



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL SENIOR  
CERTIFICATE  
NASIONALE  
SENIOR SERTIFIKAAT**

**GRADE / GRAAD  
11**

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**MATHEMATICS P1 / WISKUNDE V1  
MEMORANDUM**

**MARKS:** 150  
**PUNTE:**

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This memorandum consists of 12 pages  
Hierdie memorandum bestaan uit 12 bladsye.

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QUESTION 1 / VRAAG 1			
1.1.1	$(x + 3)(x - 1) = -x + 1$ $x^2 + 2x - 3 = -x + 1$ or/of $(x + 3)(x - 1) + (x - 1) = 0$ $x^2 + 3x - 4 = 0$ or/of $(x - 1)(x + 4) = 0$ $(x + 4)(x - 1) = 0$ $\therefore x = -4$ or $x = 1$ or/of $\therefore x = 1$ or/of $x = -4$	<ul style="list-style-type: none"> <li>✓ simplify LHS vereenvoudig LK</li> <li>✓ standard form standaardvorm</li> <li>✓ factorisation faktoriserings</li> <li>✓ for both values of <math>x</math> vir beide <math>x</math> waardes</li> </ul>	(4)
1.1.2	$x^2 + 3x - 4 < 0$ $\therefore (x + 4)(x - 1) < 0$ $\therefore -4 < x < 1$	<ul style="list-style-type: none"> <li>✓ factorisation faktoriserings</li> <li>✓ -4 and/en 1</li> <li>✓ notation/ notasie</li> </ul>	(3)
1.1.3	$x^2 + 3x = 1$ or/of $x^2 + 3x = 1$ $x^2 + 3x - 1 = 0$ $x^2 + 3x + \left(\frac{3}{2}\right)^2 = 1 + \left(\frac{3}{2}\right)^2$ $= \frac{-3 \pm \sqrt{(3)^2 - 4(1)(-1)}}{2(1)}$ $\left(x + \frac{3}{2}\right)^2 = \frac{13}{4}$ $= \frac{-3 \pm \sqrt{13}}{2}$ $x + \frac{3}{2} = \pm \sqrt{\frac{13}{4}}$ $= -\frac{3}{2} \pm \sqrt{\frac{13}{4}}$ $x = 0,3$ or $x = -3,3$ $\therefore x = 0,3$ or/of $= -3,3$	<ul style="list-style-type: none"> <li>✓ standard form standaardvorm</li> <li>✓ method/Substitution metode/vervangings</li> <li>✓ simplification vereenvoudigings</li> <li>✓✓ one mark for each answer een punt vir elke antwoord</li> </ul>	(5)
1.2	$x = 3 - y$ $2x^2 + 2y^2 = 5xy$ $2(3 - y)^2 + 2y^2 = 5(3 - y)y$ $2(9 - 6y + y^2) + 2y^2 = 15y - 5y^2$ $18 - 12y + 2y^2 + 2y^2 = 15y - 5y^2$ $9y^2 - 27y + 18 = 0$ $y^2 - 3y + 2 = 0$ $(y - 2)(y - 1) = 0$ $\therefore y = 2$ or $y = 1$ $\therefore x = 1$ or $x = 2$	<ul style="list-style-type: none"> <li>✓ <math>x = 3 - y</math></li> <li>✓ substitution vervangings</li> <li>✓ simplification vereenvoudigings</li> <li>✓ simplification vereenvoudigings</li> <li>✓ factorisation faktoriserings</li> <li>✓ both values of/ albei waardes van <math>y</math></li> <li>✓✓ each value of/ elke waarde van <math>x</math></li> </ul>	(8)

1.3	$\begin{aligned} f(x-1) &= (x-1)^2 - 2(x-1) \\ &= x^2 - 2x + 1 - 2x + 2 \\ &= x^2 - 4x + 3 \\ &= (x^2 - 4x + 4) - 1 \\ &= (x-2)^2 - 1 \end{aligned}$	<ul style="list-style-type: none"><li>✓ substitution vervanging</li><li>✓ simplification vereenvoudiging</li><li>✓ quadratic expression kwadatische uitdrukking</li><li>✓ completion of square / kwadraatsvoltooiing</li></ul>	(4)
1.4	$\begin{aligned} 2.5^x &= 50 \\ 5^x &= 25 \\ 5^x &= 5^2 \\ \therefore x &= 2 \end{aligned}$	<ul style="list-style-type: none"><li>✓ divide by 2 deel deur 2</li><li>✓ same base selfde basis</li><li>✓ answer/ antwoord</li></ul>	(3)
			[27]

