



education

Department of
Education
FREE STATE PROVINCE

VOORBEREIDENDE EKSAMEN

GRAAD 12

WISKUNDE V1

SEPTEMBER 2018

PUNTE: 150

NASIENRIGLYNE

Hierdie nasienriglyn bestaan uit 13 bladsye.

LET WEL:

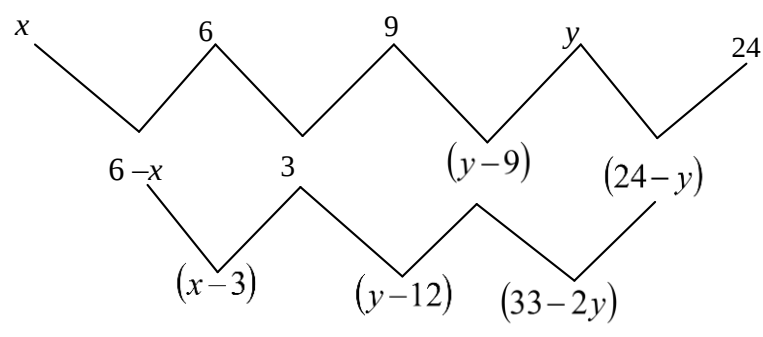
- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die memorandum van toepassing.

VRAAG 1

1.1				
	1.1.1	$-3x^2 + 2x + 2 = 0$ $x = \frac{-2 \pm \sqrt{(2)^2 - 4(-3)(2)}}{2(-3)}$ $x = -0,55 \text{ of } x = 1,22$	✓ vervang met korrekte formule ✓ $x = -0,55$ ✓ $x = 1,22$	(3)
	1.1.2	$x^2 + 2x - 3 = 5$ $x^2 + 2x - 8 = 0$ $(x + 4)(x - 2) = 0$ $x = -4 \text{ of } x = 2$	✓ standaard vorm ✓ faktore ✓ beide x waardes	(3)
	1.1.3	$x^2 - 2x - 15 \leq 0$ $(x - 5)(x + 3) \leq 0$ CVs : -3 en 5 Oplos sin g : $-3 \leq x \leq 5$	✓ faktore ✓ kritiese waardes ✓ antwoord (notatsie)	(3)
	1.1.4	$-\sqrt{2x - 1} = 2 - x$ $x - 2 = \sqrt{2x - 1}$ $x^2 - 4x + 4 = 2x - 1$ $x^2 - 6x + 5 = 0$ $(x - 5)(x - 1) = 0$ $x = 5 \text{ of } x = 1$ $\therefore x = 5 \text{ slegs}$	✓ $x^2 - 4x + 4 = 2x - 1$ ✓ standaard vorm ✓ faktore ✓ $x = 5 \text{ slegs}$	(4)
	1.1.5	$7 \cdot 3^x - 3^{x+1} = 36$ $7 \cdot 3^x - 3 \cdot 3^x = 36$ $3^x(7 - 3) = 36$ $3^x(4) = 36$ $3^x = 9$ $3^x = 3^2$ $\therefore x = 2$	✓ $3^x(7 - 3) = 36$ ✓ $3^x = 9$ ✓ $x = 2$	(3)

1.2	$2x - 1 = y$ en $x^2 - xy = 3x - 3$ $x^2 - x(2x - 1) = 3x - 3$ $x^2 - 2x^2 + x = 3x - 3$ $x^2 + 2x - 3 = 0$ $(x + 3)(x - 1) = 0$ $x = -3$ of $x = 1$ $y = -7$ of $y = 1$	✓ vervanging ✓ standaard vorm ✓ faktore ✓ beide x-waardes ✓ beide y-waardes	(5)
1.3	$\sqrt{5} \cdot \sqrt{125} - \frac{5^x \cdot 5^{x+1}}{5^{2x}}$ $= \sqrt{5} \cdot \sqrt{25 \cdot 5} - \frac{5^{2x} \cdot 5}{5^{2x}}$ $= 5\sqrt{5} \cdot \sqrt{5} - 5$ $= 25 - 5$ $= 20$	✓ $5 \cdot \sqrt{5} \cdot \sqrt{5}$ ✓ 5 ✓ antwoord	(3)
			[24]

