



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE/GRAAD 12

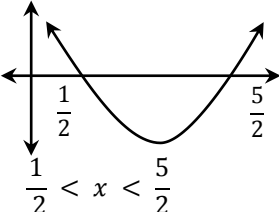
SEPTEMBER 2013

**MATHEMATICS/WISKUNDE P1/V1
MEMORANDUM**

MARKS/PU 150
NTE:

This memorandum consists of 11 pages./
Hierdie memorandum bestaan uit 11 bladsye.

QUESTION/VRAAG 1

1.1	1.1.1	$(2x + 3)(3 - x) = 4$ $\therefore 6x - 2x^2 + 9 - 3x - 4 = 0$ $\therefore 2x^2 - 3x - 5 = 0$ $\therefore (2x - 5)(x + 1) = 0$ $\therefore x = \frac{5}{2} \text{ or/of } x = -1$	(3)	<ul style="list-style-type: none"> ✓ simplification vereenvoudiging ✓ factors faktore ✓ for both values of x beide waardes van x 	
	1.1.2	$2x^2 + 3x = 3$ $2x^2 + 3x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-3)}}{2(2)}$ $= \frac{-3 \pm \sqrt{33}}{4}$ $= 0,69 \text{ or/of } -2,19$	(4)	<ul style="list-style-type: none"> ✓ standard form standaardvorm ✓ formula formule ✓ substitution vervanging ✓ both values of x beide waardes van x 	
	1.1.3	$(2x - 3)^2 < 4$ $\therefore 4x^2 - 12x + 9 < 4$ $\therefore 4x^2 - 12x + 5 < 0$ $\therefore (2x - 5)(2x - 1) < 0$ $\therefore \frac{1}{2} < x < \frac{5}{2}$	<p style="text-align: center;">or/of</p>  <p style="text-align: center;">$\frac{1}{2} < x < \frac{5}{2}$</p>	(4)	<ul style="list-style-type: none"> ✓ standard form standaardvorm ✓ factorisation faktoriserings ✓✓ answer/antwoord
1.2		$3y = 2x$ $\therefore y = \frac{2}{3}x \quad (1)$ $x^2 - y^2 + 2x - y = 1 \quad (2)$ <p style="text-align: center;">sub (1) in (2)</p> $x^2 - \left(\frac{4}{9}x^2\right) + 2x - \frac{2}{3}x - 1 = 0$ $\therefore 9x^2 - 4x^2 + 18x - 6x - 9 = 0$ $\therefore 5x^2 + 12x - 9 = 0$ $\therefore (5x - 3)(x + 3) = 0$ $\therefore x = \frac{3}{5} \text{ or/of } x = -3$ $x = \frac{3}{5} \text{ in (1)} \quad \therefore y = \frac{2}{3}\left(\frac{3}{5}\right) = \frac{2}{5}$ $x = -3 \text{ in (1)} \quad \therefore y = \frac{2}{3}(-3) = -2$	(6)	<ul style="list-style-type: none"> ✓ y in terms of x y in terme van x ✓ substitution vervanging ✓ simplification vereenvoudiging ✓ factorisation faktoriserings ✓ for both values of x vir beide waardes van x ✓ for both values of y vir beide waardes van y 	

1.3	<p>Let/Laat 2013 = x</p> $\sqrt[2013]{\frac{2^{2014} - 2^{2013}}{2^{4026}}} = x \sqrt{\frac{2^{x+1} - 2^x}{2^{2x}}}$ $= x \sqrt{\frac{2^x(2-1)}{2^x \cdot 2^x}}$ $= x \sqrt{\frac{1}{2^x}}$ $= x \sqrt{2^{-x}}$ $= (2^{-x})^{\frac{1}{x}}$ $= 2^{-1}$ $= \frac{1}{2}$	(4)	<ul style="list-style-type: none"> ✓ expressed exponents in terms of x druk eksponente uit in terme van x ✓ factorising faktoriserings ✓ simplification vereenvoudiging ✓ answer antwoord
		[21]	

