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VOORBEREIDENDE EKSAMEN

2018

NASIENRIGLYNE

10611	WISKUNDE (VRAESTEL 1)
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14 bladsye

GAUTENGSE DEPARTEMENT VAN ONDERWYS
VOORBEREIDENDE EKSAMEN

WISKUNDE
(Vraestel 1)

NASIENRIGLYNE

VRAAG 1		
1.1		
1.1.1	$x^2 - x - 30 = 0$ $(x - 6)(x + 5) = 0$ $x = 6$ of $x = -5$	✓ korrekte faktore ✓ albei antwoorde korrek (2)
1.1.2	$3x^2 - 8x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(3)(-4)}}{2(3)}$ $x = 3,10$ of $x = -0,43$	✓ standaardvorm ✓ korrekte vervanging in korrekte formule ✓ $x = 3,10$ ✓ $x = -0,43$ Penaliseer slegs een keer vir verkeerde afronding (4)
1.1.3	$\sqrt{5 - x} - x = 1$ $\sqrt{5 - x} = 1 + x$ $(\sqrt{5 - x})^2 = (1 + x)^2$ $x^2 + 3x - 4 = 0$ $(x + 4)(x - 1) = 0$ $x = -4$ of $x = 1$ N.v.T.	✓ isoleer vierkantswortel ✓ kwadreer albei kante ✓ standaardvorm ✓ albei antwoorde korrek ✓ kies korrekte antwoord (5)
1.1.4	$\frac{6x^2 - 3x}{3} \leq 3x^2$ $2x^2 - x \leq 3x^2$ $2x^2 - 3x^2 - x \leq 0$ $-x^2 - x \leq 0$ $-x(x + 1) \leq 0$ $x \geq 0$ of $x \leq -1$ OF	✓ vereenvoudiging ✓ standaardvorm ✓ korrekte faktore ✓ kritieke waardes ✓ korrekte ongelykheid

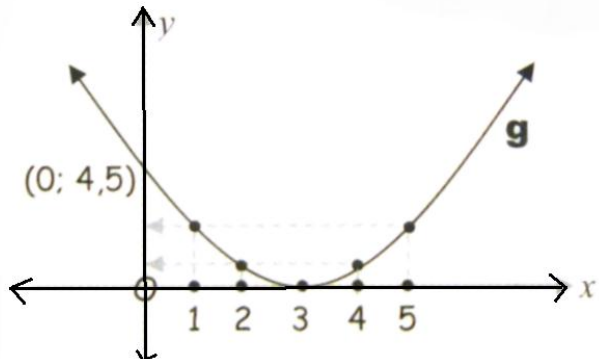
	$\frac{6x^2 - 3x}{3} \leq 3x^2$ $6x^2 - 3x \leq 9x^2$ $6x^2 - 9x^2 - 3x \leq 0$ $-3x^2 - 3x \leq 0$ $3x(x+1) \geq 0$ $x \geq 0 \text{ of } x \leq -1$	✓ vereenvoudiging ✓ standaardvorm ✓ korrekte faktore ✓ kritieke waardes ✓ korrekte ongelijkheid (5)
1.1.5	$2x^2 + 7\sqrt{2x} = 2$ $2^2 \cdot 2^x + 7 \cdot 2^{\frac{x}{2}} - 2 = 0$ $4 \cdot 2^x + 7 \cdot 2^{\frac{x}{2}} - 2 = 0$ $(4 \cdot 2^{\frac{x}{2}} - 1)(2^{\frac{x}{2}} + 2) = 0$ $2^{\frac{x}{2}} = \frac{1}{4} \quad \text{or} \quad 2^{\frac{x}{2}} = -2$ $2^{\frac{x}{2}} = 2^{-2} \quad \text{N.v.T.}$ $\frac{x}{2} = -2$ $x = -4$	✓ standaardvorm ✓ faktore ✓ $2^{\frac{x}{2}} = 2^{-2}$ ✓ N.v.T. ✓ $x = -4$ (5)
1.2	$6x^2 + 2px - 3x - p = 0$ $6x^2 + x(2p - 3) - p = 0$ $\Delta = b^2 - 4ac$ $\Delta = (2p - 3)^2 - 4(6)(-p)$ $= 4p^2 + 12p + 9$ $= (2p + 3)^2$ $\Delta = \text{volkome vierkant}$ $\therefore \text{rasionale wortels}$	✓ koëffisiënt van x ✓ korrekte vervanging in korrekte formule ✓ faktore ✓ $\therefore \Delta = \text{volkome vierkant}$ (gevolgtrekking) (4)
[25]		