VRAAG 2

2.1	3; -2; -7; -12; ...			
	2.1.1	$a = 3$ en $d = -5$ $T_{21} = 3 + 20(-5)$ $T_{21} = -97$	✓ korrekte vervanging ✓ antwoord	(2)
	2.1.2	$T_n = a + (n-1)d$ $-177 = 3 + (n-1)(-5)$ $-177 = 3 - 5n + 5$ $5n = 185$ $\therefore n = 37$	✓ vervanging ✓ $n = 37$	(2)
2.2	$S_n = n^2 - 2n$			
	2.2.1	$S_{13} = (13)^2 - 2(13)$ $S_{13} = 143$	✓ vervanging ✓ antwoord	(2)
	2.2.2	$S_{12} = (12)^2 - 2(12)$ $S_{12} = 120$ $T_{13} = S_{13} - S_{12}$ $T_{13} = 143 - 120 = 23$	✓ $S_{12} = 120$ ✓ antwoord	(2)
2.3	 $(33-2y) = (y-12)$ $3y = 45$ $\therefore y = 15$ $\therefore x = 6$ $x + y = 21$		✓ Eerste differensie i.t.v. y ✓ Tweede differensie i.t.v. y ✓ gelykstelling van twee differensies ✓ $y = 15$ ✓ $x + y = 21$	(5)
				[13]

VRAAG 3

3.1	$S_n = a + ar + ar^2 + \dots + ar^{n-2} + ar^{n-1}$ $rS_n = ar + ar^2 + ar^3 + \dots + ar^{n-2} + ar^{n-1} + ar^n$ $S_n - rS_n = a - ar^n$ $S_n(1-r) = a(1-r^n)$ $\therefore S_n = \frac{a(1-r^n)}{1-r}$	$\checkmark S_n$ $\checkmark rS_n$ $\checkmark S_n - rS_n = a - ar^n$ $\checkmark S_n(1-r) = a(1-r^n)$	(4)
3.2			
3.2.1	$4; \frac{4}{5}; \frac{4}{25}$	$\checkmark$ antwoord	(1)
3.2.2	$S_\infty = \frac{a}{1-r}$ $S_\infty = \frac{4}{1-\frac{1}{5}}$ $S_\infty = 5$	$\checkmark r = \frac{1}{5}$ $\checkmark$ vervanging met korrekte formule $\checkmark$ antwoord	(3)
3.2.3	$S_\infty - S_n < 0.0001$ $5 - \frac{4 \left[1 - \left(\frac{1}{5} \right)^n \right]}{1 - \frac{1}{5}} < 0.0001$ $4 - 4 + 4(0,2)^n < 0,00008$ $(0,2)^n < 0,00002$ $\therefore n > \frac{\log 0,00002}{\log 0,2}$ $n > 6,722706232$ Kleinste $n = 7$	$\checkmark$ opstelling van die ongelykheid $\checkmark$ vervang. $S_\infty; a$ en r $\checkmark (0,2)^n = 0,00002$ $\checkmark$ korrekte gebruik van logaritmes $\checkmark n = 7$	(5)
			[13]