QUESTION/VRAAG 2

2.1	1 ; 6 ; 15 ; ...	(1)	✓ for sequence vir ry
2.2	28 ; 45	(1)	✓ answer antwoord
2.3	quadratic sequence: Second difference is constant kwadratiese ry: Tweede verskil is konstant	(2)	✓✓ quadratic sequence kwadratiese ry
2.4	$T_n = 2n^2 - n$	(2)	✓✓ general term algemene term
		[6]	

QUESTION/VRAAG 3

3.1	$\frac{n}{2}(7n + 15) = 425$ $7n^2 + 15n = 850$ $7n^2 + 15n - 850 = 0$ $\therefore (7n + 85)(n - 10) = 0$ $\therefore n = -\frac{85}{7} \text{ or/of } n = 10$ <p>10 terms must be added 10 terme moet bymekaar getel word</p>	(5)	<ul style="list-style-type: none"> ✓ simplification vereenvoudiging ✓ standard form standaardvorm ✓ factorisation faktoriserings ✓ values of n waardes van n ✓ answer antwoord
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3.2	$T_6 = S_6 - S_5$ $= \frac{6}{2}[7(6) + 15] - \frac{5}{2}[7(5) + 15]$ $= 3(42 + 15) - \frac{5}{2}(35 + 15)$ $= 3(57) - \frac{5}{2}(50)$ $= 171 - 125$ $\therefore T_6 = 46$	(4)	✓✓ substitute in correct formula vervanging in korrekte formule. ✓ simplification vereenvoudiging ✓ answer antwoord
		[9]	

QUESTION/VRAAG 4

4.1	<p>AS/RR: $(k + 1) - (k - 4) = m - (k + 1)$ $k + 1 - k + 4 = m - k$ $\therefore k = m - 6 \quad (1)$</p> <p>GS/MR : $\frac{m}{k+1} = \frac{5k}{m}$ $\therefore m^2 = 5k^2 + 5k \quad (2)$</p> <p>Substitute (1) into (2) / Vervang (1) in (2)</p> $m^2 = 5(m - 6)^2 + 5(m - 6)$ $m^2 = 5m^2 - 60m + 180 + 5m - 30$ $\therefore 4m^2 - 55m + 150 = 0$ $(4m - 15)(m - 10) = 0$ $\therefore m = \frac{15}{4} \text{ or/of } m = 10$ <p>Substitute into (1) / Vervang in (1)</p> $k = \frac{15}{4} - 6 \quad \text{or/of} \quad k = 10 - 6$ $= -2\frac{1}{4} \quad \text{or/of} \quad k = 4$ <p>But/maar k: $m > 0$ Solution: $k = 4; m = 10$</p>	(8)	✓ $k = m - 6$ ✓ $m^2 = 5k^2 + 5k$ ✓ sub (1) into (2) vervang (1) in (2) ✓ simplification vereenvoudiging ✓ factorisation faktoriserings ✓ values of m waardes van m ✓ values of k waardes van k ✓ solution oplossing
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4.2	$\sum_{k=1}^{\infty} 27p^k = 27p + 27p^2 + 27p^3 + \dots$ $= \frac{27p}{1-p} \quad \dots \left(S_{\infty} = \frac{a}{1-r} \right)$ $\sum_{t=1}^{12} (24 - 3t) = [24 - 3(1)] + [24 - 3(2)] + [24 - 3(3)] + \dots [24 - 3(12)]$ $= 21 + 18 + 15 + \dots - 12$ $= \frac{12}{2} [21 - 12]$ $= 6.9$ $= 54$ $\therefore \frac{27p}{1-p} = 54$ $\therefore 27p = 54 - 54p$ $\therefore 81p = 54$ $\therefore p = \frac{2}{3}$	(6)	<ul style="list-style-type: none"> ✓ $\frac{27p}{1-p}$ ✓ 54 ✓ substitution vereenvoudiging ✓ simplification vereenvoudiging ✓ equate/vergelijk $\frac{27p}{1-p} = 54$ ✓ value of p waarde van p
		[14]	