	VRAAG 2	
2.1	$T_n = a + (n-1)d$ $-239 = 6 + (n-1)(-5)$ $-239 = 6 - 5n + 5$ $250 = 5n$ $n = 50$	$\checkmark T_n = -239$ $\checkmark d = -5$ $\checkmark$ antwoord (3)
2.2	$T_3 = ar^2 = 18 \dots \textcircled{1}$ $T_5 = ar^4 = 162 \dots \textcircled{2}$ $\textcircled{2} \div \textcircled{1}: \quad r^2 = 9 \quad (r < 0)$ $r = -3$ $ar^2 = 18$ $a(9) = 18$ $a = 2$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $S_7 = \frac{2((-3)^7 - 1)}{-3 - 1}$ $= \frac{2(-2187 - 1)}{-4}$ $= 1094$	$\checkmark$ vergelyking $\textcircled{1}$ $\checkmark$ vergelyking $\textcircled{2}$ $\checkmark r = -3$ $\checkmark a = 2$ $\checkmark$ korrekte vervanging in korrekte formule $\checkmark$ antwoord (6)
2.3	3; x ; 11; 21; 35 $x - 3$; $11 - x$; 10; 14 $-2x = 4 - 14$ $-2x = -10$ $x = 5$	$\checkmark$ eerste verskil $\checkmark$ gelykstel van tweede verskil $\checkmark$ antwoord (3)

2.4	$S_8 : S_4 = 97:81$ $\frac{S_8}{S_4} = \frac{97}{81}$ $\frac{a(1-r^8)}{1-r} \div \frac{a(1-r^4)}{1-r} = \frac{97}{81}$ $\frac{a(1-r^8)}{1-r} \times \frac{1-r}{a(1-r^4)} = \frac{97}{81}$ $\frac{(1-r^8)}{(1-r^4)} = \frac{97}{81}$ $\frac{(1-r^4)(1+r^4)}{(1-r^4)} = \frac{97}{81}$ $1+r^4 = \frac{97}{81}$ $r^4 = \frac{16}{81}$ $r^4 = \left(\frac{2}{3}\right)^4$ $r = \left(\frac{2}{3}\right)$ $\therefore r = \left(\frac{2}{3}\right)$ Eerste drie terme: 9; 6; 4	$\checkmark \frac{a(1-r^8)}{1-r} \div \frac{a(1-r^4)}{1-r} = \frac{97}{81}$ $\checkmark$ vereenvoudig $\frac{(1-r^8)}{(1-r^4)} = \frac{97}{81}$ $\checkmark$ faktore $\checkmark r^4 = \left(\frac{2}{3}\right)^4$ $\checkmark r = \left(\frac{2}{3}\right)$ $\checkmark$ eerste drie terme (6)
2.5.1	$2(p-5) + 2(p-5)^2 + 2(p-5)^3 + \dots$ $r = p-5$ Konvergeer: $-1 < r < 1$ $-1 < p-5 < 1$ $4 < p < 6$	$\checkmark r = p-5$ $\checkmark -1 < p-5 < 1$ $\checkmark 4 < p < 6$ (3)
2.5.2	$S_\infty = \frac{a}{1-r}$ $= \frac{-1}{1-(-\frac{1}{2})}$ $= -\frac{2}{3}$	$\checkmark$ vervang $a = -1$; $\checkmark r = -\frac{1}{2}$ $\checkmark$ antwoord (3)
		[24]

	VRAAG 3	
3.1	$A = P(1-i)^n$ $100\,000 = 134\,000(1-0,068)^n$ $\frac{50}{67} = (0,932)^n$ $n = \log_{0,932}\left(\frac{50}{67}\right)$ $n = 4,16 \text{ jare}$	✓ korrekte formule ✓ korrekte vervanging ✓ $n = \log_{0,932}\left(\frac{50}{67}\right)$ ✓ antwoord (4)
3.2.1	$A = P(1+i)^n$ $A = 150\,000\left(1 + \frac{0,1525}{12}\right)^2$ $= R153\,836,73$ $P = \frac{x[1 - (1+i)^{-n}]}{i}$ $153\,836,73 = \frac{x\left[1 - \left(1 + \frac{0,1525}{12}\right)^{-24}\right]}{\frac{0,1525}{12}}$ $x = R7\,477,31$ $\therefore$ Die maandelikse paaiement is R7 477,31 per maand	✓ $n = 2$ ✓ $i = \frac{0,1525}{12}$ ✓ korrekte vervanging in korrekte formule vir P ✓ $n = -24$ ✓ antwoord (5)
3.2.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $7\,477,31 = \frac{x\left[1 - \left(1 + \frac{0,1525}{12}\right)^{-6}\right]}{\frac{0,1525}{12}}$ $= R42\,934,09$ OF	✓ vervanging in korrekte formule ✓ $i = \frac{0,1525}{12}$ ✓ $n = -6$ ✓ antwoord

