



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NASIONALE SENIOR SERTIFIKAAT

GRAAD 12

WISKUNDE V1

MODEL 2008

MEMORANDUM

Hierdie memorandum bestaan uit 11 bladsye.

VRAAG 1

1.1.1	$x^2 - 10x = 24$ $x^2 - 10x - 24 = 0$ $(x - 12)(x + 2) = 0$ $x = 12$ or $x = -2$ OF $(x - 5)^2 = 49 = 7^2$ $\therefore x = 5 \pm 7, = 12 \text{ or } -2$	✓ standaard vorm ✓ faktore ✓ antwoorde (3)
1.1.2	$x^2 - 6x = 10(1 - 3x)$ $x^2 - 6x = 10 - 30x$ $x^2 + 24x - 10 = 0$ $x = \frac{-24 \pm \sqrt{(24)^2 - 4(1)(-10)}}{2(1)}$ $x = \frac{-24 \pm \sqrt{616}}{2}$ $x = 0,41$ or $x = -24,41$	✓ standaard vorm ✓ vervanging ✓ 616 ✓✓ antwoorde (5)
1.1.3	$(x - 1)(x - 2) \leq 6$ $x^2 - 3x - 4 \leq 0$ $(x - 4)(x + 1) \leq 0$ $\begin{array}{ccccccc} + & 0 & - & 0 & + & & \\ & -1 & & 4 & & & \end{array}$ $-1 \leq x \leq 4$	✓ standaard vorm ✓ faktore ✓✓ antwoord (4)
1.2	$x + 3y = 5$ $x = 5 - 3y$ $(5 - 3y)y + y^2 = 3$ $5y - 3y^2 + y^2 = 3$ $0 = 3 - 5y + 2y^2$ $0 = (3 - 2y)(1 - y)$ $y = \frac{3}{2}$ or $y = 1$ $x = \frac{1}{2}$ or $x = 2$	✓ los op vir x ✓ vervanging ✓ standaard vorm ✓ faktore ✓✓ y-antwoorde ✓ x-antwoorde (7) [20]

VRAAG 2

2.1	$F_v = P_v(1-i)^n$ $0,25P = P(1-0,21)^n$ $n \log 0,79 = \log 0,25$ $n = \frac{\log 0,25}{\log 0,79}$ $n = 5,88 \text{ jare}$	✓ formule ✓ vervanging ✓ vereenvoudiging ✓ n = ✓ antwoord (5)
2.2.1	$F_v = P_v(1-i)^n$ $491520 = 1200000(1-i)^4$ $(1-i)^4 = 0,4096$ $i = 0,2$ $r = 20,00\%$	 ✓✓ vervanging ✓ vereenvoudiging ✓ antwoord (4)
2.2.2	$F_{v(\text{sinkingfund})} = 1,2000000(1,15)^4 - 491520$ $= R1607287,50$	✓ vervanging ✓ antwoord (2)
2.2.3	$(1,15)^4 = 1,74900625$ $\therefore$ 'n toename van 74,90 %	✓ vervanging ✓ toename (2)
2.2.4	gestel x is die maandelikse paaieiment $i = \frac{9}{1200} = 0,0075$ $1607287,50 = x \left[\frac{(1,0075)^{48} - 1}{0,0075} \right]$ $1607287,50 = x[57,5207111]$ $x = R27\,942,76$	✓ i ✓ 1607287,50 ✓ 1,0075 ✓ vervanging ✓ 57,5207111 ✓ antwoord (6)

[19]

