

# **$\alpha$ -MATHEMATICS**

**Alpha Wiskunde Graad 10 / *Alpha Mathematics Grade 10***

**Finale eksamen 2022 / *Final exam 2022***

## **MEMORANDUM**

**Totaal / *Total*: 120 punte / *marks***

**Eksaminator / *Examiner*: Lanice Liebenberg**

**Moderator: Anna Muller**

**Hierdie memorandum bestaan uit 9 bladsye. /**

***This memorandum consists of 9 pages.***

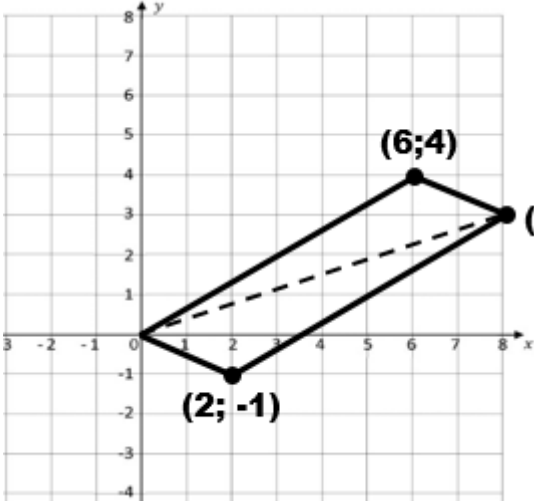
**Vraag / Question 1****[20 punte / marks]**

<b>1.1</b>	A	B	C	D
<b>1.2</b>	A	B	C	D
<b>1.3</b>	A	B	C	D
<b>1.4</b>	A	B	C	D
<b>1.5</b>	A	B	C	D
<b>1.6</b>	A	B	C	D
<b>1.7</b>	A	B	C	D
<b>1.8</b>	A	B	C	D
<b>1.9</b>	A	B	C	D
<b>1.10</b>	A	B	C	D

Vraag / Question 2

[14 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
2.1.1	$i^{75}$ $= i^{72} \cdot i^3$ $= 1 \cdot -i$ $= -i \checkmark \checkmark$	(2)
2.1.2	$\sqrt{-12}$ $= \sqrt{4} \cdot \sqrt{3} \cdot \sqrt{-1}$ $= 2\sqrt{3}i \checkmark \checkmark$	(2)
2.2	$LHS = \frac{3i^{13} + i^{14}}{4}$ $= \frac{i^{13}(3+i)}{4}$ $= \frac{i^4(3+i)}{4}$ $= \frac{-1+3i}{4} \checkmark$ $RHS = \frac{-3i^2 + 7i - 2}{8-4i}$ $= \frac{1+7i}{8-4i} \checkmark$ $= \frac{1+7i}{8-4i} \times \frac{8+4i}{8+4i} \checkmark$ $= \frac{8+4i+56i+28i^2}{64-16i^2} \checkmark$ $= \frac{-20+60i}{80}$ $= \frac{-1+3i}{4} \checkmark$ $LHS = RHS$	(6)

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
2.3		<p>(4)</p> <p>✓(6;4)</p> <p>✓(2;-1)</p> <p>✓✓(8;3)</p>

Vraag / Question 3

[12 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
3.1	$\frac{x^2-7x+4}{(x+1)(x-1)^2} \equiv \frac{A}{(x+1)} + \frac{B}{(x-1)} + \frac{C}{(x-1)^2} \checkmark$ $x^2 - 7x + 4 = A(x-1)^2 + B(x+1)(x-1) + C(x+1) \checkmark$ <p><math>x = -1</math>  <math>12 = 4A</math>  <math>A = 3 \checkmark</math></p> <p><math>x = 1</math>  <math>-2 = 2C</math>  <math>C = -1 \checkmark</math></p> <p><math>x = 0</math>  <math>4 = A - B + C</math>  <math>4 = 3 - B - 1</math>  <math>B = -2 \checkmark</math></p> $\frac{x^2-7x+4}{(x+1)(x-1)^2} \equiv \frac{3}{(x+1)} - \frac{2}{(x-1)} - \frac{1}{(x-1)^2} \checkmark$	(7)