	$F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{7\,477,31 \left[\left(1 + \frac{0,1525}{12} \right)^{18} - 1 \right]}{\frac{0,1525}{12}}$ $F = R150\,164,35$ $A = P(1+i)^n$ $A = 153\,836,73 \left(1 + \frac{0,1525}{12} \right)^{18}$ $A = R193\,098,52$ ∴ Die uitstaande balans is R42 934,17	✓ $n = -18$ ✓ $i = \frac{0,1525}{12}$ ✓ $153\,836,73 \left(1 + \frac{0,1525}{12} \right)^{18}$ ✓ antwoord (4)
		[13]
	VRAAG 4	
4.1	$y = -8$	✓ antwoord (1)
4.2	$f(x) = 0$ $2^x - 8 = 0$ By P : $2^x = 8$ $2^x = 2^3$ $x = 3$ P(3;0) $x = 0$ By D: $f(x) = 2^0 - 8$ $= 1 - 8$ $= -7$ D(0;-7)	✓ $2^x = 2^3$ ✓ P(3;0) ✓ $2^0 = 1$ ✓ D(0; - 7) (4)
4.3	$h(x) = f(2x) + 8$ $= 2^{2x} - 8 + 8$ $= 2^{2x}$ $h(x) = 2^{2x}$ OF $h(x) = 4^x$	✓ vervanging ✓ antwoord (2)
4.4	$y = 4^x$ $h^{-1} : x = 4^y$ $y = \log_4 x$ OF	✓ omruil x en y ✓ antwoord

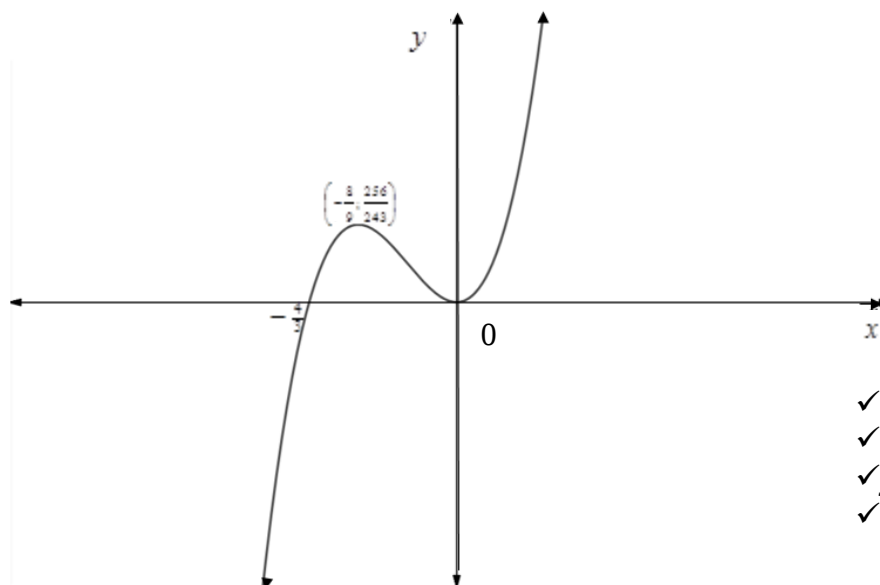
	$x = 2^{2y}$ $2y = \log_2 x$ $y = \frac{1}{2} \log_2 x$ $\log_2 \sqrt{x}$	✓omruil van x en y ✓antwoord (2)
4.5	$y \in R$ OF $y \in (-\infty; \infty)$	✓antwoord (1)
4.6	$y = a(x-p)^2 + q$ $y = a(x-3)^2$ $4,5 = a(0-3)^2$ $\frac{1}{2} = a$ $y = \frac{1}{2}(x^2 - 6x + 9)$ OF $y = \frac{1}{2}(x-3)^2$ OF $y = \frac{1}{2}x^2 - 3x + 4,5$	✓vervang punte van D en P ✓waarde van a ✓vergelyking (in enige vorm) (3)
4.7	As gevolg van simmetrie: $g(1) = g(5)$ en $g(2) = g(4)$ $\sum_{k=0}^3 g(k) - \sum_{k=4}^5 g(k)$ $= [g(0) + g(1) + g(2) + g(3)] - [g(4) + g(5)]$ $= g(0) + [g(1) - g(5)] + [g(2) - g(4)] + g(3)$ $= 4,5 + 0 + 0 + 0$ $= 4,5$ 	✓korrekte aftrekking ✓uitbreiding ✓antwoord (3)