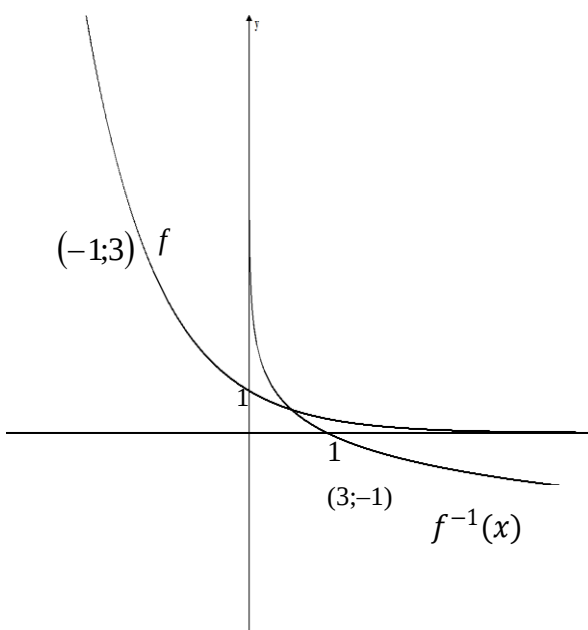
VRAAG 4

4.1	$0 = 4x + 8$ $-4x = 8$ $\therefore x = -2$ $A(-2;0)$	$\checkmark y = 0$ $\checkmark x = -2$	(2)
4.2	$B(10;0)$	$\checkmark x = 10$ $\checkmark y = 0$	(2)
4.3	$h(x) = a(x - x_1)(x - x_2)$ $h(x) = a(x + 2)(x - 10)$ $32 = a(6 + 2)(6 - 10)$ $32 = -32a$ $a = -1$ $\therefore h(x) = -1(x + 2)(x - 10)$ $h(x) = -x^2 + 8x + 20$	$\checkmark$ vervang $x_1 = -2$ en $x_2 = 10$ $\checkmark$ vervang $(6;32)$ $\checkmark a = -1$ $\checkmark$ vergelyking van $h(x)$	(4)
4.4	$F(0;8)$ en $C(0;20)$ $FC = 12$ eenhede	$\checkmark F(0;8)$ en $C(0;20)$ $\checkmark$ antwoord	(2)
4.5	$h(4) = -(4)^2 + 8(4) + 20 = 36$ Reeks: $y \in (-\infty; 36]$ OF $y / y \in R; y \leq 36$	$\checkmark y = 36$ $\checkmark$ antwoord	(2)
4.6	$x \in (10; \infty)$ OF $x / x \in R; x > 10$	$\checkmark$ kritiese waardes $\checkmark$ notasie	(2)
4.7	$4x + k = -x^2 + 8x + 20$ $x^2 - 4x + k - 20 = 0$ $\Delta = b^2 - 4ac$ $\Delta = (-4)^2 - 4(1)(k - 20)$ $0 = 16 - 4k + 80$ $4k = 96$ $k = 24$ OF $h'(x) = f'(x)$ $-2x + 8 = 4$ $\therefore x = 2$ $h(2) = -2^2 + 8(2) + 20 = 32$ $\therefore (2; 32)$ $32 = 4(2) + k$ $24 = k$	$\checkmark$ standard vorm $\checkmark$ vervang met Δ $\checkmark \Delta = 0$ $\checkmark$ antwoord $\checkmark -2x + 8 = 4$ $\checkmark x = 2$ $\checkmark h(2) = 32$ $\checkmark k = 24$	(4)
			[18]

VRAAG 5

5.1	$f(x) = \frac{2+x}{x-1}$ $f(x) = \frac{x-1+3}{x-1}$ $f(x) = \frac{x-1}{x-1} + \frac{3}{x-1}$ $f(x) = \frac{3}{x-1} + 1$	$\checkmark \frac{x-1+3}{x-1}$ $\checkmark \frac{x-1}{x-1} + \frac{3}{x-1}$ $\checkmark f(x) = \frac{3}{x-1} + 1$	(3)
5.2	$x = 1$ $y = 1$	$x = 1$ $y = 1$	(2)
5.3	$0 = \frac{2+x}{x-1}$ $0 = 2+x$ $x = -2$ $A(-2; 0)$	$\checkmark y = 0$ $\checkmark x = -2$	(2)
5.4	$x = 3$	$\checkmark$ antwoord	(1)
			[8]

VRAAG 6

6.1	$f(x) = \left(\frac{1}{3}\right)^x$		
6.1.1	$x = \left(\frac{1}{3}\right)^y$ $f^{-1}(x) = \log_{\frac{1}{3}} x$ OF $f^{-1}(x) = -\log_3 x$ Slegs Antwoord: Volpunte	✓ $x = \left(\frac{1}{3}\right)^y$ ✓✓ antwoord	(2)
6.1.2		$f(x) = \left(\frac{1}{3}\right)^x$: ✓ vorm ✓ y-afsnit $f^{-1}(x) = \log_{\frac{1}{3}} x$: ✓ vorm ✓ x-afsnit	(4)
6.2	$p(-3) = 10$ en $p'(x) = -2$ $p(x) = -2x + c$ $10 = -2(-3) + c$ $\therefore c = 16$ $p(x) = y = -2x + 16$ $x = -2y + 16$ $p^{-1}(x) = -\frac{1}{2}x + 8$	✓ $m = -2$ ✓ $c = 16$ ✓ omruil van x en y $(x = -2y + 16)$ ✓ antwoord	(4)
			[10]