	OF $a(1)^2 + b(1) + c = 5$ (i) $a + b + c = 5$ $a(2)^2 + b(2) + c = 18$ (ii) $4a + 2b + c = 18$ $a(3)^2 + b(3) + c = 37$ (iii) $9a + 3b + c = 37$ (ii) – (i): $3a + b = 13$ $b = 13 - 3a$ Vervang $b = 13 - 3a$ in (iii) $9a + 3(13 - 3a) + c = 37$ $9a + 39 - 9a + c = 37$ $c = -2$ Vervang $b = 13 - 3a$ and $c = -2$ into (ii) $4a + 2(13 - 3a) + (-2) = 18$ $-2a = -6$ $a = 3$ $\therefore b = 4$ OF Gestel T_n is die n^{de} term van die reeks Dus $\left. \begin{array}{l} T_2 - T_1 = 13 \\ T_3 - T_2 = 19 \\ T_4 - T_3 = 25 \\ T_5 - T_4 = 31 \\ T_n - T_{n-1} = \dots \end{array} \right\} \text{tel beide kante op}$ $T_n - T_1 = 13 + 19 + 25 + \dots (\text{tot } n - 1 \text{ terme})$ $T_n - 5 = \left(\frac{n-1}{2} \right) [2(13) + (n-2)6]$ $T_n = (n-1)(3n+7) + 5$ $T_n = 3n^2 + 4n - 2$	
4.3	$3n^2 + 4n - 2 = 1278$ $3n^2 + 4n - 1280 = 0$ $(3n + 64)(n - 20) = 0$ $n = \frac{-64}{3} \text{ or } n = 20$ $n = \frac{-64}{3} \text{ is nie geldig nie}$ $\therefore n = 20$	✓ vervanging ✓ faktore ✓ $n \neq \frac{-64}{3}$ ✓ $n = 20$ (4) [11]

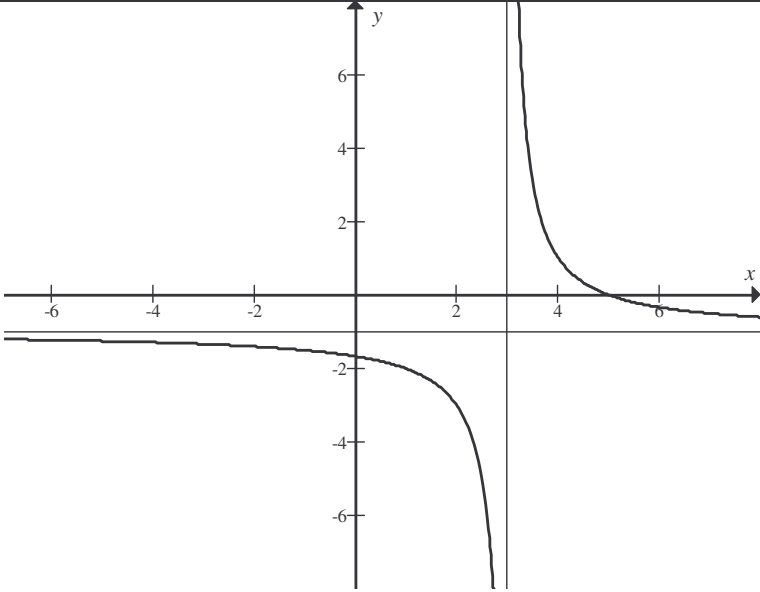
VRAAG 5

5.1	Patroon 3 $\frac{1}{4} + \frac{3}{16} + \frac{9}{64}$ Patroon 4 $\frac{1}{4} + \frac{3}{16} + \frac{9}{64} + \frac{27}{256}$	✓ eerste term ✓ tweede term ✓ derde term (3)
5.2	$\frac{1}{4} + \frac{3}{16} + \frac{9}{64} + \dots + \frac{3^{n-1}}{4^n}$ $\sum_{k=1}^n \frac{3^{k-1}}{4^k}$	✓ teller ✓ noemer (2)
5.3	$a = \frac{1}{4} \quad r = \frac{3}{4}$ $S = \frac{a}{1-r} = \frac{\frac{1}{4}}{1-\frac{3}{4}} = 1$	✓ a ✓ r ✓ vervanging ✓ antwoord (4) [9]