4.8	Enige opwaartse transformasie gee nie-reële wortels.	✓ antwoord (1)
		[17]
	VRAAG 5	
5.1	$x = -2$ of $x = 4$	✓ $x = -2$ ✓ $x = 4$ (2)
5.2	$x < -2$ of $-2 < x \leq 6$ OF $x \leq 6; x \neq -2$	✓ $x < -2$ ✓ $-2 < x \leq 6$ OF ✓ $x \leq 6$ ✓ $x \neq -2$ (2)
5.3	$-2 \leq x \leq 2$	✓ korrekte ongelykheid ✓ korrekte kritieke waardes (2)
		[6]
	VRAAG 6	
6.1	$g(x) = \frac{1}{4}x^2$	✓ antwoord (1)
6.2	$h(x) = \frac{1}{4}(x)^2 - 2$	✓ antwoord (1)
6.3	$y \geq -2$ OF $y \in [-2; \infty)$	✓ antwoord (korrekte ongelykheid / hakkies) (1)
		[3]
	VRAAG 7	
7.1	$x = 2$	✓ $x = 2$ (1)
7.2	Translasie van 2 eenhede na regs en 3 eenhede afwaarts.	✓ antwoord (2)
7.3	$x \in R; x \neq 3$	✓ antwoord (1)
7.4	$y = x + c$ $0 = 2 + c$ $-2 = c$ $y = x - 2$	✓ korrekte gradiënt ($m=1$) ✓ vervang $C(2; 0)$ ✓ vegelyking (3)
		[7]

	VRAAG 8	
8.1	$f(x+h) = 1 - 3(x+h)^2$ $= 1 - 3(x^2 + 2xh + h^2)$ $= 1 - 3x^2 - 6xh - 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{1 - 3x^2 - 6xh - 3h^2 - (1 - 3x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{1 - 3x^2 - 6xh - 3h^2 - 1 + 3x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $= -6x$	$\checkmark f(x+h) =$ $1 - 3x^2 - 6xh - 3h^2$ $\checkmark$ korrekte vervanging in korrekte formule $\checkmark$ vereenvoudig $(-6xh - 3h^2)$ $\checkmark$ gemeenskaplike faktor h $\checkmark -6x$ (5)
8.2	$f'(2) = -6(2)$ $= -12$	$\checkmark$ vervang $x = 2$ in $f'(x)$ $\checkmark$ antwoord (2)
		[7]
	VRAAG 9	
	Leerlinge word slegs EEN keer in hierdie vraag gepepalseer vir verkeerde notasie.	
9.1	$\frac{d}{dt} [(t-2)(t+3)]$ $= \frac{d}{dt} [t^2 + t - 6]$ $= 2t + 1$	$\checkmark$ korrekte kwadratiese vergelyking $\checkmark 2t$ $\checkmark 1$ (3)
9.2	$D_x \left[\frac{5x^3 - 4}{x} \right]$ $= D_x \left[5x^2 - \frac{4}{x} \right]$ $= D_x [5x^2 - 4x^{-1}]$ $= 10x + 4x^{-2}$	$\checkmark$ vereenvoudiging $\checkmark 10x$ $\checkmark 4x^{-2}$ (3)
		[6]

	VRAAG 10	
10.1	$f(x) = ax^3 + bx^2$ $7 = a + b \dots\dots\dots(1)$ $f'(x) = 3ax^2 + 2bx$ $17 = 3a(1)^2 + 6(1)$ $17 = 3a + 2b \dots\dots(2)$ Uit (1) $b = 7 - a$ Vervang in (2) $3a + 2(7 - a) = 17$ $3a + 14 - 2a = 17$ $a = 3$ $b = 4$ OF $f(x) = ax^3 + bx^2$ $7 = a + b$ $f'(x) = 3ax^2 + 2bx$ $17 = 3a(1)^2 + 6(1)$ $17 = 3a + 2b$ uit (1) $a = 7 - b$ Vervang in (2) $3(7 - b) + 2b = 17$ $21 - 3b + 2b = 17$ $-b = -4$ $b = 4$ $a = 3$	$\checkmark 7 = a + b$ $\checkmark$ afgeleide $\checkmark 17 = 3a + 2b$ $\checkmark b = 7 - a$ $\checkmark a = 3$ (moet bewerking wys) $\checkmark b = 4$ (moet bewerking wys) OF $\checkmark 7 = a + b$ $\checkmark$ afgeleide $\checkmark 17 = 3a + 2b$ $\checkmark a = 7 - b$ $\checkmark b = 4$ (moet bewerking wys) $\checkmark a = 3$ (moet bewerking wys) (6)
10.2	$f(x) = 3x^3 + 4x^2$ $f'(x) = 9x^2 + 8x$ $9x^2 + 8x = 17$ $9x^2 + 8x - 17 = 0$ $(9x + 17)(x - 1) = 0$ $x = -\frac{17}{9}$ of $x = 1$ $y = 3\left(-\frac{17}{9}\right)^3 + 4\left(-\frac{17}{9}\right)^2$ $= -5,95$ Die ander punt is $(-1,89; -5,95)$	$\checkmark$ afgeleide $\checkmark$ stel gelyk aan 17 $\checkmark$ standaard vorm $\checkmark$ faktore $\checkmark$ x-waarde $\checkmark$ y- waarde (6)