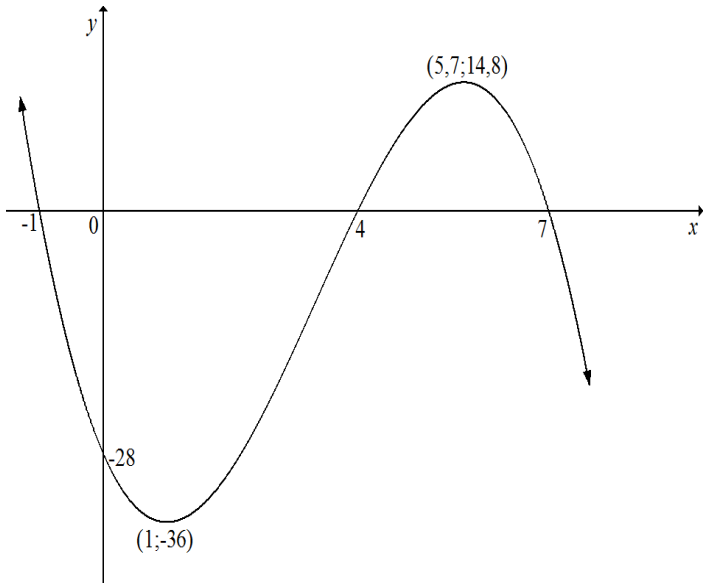
VRAAG 7

7.1	$1 + i_{eff} = \left(1 + \frac{i_{nom}}{n}\right)^n$ $1 + i_{eff} = \left(1 + \frac{0,096}{12}\right)^{12}$ $\therefore i_{eff} = 0,100338694$ $\therefore r_{eff} = 10,03\%$	✓ $i = \frac{0,096}{12}$ ✓ vervang met korrekte formule ✓ antwoord (i of r)	(3)
7.2	$A = P(1 - i)^n$ $60\,000 = 150\,000 \left(1 - \frac{0,88}{4}\right)^n$ $0,4 = (0,978)^n$ $\therefore n = \frac{\log 0,4}{\log 0,978}$ $n = 41,1897 \dots \text{kware} = 10,3 \text{ jare}$	✓ $i = \frac{0,88}{4}$ ✓ vervang met korrekte formule ✓ Korrekte gebruik van logaritmes ✓ antwoord	(3)
7.3			
7.3.1	$P = \frac{x[1 - (1 + i)^{-n}]}{i}$ $R250\,000 = \frac{x \left[1 - \left(1 + \frac{0,1}{12}\right)^{-120}\right]}{\frac{0,1}{12}}$ $\therefore x = R3\,303,77$	✓ $i = \frac{0,1}{12}$ ✓ $n = 120$ ✓ vervang met korrekte formule ✓ antwoord	(4)
7.3.2	Uitstaande balans (B): $B = \frac{R3\,303,77 \left[1 - \left(1 + \frac{0,1}{12}\right)^{-84}\right]}{\frac{0,1}{12}}$ $B = R199\,008,09$ OF Uitstaande Balans (B): $B = 250\,000 \left(1 + \frac{0,1}{12}\right)^{36} - \frac{3\,303,77 \left[\left(1 + \frac{0,1}{12}\right)^{36} - 1\right]}{\frac{0,1}{12}}$ $B = R199\,007,93$	✓ opstel van formule ✓ $n = 84$ ✓ vervang met korrekte formule ✓ antwoord OF ✓ opstel van formule ✓ $n = 36$ ✓ vervang met korrekte formule ✓ antwoord	(4)
			[14]

VRAAG 8

8.1	$f(x) = -3x^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-3(x+h)^2 - (-3x^2)}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-3x^2 - 6xh - 3h^2 + 3x^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $f'(x) = -6x$	✓ vervang met korrekte formule ✓ $-6xh - 3h^2$ ✓ $\frac{h(-6x - 3h)}{h}$ ✓ antwoord	(4)
8.2	$y = 7x^4 - 5\sqrt{x} - \frac{3}{x}$ $y = 7x^4 - 5x^{\frac{1}{2}} - 3x^{-1}$ $\frac{dy}{dx} = 28x^3 - \frac{5}{2}x^{-\frac{1}{2}} + 3x^{-2}$	✓ $y = 7x^4 - 5x^{\frac{1}{2}} - 3x^{-1}$ ✓ $28x^3$ ✓ $-\frac{5}{2}x^{-\frac{1}{2}}$ ✓ $+3x^{-2}$	(4)
8.3	$g(x) = ax^3 - 24x + b$ $g'(x) = 3ax^2 - 24$ $0 = 3a(-2)^2 - 24$ $24 = 12a$ $a = 2$ $17 = 2(-2)^3 - 24(-2) + b$ $17 = -16 + 48 + b$ $b = -15$	✓ $g'(x) = 3ax^2 - 24$ ✓ vervanging $x = -2$ $g'(x) = 0$ ✓ waarde van a ✓ vervanging $(-2; 17)$ in $g(x)$ ✓ $b = -15$	(5)
			[13]