QUESTION2 / VRAAG 2			
2.1	(0 ; 1)	✓ y-intercept y-afsnit	(1)
2.2	Asymptotes of: $f(x): y = 0$ ✓ $h(x): x = 0$ ✓ $y = 5$ ✓	1 mark for each correct answer 1 punt vir elke korrekte antwoord	(3)
2.3	$f$ and $h$ are decreasing ✓✓ $f$ en $h$ verminder		(2)
2.4		1 mark for each correct curve / 1 punt vir elke korrekte kromme  1 mark for asymptote $y = 5$ 1 punt vir asimptoot $y = 5$	(4)
2.5	$y = 5^x$ ✓		(1)
2.6	$y = \frac{x}{5} + 5$	✓ answer antwoord	(1)
			[12]

QUESTION 3 / VRAAG 3																											
3.1	$T_n = 3n^2 + 2$ $T_2 = 3(2)^2 + 1$ $= 13$ $\therefore T_2 \neq 12$ $\therefore$ False/Vals	✓ substitution in general term vervanging in algemene term ✓ simplification vereenvoudiging ✓ $T_2 \neq 12$ ✓ deduction / afleiding	(4)																								
3.2.1	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Shape number, n Patroon nommer</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Number of white triangles Aantal wit driehoeke</td> <td>1</td> <td>3</td> <td>6</td> <td>10</td> <td>15</td> </tr> <tr> <td>Number of black triangles Aantal swart driehoeke</td> <td>0</td> <td>1</td> <td>3</td> <td>6</td> <td>10</td> </tr> <tr> <td>Total number of triangles Totale aantal driehoeke</td> <td>1</td> <td>4</td> <td>9</td> <td>16</td> <td>25</td> </tr> </tbody> </table> <p style="text-align: right;">1 mark per correct entries 1 punt per korrekte inskrywing ✓✓✓✓✓✓ (6)</p>			Shape number, n Patroon nommer	1	2	3	4	5	Number of white triangles Aantal wit driehoeke	1	3	6	10	15	Number of black triangles Aantal swart driehoeke	0	1	3	6	10	Total number of triangles Totale aantal driehoeke	1	4	9	16	25
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3.2.2	$12^2 = 144$ triangles/driehoeke	✓ $12^2$ ✓ answer/ antwoord	(2)																								

3.2.3	<p>There is a common second difference of 1, so the sequence is quadratic. Daar is 'n tweede gemene verskil van 1, daarom is die reeks kwadratiese.</p> $T = an^2 + bn + c$ $a = \frac{cd}{2}$ $= \frac{1}{2}$ $b = T_2 - T_1 - 3a \quad \text{OR/OF} \quad \frac{1}{2} + b + c = 0$ $= 1 - 0 - \frac{3}{2}$ $= -\frac{1}{2} \qquad 2 + 2b + c = 1$ $c = T_1 - a - b$ $= 0 - \frac{1}{2} - \left(-\frac{1}{2}\right)$ $= 0$ $\therefore T_n = \frac{1}{2}n^2 - \frac{1}{2}n \text{ or/of } \frac{1}{2}n(n - 1)$	<p>✓ <math>d = 1</math></p> <p>✓ value of <math>a</math> waarde van <math>a</math></p> <p>✓ equation / vergelyking</p> <p>✓ value of <math>b</math> waarde van <math>b</math></p> <p>✓ equation / vergelyking</p> <p>✓ value of <math>c</math> waarde van <math>c</math></p> <p>✓ general term algemene term</p>	(7)
3.2.4	$\frac{1}{2}n(n - 1) = 190$ $n(n - 1) = 380$ $n^2 - n - 380 = 0$ $(n - 20)(n + 19) = 0$ $n = 20$	<p>✓ equating to 190 gelykstel aan 190</p> <p>✓ simplification vereenvoudiging</p> <p>✓ standard form standaardvorm</p> <p>✓ factorisation faktorisering</p> <p>✓ <math>n = 20</math></p>	(5)
			<b>[24]</b>