3.2	Gegee	<b>(5)</b>																														
	$x^2 - 5$  $x^2 - 5$ <table style="margin-left: 20px; border-collapse: collapse;"> <tr> <td style="border-right: 1px solid black; padding-right: 10px;"><math>x^2</math></td> <td style="padding-right: 10px;"><math>-25</math></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;"><math>x^4</math></td> <td style="padding-right: 10px;"><math>+0x^3</math></td> <td style="padding-right: 10px;"><math>-30x^2</math></td> <td style="padding-right: 10px;"><math>+0x</math></td> <td style="padding-right: 10px;"><math>+125</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding-right: 10px;"><math>-x^4</math></td> <td style="padding-right: 10px;"><math>+0x^3</math></td> <td style="padding-right: 10px;"><math>+5x^2</math></td> <td></td> <td></td> </tr> <tr> <td style="border-right: 1px solid black;"></td> <td></td> <td style="padding-right: 10px;"><math>-25x^2</math></td> <td style="padding-right: 10px;"><math>0x</math></td> <td style="padding-right: 10px;"><math>+125</math></td> </tr> <tr> <td style="border-right: 1px solid black;"></td> <td></td> <td style="padding-right: 10px;"><math>+25x^2</math></td> <td style="padding-right: 10px;"><math>+0x</math></td> <td style="padding-right: 10px;"><math>-125</math></td> </tr> <tr> <td style="border-right: 1px solid black;"></td> <td></td> <td></td> <td></td> <td style="text-align: center;"><math>0</math></td> </tr> </table>	$x^2$	$-25$				$x^4$	$+0x^3$	$-30x^2$	$+0x$	$+125$	$-x^4$	$+0x^3$	$+5x^2$					$-25x^2$	$0x$	$+125$			$+25x^2$	$+0x$	$-125$					$0$	
$x^2$	$-25$																															
$x^4$	$+0x^3$	$-30x^2$	$+0x$	$+125$																												
$-x^4$	$+0x^3$	$+5x^2$																														
		$-25x^2$	$0x$	$+125$																												
		$+25x^2$	$+0x$	$-125$																												
				$0$																												
	$x^4 - 30x^2 + 125 = 0$ $(x^2 - 5)(x^2 - 25)✓ = 0$ $(x + \sqrt{5})(x - \sqrt{5})✓(x + 5)(x - 5)✓ = 0$ $x = \pm\sqrt{5}✓ ; \pm 5✓$																															

**Vraag / Question 4**

**[7 punte / marks]**

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
4.1.1	$s = 6 \cdot \frac{\pi}{3} = 2\pi✓$ $P = 2\pi \cdot 6✓ - 2\pi + 2(6)✓$ $= 10\pi + 12 \text{ cm}$	<b>(3)</b>
4.1.2	$A = \pi \cdot 6^2✓ - \frac{1}{2} \cdot 6^2 \cdot \frac{\pi}{3}✓$ $= 30\pi \text{ cm}^2✓✓$	<b>(4)</b>

Vraag / Question 5

[13 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
5.1		<p>(6) ✓✓Begin and end points of each graph</p>
5.2.1	$(f \circ g)(x) = \left(\frac{1}{\sqrt{x}}\right)^2 + 1 \checkmark$ $= \frac{1}{x} + 1 \checkmark$	(2)
5.2.2	$(g \circ f)(3) = \frac{1}{\sqrt{3^2+1}} \checkmark \checkmark$ $= \frac{1}{\sqrt{10}} \checkmark$	(3)
5.3	$f(x) = \frac{1}{\sqrt{x}} + 2x^2 \checkmark$ $g(x) = x + 5 \checkmark$	(2)

