	$g(x) = -\frac{2}{x} - 1$		\checkmark Akkurate antwoord	(1)
				[16]

VRAAG 7				
7.1	7.1.1	$x = 0$	✓ Akkurate antwoord	(1)
	7.1.2	$0 = x^2 - 2x - 3$ $(x + 1)(x - 3) = 0$ A $(-1; 0)$ or B $(3; 0)$	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> -1 PUNT vir afsnitte nie in koördinaatvorm </div> ✓ $g(x) = 0$ ✓ $(3; 0)$ ✓ $(-1; 0)$	(3)
	7.1.3	$x = \frac{-b}{2a}$ $x = \frac{-(-2)}{2(1)}$ $x = 1$ $f(1) = (1)^2 - 2(1) - 3 = -4$ C $(1; -4)$	✓ Formule ✓ Vervanging ✓ $x = 1$ ✓ C $(1; -4)$	(4)
		O F $x = \frac{3 + (-1)}{2}$ $x = 1$ $f(1) = (1)^2 - 2(1) - 3 = -4$ C $(1; -4)$	O F ✓ Gemiddelde formule ✓ Vervanging ✓ $x = 1$ ✓ C $(1; -4)$	
	7.1.4	$y \geq -4$ O F $-4 \leq y < \infty$ O F $y \in [-4; \infty)$	✓ Notasie ✓ Waarde(s) - 4	(2)
	7.1.5	$b^2 - 4ac < 0$ $(-2)^2 - 4 \times 1 \times c < 0$ $c > 1$	✓ $b^2 - 4ac < 0$ ✓ Vervanging ✓ Notasie ✓ Waarde	(4)
7.2		$f(1) = (1)^2 + (1) - 1 = 1$ $f(3) = (3)^2 + (3) - 1 = 11$ Gemiddelde gradiënt = $\frac{f(3) - f(1)}{3 - 1}$ Gemiddelde gradiënt = $\frac{11 - 1}{2}$ = 5	✓ $f(1)$ ✓ $f(3)$ ✓ Gemiddelde gradiënt formule ✓ Vervanging ✓ Gemiddelde gradiënt = 5	(5)
				[19]

VRAAG 8				
8.1	8.1.1	$P = R5\ 600; n = 3 \text{ jaar (36 maande);}$ $i = 11.5\% \text{ p.a.}$ $A = P(1 + i.n)$ $A = 5\ 600 [1 + (0,115)(3)]$ $A = R7\ 532$	✓SI Formule ✓Vervanging ✓Waarde van A	(3)
	8.1.2	Die maandelikse lening terugbetaling: $R7\ 532 \div 36 \text{ maande}$ $= R209,22$ Maar, R12 word maandeliks vir versekering betaal, dus die totale maandelikse paaient is $R209,22 + R12 = R221,22$	$\checkmark \frac{7\ 532}{36}$ ✓Tel die maandelikse versekering by ✓R221,22	(3)
8.2		$A = P(1 - i)^n$ $\frac{200\ 000}{4} = 200\ 000(1 - i)^5$ $i = 1 - (0,25)^{\frac{1}{5}}$ $i = 0,2421$ Rentekoers = 24,21%	$\checkmark A = \frac{200\ 000}{4}$ ✓Formule ✓Vervanging ✓Rentekoers = 24,21%	(4)
8.3	8.3.1	$i_{eff} + 1 = \left(1 + \frac{i^m}{m}\right)^m$ $i_{eff} = \left(1 + \frac{0,11}{12}\right)^{12} - 1$ $i_{eff} = 0,1157$ Rentekoers = 11,57%	✓Formule ✓Vervanging ✓Rentekoers	(3)

	8.3.2	 $A_1 = P(1+i)^n$ $A_1 = P \left(1 + \frac{0,11}{12} \right)^{6 \times 12}$ $A_1 = P \left(1 + \frac{0,11}{12} \right)^{72}$ <p>Dan,</p> $A_2 = A_1 \left(1 + \frac{0,13}{4} \right)^{4 \times 4} = 300\,000$ $A_2 = P \left(1 + \frac{0,11}{12} \right)^{72} \left(1 + \frac{0,13}{4} \right)^{16} = 300\,000$ $P = \frac{300\,000}{\left(1 + \frac{0,11}{12} \right)^{72} \left(1 + \frac{0,13}{4} \right)^{16}}$ <p>$P = R\,93\,229,14$ was oorspronklik belê</p>	<p>A_1.....Eerste 6 jaar A_2.....Laaste 4 jaar</p> <p>✓ Vervang i en n</p> <p>✓ A_1</p> <p>✓ A_2</p> <p>✓ $P = R\,93\,229,14$</p>	(4)
				[17]
			TOTAAL:	150