QUESTION 4 / VRAAG 4				
4.1		$A = P(1 - in)$ $A = R15\ 000 \left(1 - \frac{12}{100} \cdot 6\right)$ $= R4\ 200$	✓ substitution of 12% and 6 vervanging van 12% en 6 ✓ substitution of R15 000 vervanging van R15 000 ✓ answer antwoord	(3)
4.2	4.2.1	$\frac{15\%}{12} = 1,25\%$ per month / per maand	✓ answer antwoord	(1)
	4.2.2	$1 + i_e = \left(1 + \frac{(i)m}{m}\right)^m$ $1 + i_e = \left(1 + \frac{15}{1\ 200}\right)^{12}$ $i_e = \left(1 + \frac{15}{1\ 200}\right)^{12} - 1$ $= 0,16075$ $r = i_e \times 100$ $= 16,08\% \text{ p.a}$	✓ substituting into correct formula vervanging in die korrekte formule ✓ simplifying vereenvoudiging ✓ 0,16075 ✓ value of $r$ waarde van $r$	(4)
	4.2.3	$A = P(1 + i)^n$ $= R2\ 500 \left(1 + \frac{15}{1\ 200}\right)^{84}$ OR/OF $2500(1 + 0,16075)^7$ $= R2\ 500(1,0125)^{84}$ $= R7\ 097,78 \quad \text{OR/OF} \quad R7\ 097,59$	✓✓ substitution vervanging ✓ simplifying vereenvoudiging ✓ answer antwoord	(4)
4.3	4.3.1	$P = \frac{A}{(1 - i)^n}$ $= \frac{183\ 680}{(1 - 0,18)^1}$ $= R224\ 000$	✓✓ substitution vervanging ✓ simplifying vereenvoudiging ✓ answer antwoord	(4)
	4.3.2	$A = P(1 - i)^n$ $= R224\ 000(1 - 0,18)^1(1 - 0,15)^1(1 - 0,12)^2$ $= R120\ 905,5232$ $= R120\ 906$	✓✓ substituting vervanging ✓ simplifying vereenvoudiging ✓ answer antwoord	(4)

4.4	$A = P_1(1+i)^n + P_2((1+i)^n$ $= R550\,000 \left(1 + \frac{0,18}{4}\right)^{7 \times 4} \checkmark + R560\,000 \left(1 + \frac{0,18}{4}\right)^{3 \times 4} \checkmark$ $= R1\,886\,335,00 \checkmark + R949\,693,60 \checkmark$ $= R2\,836\,028,60 \checkmark$	<ul style="list-style-type: none"> <li>✓ sub.ver <math>P_1(1+i)^n</math></li> <li>✓ sub.ver <math>P_2(1+i)^n</math></li> <li>✓ method / metode</li> <li>✓✓ answer</li> <li>antwoord</li> </ul>	(5)
			<b>[25]</b>

QUESTION 5 / VRAAG 5			
5.1	$\frac{-2}{x-1} - 1 = 0$ $\therefore -2 - (x-1) = 0$ $\therefore x = -1$ $y = \frac{-2}{0-1} - 1 = 1$	✓ simplify vereenvoudig ✓ $x = -1$ ✓ $(0; 1)$	(3)
5.2	$\frac{1}{2}(x-4)^2 - 2 = 0$ $\therefore (x-4)^2 = 4$ $\therefore x-4 = \pm 2$ $\therefore x = 2 \text{ or } 6$	✓ $y = 0$ ✓ $(x-4)^2 = 4$ ✓ both answers/ albei antwoorde	(3)
5.3		✓ f: x-intercepts x-afsnitte ✓ y-intercept y-afsnit ✓ turning point draaipunt ✓ shape / vorm  ✓ g: intercepts afsnitte ✓ asymptotes asimptote ✓ shape / vorm	(7)
5.4	$y \in \mathbb{R} \checkmark; y \neq -1 \checkmark$		(2)
5.5	-2	✓ -2	(1)
5.6	$x > 4$	✓ 4 ✓ >	(2)
			<b>[18]</b>