QUESTION/VRAAG 5

5.1	$A = P(1 - i)^n$ $\therefore 90\,000 = 200\,000(1 - 0,08)^n$ $\therefore 90\,000 = 200\,000(0,92)^n$ $\therefore \frac{90\,000}{200\,000} = (0,92)^n$ $\therefore 0,45 = (0,92)^n$ $\therefore \log_{0,92} 0,45 = n$ $\therefore n = 9,576544593$ <p>It will take approximately 9,6 years to depreciate to R90 000. Dit sal ongeveer 9,6 jaar neem om te depresieer tot R90 000.</p>	(5)	<ul style="list-style-type: none"> ✓ correct formula korrekte formule ✓ correct substitution korrekte vervanging ✓ simplification vereenvoudiging ✓ use of logs gebruik van logs ✓ value of n waarde van n
5.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $\therefore F = \frac{2000 \left[\left(1 + \frac{0,06}{12} \right)^{61} - 1 \right]}{\frac{0,06}{12}}$ $= \frac{2000[(1+0,005)^{61} - 1]}{0,005}$ $\therefore F = R142\,237,76$	(5)	<ul style="list-style-type: none"> ✓ correct formula korrekte formule ✓ $\frac{0,06}{12}$ ✓ substitution vervanging ✓ value of n waarde van n ✓ answer antwoord

5.3	5.3.1	$\text{At } T_2 : A = 100\,000(1,015)^2$ $\therefore A = R103\,022,50$	(2)	✓ correct formula korrekte formule ✓ answer/antwoord
	5.3.2	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $\therefore 103\,022,50 = \frac{x[1-(1,015)^{-238}]}{0,015}$ $\therefore x = R1591,35$	(3)	✓ correct annuity formula korrekte annuïteits- formule ✓ substitution Vervanging ✓ answer/antwoord
			[15]	

QUESTION/VRAAG 6

6.1	$x = 2$ and/en $y = -3$	(2)	✓ $x = 2$ ✓ $y = -3$
6.2	$x = 0$ gives/gee $y = -4\frac{1}{2}$ $y = 0$ gives/gee $x = 3$ Intercepts are/Snypunte $(0 ; -4\frac{1}{2})$ and/en $(3 ; 0)$	(3)	✓ $y = -4\frac{1}{2}$ ✓ $x = 3$ ✓ $(0 ; -4)$ and/en $(3 ; 0)$
6.3		(4)	✓✓ left branch linker tak ✓✓ right branch regter tak

6.4	$y = -x + c$ $\therefore y = -(x-2) - 3$ $\therefore y = -x - 1$	(2)	✓ equation vergelyking ✓ substitution/answer vervanging/ antwoord
6.5	$y \in \mathbb{R}, y \neq -1$	(1)	✓ answer/antwoord
		[12]	