VRAAG 6

6.1	$b(1)^2 = \frac{1}{2}$ $b = \frac{1}{2}$ $a^1 = \frac{1}{2}$ $a = \frac{1}{2}$	✓ antwoord ✓ antwoord (2)
6.2	$y = 2^{-x}$ $y = \left(\frac{1}{2}\right)^x$ $f^{-1} : x = \left(\frac{1}{2}\right)^y$ $y = \log_{\frac{1}{2}} x$	✓ vervanging ✓ $f^{-1} : x = \left(\frac{1}{2}\right)^y$ ✓ antwoord (3)
6.3	Die inverse is nie 'n funksie nie, want byvoorbeeld, $g^{-1}\left(\frac{1}{2}\right) = 1$ of -1	✓✓ antwoord (2)
6.4	$x \in [0 ; \infty)$ of $x \in (-\infty ; 0]$	✓ $x \in [0 ; \infty)$ ✓ $x \in (-\infty ; 0]$ (2)
6.5.1	$0 < x < 1$	✓✓ antwoord (2)
6.5.2	$f(x) - 1 = g(x)$ $f(x) - g(x) = 1$ $x = 0$	✓ stelling ✓ antwoord (2)
		[15]

VRAAG 7

7.1	$x = 3$ $y = -1$	✓ antwoord ✓ antwoord (2)
7.2	x -snypunt: $0 = -1 + \frac{2}{x-3}$ $x - 3 = 2$ $x = 5$ x -snypunt $(5 ; 0)$ y -snypunt $\left(0 ; -\frac{5}{3}\right)$	✓ vervanging ✓ x -snypunt ✓ y -snypunt (3)
7.3		✓ vorm ✓ snypunte ✓ asimptote (3) [8]

VRAAG 8

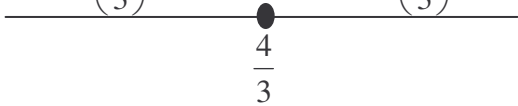
8.1	Periode = 360°	✓ antwoord (1)
8.2	Die skuif verander die waardeversameling van $g(x)$ na $y \in [-1 ; 3]$	✓ - 1 ✓ 3 (2)
8.3	$g(x) = \cos(x + 30^\circ - 30^\circ)$ $g(x) = \cos x$	✓ antwoord (1) [4]

VRAAG 9

9.1	$f'(x) = \lim_{h \rightarrow 0} \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{x - (x+h)}{x(x+h)}}{h}$ $= \lim_{h \rightarrow 0} \frac{x - (x+h)}{x(x+h)} \div h$ $= \lim_{h \rightarrow 0} \frac{-h}{x(x+h)} \times \frac{1}{h}$ $= \lim_{h \rightarrow 0} \frac{-1}{x(x+h)}$ $= \frac{-1}{x^2}$	✓ vervanging ✓ gem. noemer ✓ vereenvoudiging ✓ vereenvoudiging ✓ antwoord (5)
9.2.1	$D_x[-5x^2 + 2x]$ $= -10x + 2$	✓✓ antwoord (2)
9.2.2	$y = \sqrt{x^3} + \frac{1}{3x^3}$ $y = x^{\frac{3}{2}} + \frac{1}{3}x^{-3}$ $\frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}} - x^{-4}$	✓ $x^{\frac{3}{2}}$ ✓ $\frac{1}{3}x^{-3}$ ✓✓ antwoord (4) [11]