QUESTION 6 / VRAAG 6			
6.1	$(0 ; 0)$ $f(x) = 1 + a \cdot 2^x$ $0 = 1 + a \cdot 2^0$ $0 = 1 + a \cdot 1$ $\therefore a = -1$	✓ substitution vervanging ✓ simplifying vereenvoudiging	(2)
6.2	$f(x) = 1 - 2^x$ $f(-15) = 1 - 2^{-15}$ $= 0,99997$	✓ substitution vervanging ✓ answer antwoord	(2)
6.3	$f(x) = 1 - 2^x$ $(x ; 0,5)$ $\therefore 0,5 = 1 - 2^x$ $2^x = 1 - 0,5$ $2^x = 0,5 = \frac{1}{2}$ $2^x = 2^{-1}$ $\therefore x = -1$	✓ substitution vervanging ✓ express with same base uitdruk met dieselfde basis ✓ answer antwoord	(3)
6.4	$h(x) = f(x - 2)$ $= 1 - 2^{x-2}$	✓✓ $h(x)$	(2)
			<b>[9]</b>

QUESTION 7 / VRAAG 7			
7.1	$-x^2 - 2x + 3 = 0$ $\therefore x^2 + 2x - 3 = 0$ $\therefore (x + 3)(x - 1) = 0$ $\therefore x = -3 \text{ or } x = 1$ $AB = 4 \text{ units/eenhede}$ $OC = 3 \text{ units/eenhede}$	✓ equating to 0 gelykstel aan 0 ✓ factors /faktore ✓ $x = -3$ $x = 1$ ✓ $AB = 4$ units/eenhede  ✓ $OC = 3$ units/eenhede	(5)
7.2	$x = -1$	✓✓ $x = -1$	(2)
7.3	$f(-1) = -(-1)^2 - 2(-1) + 3$ $= -1 + 2 + 3$ $= 4$	✓ substituting vervanging ✓ simplification vereenvoudiging ✓ answer antwoord	(3)
7.4.1	$m_{AC} = \frac{3}{3}$ $= 1$	✓ numerator teller ✓ denominator noemer ✓ answer / antwoord	(3)
7.4.2	$m = 1$ subs/verv. (1;0) in $y = x + c$ $\therefore 0 = 1 + c$ $\therefore c = -1$ $\therefore y = x - 1$	✓ $m = 1$ ✓ $y = x + c$ ✓ $0 = 1 + c$ ✓ $c = -1$	(4)
			<b>[17]</b>

QUESTION 8 / VRAAG 8			
8.1	$x \leq 35$ $y \leq 20$ $x + y \leq 50$ $40x + 50y \geq 2\,000$ $x, y \in \mathbb{N}_0$	✓ $x \leq 35$ ✓ $y \leq 20$ ✓ $x + y \leq 50$ ✓ $40x + 50y \geq 2\,000$	(4)
8.2	<p>The graph shows a coordinate system with the x-axis representing the number of wall models and the y-axis representing the number of table models. The feasible region is shaded and bounded by the lines <math>x = 35</math>, <math>y = 20</math>, <math>x + y = 50</math>, and <math>4x + 5y = 200</math>. The vertices of the feasible region are (25, 20), (30, 20), (35, 15), and (35, 12).</p>	✓ $x = 35$ ✓ $y = 20$ ✓ $x + y = 50$ ✓ $4x + 5y = 200$ ✓ feasible region gangbare gebied	(5)
8.3	(25 ; 20) (30 ; 20) (35 ; 15) (35 ; 12)	✓ (25 ; 20) ✓ (30 ; 20) ✓ (35 ; 15) ✓ (35 ; 12)	(4)
8.4	$P = 20x + 10y$	✓ $P = 20x + 10y$	(1)
8.4	Max. profit: R850 for 35 wall models and 15 table models Mak. wins: R850 vir 35 muurmodelle en 15 tafelmodelle Min. profit : R700 for 25 wall models and 20 table models Min, wins : R700 vir 25 muurmodelle en 20 tafelmodelle	✓✓ for max profit vir mak. wins ✓✓ for min profit vir mak. wins	(4)
			<b>[18]</b>
<b>TOTAL/TOTAAL:</b>			<b>150</b>