10.3



- ✓ vorm
- ✓ x-afsnitte
- ✓ y-afsnit
- ✓ draaipunte

OF

 x – afsnitte

$$0 = 3x^3 + 4x^2$$

$$0 = x^2(3x + 4)$$

$$x = 0 \quad \text{of} \quad x = -\frac{4}{3}$$

 y – afsnit : $(0; 0)$

Draaipunt

$$0 = 9x^2 + 8x$$

$$x(9x + 8) = 0$$

$$x = 0 \quad \text{of} \quad x = -\frac{8}{9}$$

$$y = 3\left(-\frac{8}{9}\right) + 4\left(-\frac{8}{9}\right)^2$$

$$= \frac{256}{243} \quad \text{of} \quad 1,05$$

$$(0;0) \quad \text{of} \quad \left(-\frac{8}{9}; \frac{256}{243}\right)$$

(Indien geenskets – gee 3 punte vir korrekte berekeninge)✓ x -afsnitte✓ y -afsnit

✓ draaipunte

(4)

10.4

$$f(x) = 3x^3 + 4x^2$$

$$f'(x) = 9x^2 + 8x$$

$$f''(x) = 18x + 8$$

$$18x + 8 > 0$$

$$x > -\frac{8}{18}$$

OF

$$x > -\frac{4}{9}$$

✓ $f''(x) = 18x + 8$ ✓ $18x + 8 > 0$

✓ antwoord

(3)

[19]

	VRAAG 11	
11.1	$s(t) = 6000 - 600t - 0,2t^3 + 2 \times 10^{-3}t^5$ $s'(t) = -600 - 0,6t^2 + 10^{-2}t^4$ $s'(0) = -600 - 0,6(0)^2 + 10^{-2}(0)^4$ $s'(0) = -600$ Meteoriet beweeg na aarde teen 600 m/s	✓ afgeleide ✓ vervang met 0 ✓ antwoord (600 m/s) (3)
11.2	$s(t) = 6000 - 600t - 0,2t^3 + 2 \times 10^{-3}t^5$ $s(10) = 6000 - 600(10) - 0,2(10)^3 + 2 \times 10^{-3}(10)^5$ $= 0$ Die meteoriet sal 0 m vanaf aarde wees, wanneer dit aarde tref.	✓ vervanging ✓ antwoord (2)
11.3	$s''(t) = -1,2t + 4 \times 10^{-2}t^3$ $s''(5) = -1,2(5) + 4 \times 10^{-2}(5)^3$ $= -1 \text{ m/s}^2$	✓ tweede afgeleide ✓ vervanging ✓ antwoord (3)
		[8]
	VRAAG 12	
12.1	Nee. $P(A \cap B) \neq 0$ OF $P(A \cap B) = 0,1596$	✓ Nee ✓ $P(A \cap B) \neq 0$ OF ✓ $P(A \cap B) = 0,1596$ (2)
12.2	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= 0,38 + 0,42 - 0,16$ $= 0,64$	✓ vervanging ✓ antwoord (2)
12.3	$n(S) = \frac{456}{0,38}$ $= 1\,200$	✓ vervanging ✓ antwoord (2)
12.4	$n(C') = 1\,200(0,72)$ $= 864$	✓ vervanging ✓ antwoord (2)
		[8]

	VRAAG 13	
13.1	$P(E) = \frac{n(E)}{n(S)}$ $= \frac{3!}{5!}$ $= \frac{1}{20}$ $= 0,05$	✓3! ✓5! ✓ antwoord (3)
13.2	Kinders 7! Grootouers 2! Ouers $2! \times 2! \times 2! \times 3! = 48$ Hoeveelheid moontlikhede $7! \times 2! \times 48$ $= 483\,840$	✓7! ✓2! ✓48 ✓ antwoord (4)
		[7]
		TOTAAL 150