QUESTION/VRAAG 7

7.1	$k = \frac{1}{2}$	(1)	✓ value of k waarde van k
7.2	$a = -1\frac{1}{2}$	(1)	✓ value of m waarde van m
7.3	$f(x) = a(x-2)\left(x + \frac{3}{2}\right)$ $= a\left(x^2 - \frac{x}{2} - 3\right)$ but y-intercept is 6/maar y-afsnit is 6 $\therefore -3a = 6$ $\therefore a = -2$ $\therefore f(x) = -2x^2 + x + 6$ $\therefore f\left(\frac{1}{4}\right) = -2\left(\frac{1}{4}\right)^2 + \frac{1}{4} + 6$ $= -\frac{1}{8} + \frac{1}{4} + 6$ $= 6\frac{1}{8}$ $\therefore b = 6\frac{1}{8}$	(6)	✓ setting up of factors opstel van faktore ✓ equate -3a to 6 vergelyk -3a met 6 ✓ value of a waarde van a ✓ $f(x)$ ✓ $f\left(\frac{1}{4}\right)$ ✓ value of b waarde van b
7.4	gradient of tangent is/gradient van raaklyn is: $f'(x) = -4x + 1$ $f'(0) = 1$ At/By (0 ; 6) is gradient/gradient 1 equation of tangent /vergelyking van raaklyn $\therefore \frac{y-6}{x-0} = 1$ or/of $(y - y_1) = m(x - x_1)$ $y - 6 = 1(x - 0)$ $\therefore y - 6 = x$ $\therefore y - 6 = x$ $\therefore y = x + 6$ $\therefore y = x + 6$	(3)	✓ gradient of/van $f(x)$ ✓ equate gradients vergelyk gradient ✓ equation of tangent vergelyking van raaklyn
		[11]	

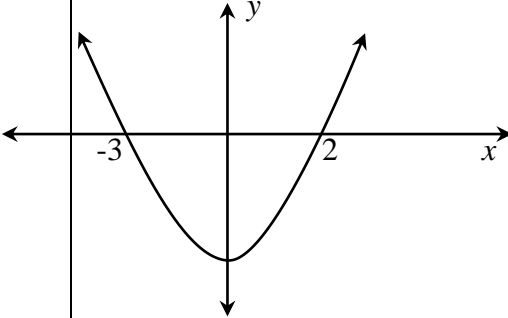
QUESTION/VRAAG 8

8.1	8.1.1	<p>Inverse: $x = 3^y$ $\therefore g(x) = \log_3 x$ $y = \log_3 x$</p> <p>$h(x) = -g(x)$ $= -\log_3 x$ $\therefore y = \log_{\frac{1}{3}} x$</p>	(5)	<ul style="list-style-type: none"> ✓ for inverse vir inverse ✓ express in log form uitdruk in log vorm ✓ $y = \log_3 x$ ✓ $h(x) = -\log_3 x$ ✓ $y = \log_{\frac{1}{3}} x$
	8.1.2	a. $x > 0 \quad x \in \mathbb{R}$	(1)	✓ answer/antwoord
		b. $x = 1$	(1)	✓ answer/antwoord
8.2	8.2.1	<p>$f^1(x) : x = 2y^2$ $\therefore y = \pm \sqrt{\frac{1}{2}x}$ $\therefore f^{-1}(x) = \pm \sqrt{\frac{1}{2}x}$</p>	(2)	✓✓ answer/antwoord
	8.2.2	<p>No, it is not a function. Because any vertical line crosses the graph more than once. Nee, dit is nie 'n funksie nie omdat enige vertikale lyn die grafiek twee keer sny.</p>	(2)	<ul style="list-style-type: none"> ✓ answer antwoord ✓ reason rede
	8.2.3	Let $x \geq 0$ or/of $x \leq 0$	(2)	<ul style="list-style-type: none"> ✓ $x \geq 0$ ✓ $x \leq 0$
			[13]	

QUESTION/VRAAG 9

9.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-(-x+h)^2 - (x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-x^2 - 2xh - h^2 + x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-2xh - h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-2x - h)}{h}$ $= \lim_{h \rightarrow 0} (-2x - h)$ $= -2x$	(5)	<ul style="list-style-type: none"> ✓ substitution into correct formula vervanging in korrekte formule ✓ simplification vereenvoudiging ✓ $\lim_{h \rightarrow 0} (2x - h)$ ✓ substitution vervanging ✓ answer/antwoord
9.2	<p>9.2.1</p> $f(x) = \frac{x^2 - 9}{x - 3}$ $= \frac{(x+3)(x-3)}{(x-3)}$ $= x + 3$ $f'(x) = 1$	(4)	<ul style="list-style-type: none"> ✓ factorisation faktoriserings ✓ simplification vereenvoudiging ✓ substitution vervanging ✓ answer antwoord
	<p>9.2.2</p> $f(x) = \sqrt{x} \left(x + \frac{1}{x}\right)^2$ $= x^{\frac{1}{2}}(x^2 + 2 + x^{-2})$ $= x^{\frac{5}{2}} + 2x^{\frac{1}{2}} + x^{-\frac{3}{2}}$ $= \frac{5}{2}x^{\frac{3}{2}} + x^{-\frac{1}{2}} - \frac{3}{2}x^{-\frac{5}{2}}$ $f'(x) = \frac{5}{2}x^{\frac{3}{2}} + \frac{1}{x^{\frac{1}{2}}} - \frac{3}{2x^{\frac{5}{2}}}$	(4)	<ul style="list-style-type: none"> ✓ square kwadreeer ✓ simplification vereenvoudiging ✓✓ answer antwoord
			[13]