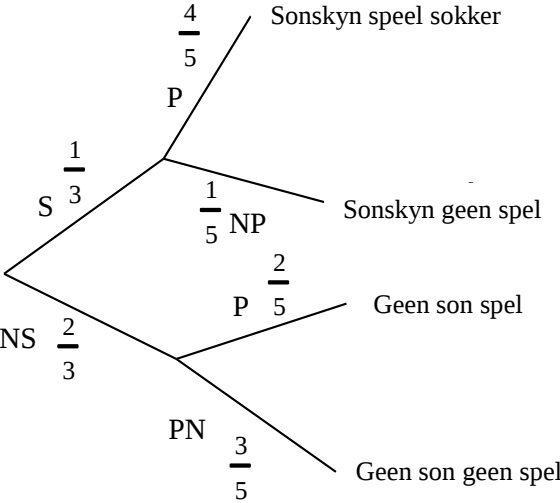
VRAAG 9

9. 1	$f(x) = -x^3 + 10x^2 - 17x - 28$ y-afsnit: $(0; -28)$ x-afsnit: $(x+1)(x^2 - 11x - 28) = 0$ $(x+1)(x-7)(x-4) = 0$ $x = -1$ of $x = 7$ of $x = 4$ $(-1; 0); (7; 0); (4; 0)$	✓ $(0; -28)$ ✓✓ $(x+1)(x^2 - 11x - 28) = 0$ ✓ $(x+1)(x-7)(x-4) = 0$ ✓ x-waardes	(5)
9. 2	$f(x) = -x^3 + 10x^2 - 17x - 28$ $0 = -3x^2 + 20x - 17$ $0 = 3x^2 - 20x + 17$ $0 = (3x - 17)(x - 1)$ $\therefore x = \frac{17}{3}$ or $x = 1$ Draaipunte: $\left(\frac{17}{3}; 14,8\right)$ en $(1; -36)$	✓ $0 = -3x^2 + 20x - 17$ ✓ faktore ✓ beide x-waardes ✓ $\left(\frac{17}{3}; 14,8\right)$ ✓ $(1; -36)$	(5)
9. 3		✓ vorm ✓ draaipunt ✓ x- en y-afsnitte	(3)
9. 4	$k - 3 > 14,8$ or $k - 3 < -36$ $k > 17,8$ or $k < -33$	✓ $k > 17,8$ ✓ $k < -33$	(2)
			[15]

VRAAG 10

10.1	$\tan 60^\circ = \frac{DE}{x}$ $\therefore DE = x\sqrt{3}$ $EF = y - 2x$ Oppvl van reghoek = basis $\times$ hoogte $= (y - 2x)x\sqrt{3}$ $= \sqrt{3}xy - 2\sqrt{3}x^2$	$\checkmark \tan 60^\circ = \frac{DE}{x}$ $\checkmark DE = x\sqrt{3}$ $\checkmark EF = y - 2x$ $\checkmark (y - 2x)x\sqrt{3}$	(4)
10.2	$A = \sqrt{3}xy - 2\sqrt{3}x^2$ $\frac{dA}{dx} = \sqrt{3}y - 4\sqrt{3}x = 0$ $\therefore x = \frac{y}{4}$ $MaksOppvl = \sqrt{3}\left(\frac{y}{4}\right)y - 2\sqrt{3}\left(\frac{y}{4}\right)^2$ $= \frac{\sqrt{3}y^2}{4} - \frac{2\sqrt{3}y^2}{16}$ $= \frac{\sqrt{3}}{8}y^2$	$\checkmark \frac{dA}{dx} = \sqrt{3}y - 4\sqrt{3}x$ $\checkmark \frac{dA}{dx} = 0$ $\checkmark x = \frac{y}{4}$ $\checkmark$ Vervanging $x = \frac{y}{4}$ $\checkmark$ antwoord	(5)
			[9]

VRAAG 11

11.1	11.1.1	$\therefore P(A) = 0,45$ $P(A \text{ of } B) = P(A) + P(B)$ $= 0,45 + 0,29$ $= 0,74$	✓ vervanging ✓ antwoord	(2)
	11.1.2	$P(A) \times P(B) = 0,45 \times 0,29$ $= 0,1305 \approx 0,13$ $P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$ $= 0,45 + 0,29 - 0,1276$ $= 0,0695 \approx 0,61$	✓ $0,45 \times 0,29$ ✓ $0,1267$ or $\frac{319}{2500}$ ✓ vervanging ✓ antwoord	(4)
11.2	 $P(\text{speel nie sokker nie}) =$ $\frac{1}{3} \times \frac{1}{5} + \frac{2}{3} \times \frac{3}{5} = \frac{7}{15}$		✓ $\frac{1}{3} \times \frac{1}{5}$ ✓✓ $\frac{2}{3} \times \frac{3}{5}$ ✓ $\frac{7}{15}$	(4)
11.3	Aantal verskillende kodes = $26 \times 9 \times 8 \times 7 = 13104$		✓ 26 ✓ $9 \times 8 \times 7$ ✓ antwoord	(3)
				[13]

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