VRAAG 10

10.1	$f'(x) = 3x^2 - 8x - 11$ $0 = (3x - 11)(x + 1)$ $x = \frac{11}{3}$ or $x = -1$ $A(-1; 36)$ en $B\left(\frac{11}{3}; -14,8\right)$ Of Sommige candidate mag Horner se metode ken $f\left(\frac{11}{3}\right) = \left(\left(\left(\frac{11}{3} - 4\right) \times \frac{11}{3}\right) - 11\right) \times \frac{11}{3} + 30$ (dit maak sakrekenaarwerk baie makliker) i.e. $f(x) = ((x - 4)x - 11) + 30$	✓ afgeleide ✓ afgeleide = 0 ✓ faktore ✓ x-waardes ✓ punte (5)
10.2	$(1; 36)$ $\left(\frac{17}{3}; -14,8\right)$	✓ $x = 1$ ✓ y-waardes bly dieselfde (2)
10.3	Gemiddelde tempo van verandering $= \frac{36 - (-14,8)}{-1 - \frac{11}{3}}$ $= \frac{50,8}{-4,6}$ $= -10,89$	✓ formule ✓ vervanging ✓ antwoord (3)
10.4	$f'(1) = 3x^2 - 8x - 11$ $= 3(1)^2 - 8(1) - 11$ $= -16$ $f(1) = 1^3 - 4(1)^2 - 11(1) + 30$ $f(1) = 16$ $y - 16 = -16(x - 1)$ $y = -16x + 32$	✓ $m = -16$ ✓ punt $(1; 16)$ ✓ vervanging ✓ antwoord (4)
10.5	$-16x + 32 = x^3 - 4x^2 - 11x + 30$ $0 = x^3 - 4x^2 + 6x - 2$ $0 = (x - 1)(x^2 - 3x + 2)$ $0 = (x - 1)(x - 1)(x - 2)$ $x = 1$ of $x = 2$ die raaklyn sny die grafiek weer by $x = 2$	✓ vervanging ✓ standaard vorm ✓ faktore ✓ antwoord (4)
10.6	$k > 36$ of $k < -14,8$	✓✓ antwoorde (2)

10.7	$f'(x) = 3x^2 - 8x - 11$ $f''(x) = 6x - 8$ $0 = 6x - 8$ $x = \frac{4}{3}$ $f''\left(\frac{4}{3}\right) < 0 \qquad f''\left(\frac{4}{3}\right) > 0$  buigpunt $\left(\frac{4}{3}; \frac{286}{27}\right)$ of (1,33 ; 10,59)	$\checkmark f''(x) = 6x - 8$ $\checkmark f''(x) = 0$ $\checkmark\checkmark$ argument $\checkmark$ x-waarde $\checkmark$ y-waarde (6) [26]
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VRAAG 11

11.1	$\text{area} = \frac{\text{volume}}{\text{height}} = \frac{x^3 - 8x^2 + 5x + 50}{5 - x} = -x^2 + 3x + 10$	$\checkmark$ deling deur 5 - x $\checkmark\checkmark$ antwoord (3)
11.2	$f(x) = x^3 - 8x^2 + 5x + 50$ $f'(x) = 3x^2 - 16x + 5$ $0 = 3x^2 - 16x + 5$ $0 = (3x - 1)(x - 5)$ $x = \frac{1}{3} \text{ or } x \neq 5$ Maar $x = 5$ is nie geldig nie $\therefore x = \frac{1}{3}$	$\checkmark f'(x)$ $\checkmark = 0$ $\checkmark$ faktore $\checkmark$ antwoorde $\checkmark$ verwerp $x = 5$ $\checkmark$ afmetings (6) [9]

VRAAG 12

12.1	$\frac{1}{2}x + \frac{1}{5}y \leq 480$ $\therefore 5x + 2y \leq 4800$ $\frac{y}{x} \geq \frac{3}{2}$ $\therefore y \geq \frac{3x}{2}$	✓✓ vergelyking ✓✓ vergelyking (4)
12.2 en 12.3		✓✓✓ beperkinge korrek geplot (3) ✓ gangbare gebied (1)
12.4	$P = 12\,000x + 4\,000y$	✓✓ vergelyking (2)
12.5	$x = 600$ and $y = 900$	✓✓ antwoord (2)
12.6	$P = 12\,000(600) + 4\,000(900)$ $= R\,10\,800\,000$	✓ vervanging ✓ antwoord (2) [14]

Totaal: 150