QUESTION/VRAAG 10

10.1	10.1.1	$x = -3$ or/of $x = 2$	(2)	✓✓ for each value x vir elke waarde van x
	10.1.2	$x < -3$ or/of $x > 2$	(2)	✓✓ for each value of x vir elke waarde van x
	10.1.3		(3)	✓✓ x-intercepts x-afsnitte ✓ shape vorm
	10.1.4	$f(x) - k = 0$ $\therefore f(x) = k$ $\therefore k < b$ or/of $k > a$	(3)	✓ $f(x) = k$ ✓ $k < b$ ✓ $k > a$
10.2	$f(-1) = (-1)^2 - 4$ $= -3$ $(-1 ; -3)$ $f(3) = (3)^2 - 4$ $= 5$ $m_{AB} = \frac{5 - (-3)}{3 - (-1)}$ $= \frac{8}{4}$ $= 2$		(4)	✓ $f(-1) = -3$ ✓ $f(3) = 5$ ✓ substitute into correct formula vervanging in korrekte formule ✓ answer antwoord
			[14]	

QUESTION/VRAAG 11

11.1	$h^2 + w^2 = 24^2$ $\therefore h^2 = 24 - w^2$ $= 576 - w^2$ $S = h^2w$ $= (576 - w^2)w$ $= 576w - w^3$	(3)	<ul style="list-style-type: none"> ✓ use of Pythagoras gebruik van Pythagoras ✓ substitution vervanging ✓ substitution of h^2 vervanging van h^2
11.2	$\frac{dS}{dw} = 576 - 3w^2$ $\therefore 576 - 3w^2 = 0$ $w^2 = 192$ $\therefore w = 13,86$ $h^2 = 576 - w^2$ $= 576 - 192$ $= 384$ $\therefore h = \sqrt{384}$ $= 19,60 \text{ cm}$	(4)	<ul style="list-style-type: none"> ✓ $\frac{dS}{dw}$ ✓ value of w waarde van w ✓ value of h^2 waarde van h^2 ✓ value of h waarde van h
		[7]	

QUESTION/VRAAG 12

12.1	$x + y \geq 30$ $x \leq 2y$ $\frac{2}{3}x + \frac{1}{2}y \leq 50$	(6)	<ul style="list-style-type: none"> ✓✓ $x + y \geq 30$ ✓✓ $x \leq 2y$ ✓✓ $\frac{2}{3}x + \frac{1}{2}y \leq 50$
12.2	A(75 ; 0)	(2)	<ul style="list-style-type: none"> ✓✓ one for each coordinate een vir koördinaat
12.3	12.3.1 P = 225x + 75y	(2)	<ul style="list-style-type: none"> ✓✓ P = 225x + 75y
	12.3.2 Max. profit at D(42 ; 44) Mak. wins = 225(42) + 75(44) = R12 750	(5)	<ul style="list-style-type: none"> ✓✓ x-coordinate of D x-koördinaat van D ✓✓ y-coordinate of D y-koördinaat ✓ answer antwoord
		[15]	

TOTAL/TOTAAL: 150