Vraag / Question 6

[13 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
6.1	$-19 = \begin{vmatrix} 1 & 4 & p \\ 3 & 1 & -4 \\ p & 5 & 3 \end{vmatrix}$ $-19 = \begin{vmatrix} 1 & -4 \\ 5 & 3 \end{vmatrix} \checkmark - 4 \begin{vmatrix} 3 & -4 \\ p & 3 \end{vmatrix} \checkmark + p \begin{vmatrix} 3 & 1 \\ p & 5 \end{vmatrix} \checkmark$ $-19 = 23 - 36 - 16p + 15p - p^2$ $p^2 + p - 6 = 0 \checkmark$ $(p + 3)(p - 2) = 0 \checkmark$ $p = -3 ; 2 \checkmark \checkmark$	(7)
6.2.1	$\begin{bmatrix} 4 \\ 4 \\ 4 \end{bmatrix} \checkmark$	(1)
6.2.2	$\begin{bmatrix} -2 & 10 \\ 6 & 4 \end{bmatrix} - \begin{bmatrix} 15 & 0 \\ 6 & 3 \end{bmatrix} \checkmark$ $= \begin{bmatrix} -17 & 10 \\ 0 & 1 \end{bmatrix} \checkmark$	(2)
6.2.3	$\begin{bmatrix} 5 & -3 & 7 \\ 0 & 4 & 1 \end{bmatrix} \checkmark$	(1)
6.2.4	No solution $\checkmark \checkmark$	(2)

Vraag / Question 7

[15 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
7.1.1	$ a  = \sqrt{2^2 + 3^2}$ $= \sqrt{13} \checkmark \checkmark$	(2)
7.1.2	$a \cdot b = -2(4) + 3(2) = -2 \checkmark \checkmark$	(2)
7.1.3	$-2 \checkmark = \frac{\sqrt{13} \cdot \sqrt{4^2 + 2^2} \checkmark \cdot \cos \theta}{2}$ $-\frac{2}{\sqrt{13} \cdot \sqrt{20}} = \cos \theta$ $\theta = 1,70 \checkmark \checkmark$	(4)
7.1.4	$\tan \theta = \frac{2}{4}$ $\theta = 0,46 \checkmark \checkmark$	(2)
7.1.5	$2(-2; 3) - 3(4; 2)$ $= (-4; 6) - (12; 6)$ $= (-16; 0) \checkmark \checkmark$	(2)

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
7.2	$u \cdot v = 0 \checkmark$ $6(-3) + 2(a) \checkmark = 0$ $-18 + 2a = 0$ $2a = 18$ $a = 9 \checkmark$	(3)

**Vraag / Question 8**

**[13 punte / marks]**

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
8.1	$f(x) = 10x^3 - \frac{1}{2}x^2 + 6x + 3$ $f'(x) = 30x^2 \checkmark - x \checkmark + 6 \checkmark$	(3)
8.2	$\frac{d}{dx} \left( \frac{2x^2 + 3x - 4}{x} \right)$ $= \frac{d}{dx} (2x + 3 - 4x^{-1}) \checkmark$ $= 2 \checkmark + \frac{4}{x^2} \checkmark$	(3)
8.3	$y = \frac{6}{\sqrt[3]{x^2}} + \frac{2}{x^4} - x^0$ $y = 6x^{-\frac{2}{3}} + 2x^{-4} - 1 \checkmark$ $y' = -4x^{-\frac{5}{3}} \checkmark - 8x^{-5} \checkmark$	(3)
8.4	$g(x) = \frac{2}{\sqrt[5]{2x^4 - 3x^3 + 7x}}$ $g(x) = 2(2x^4 - 3x^3 + 7x)^{-\frac{1}{5}} \checkmark$ $g'(x) = -\frac{2}{5} \checkmark (2x^4 - 3x^3 + 7x)^{-\frac{6}{5}} \checkmark (8x^3 - 9x^2 + 7) \checkmark$	(4)

Vraag / Question 9

[13 punte / marks]

NR. NO	ANTWOORD / ANSWER	PUNTE / MARKS
9.1	$\int (2x^3 - 4x^2 + 1)dx$ $= \frac{x^4}{2} \checkmark - \frac{4x^3}{3} \checkmark + x \checkmark + c$ $2 = c \checkmark$ $f(x) = \frac{x^4}{2} - \frac{4x^3}{3} + x + 2 \checkmark$	(5)
9.2	$f(x) = g(x)$ $x^3 + x^2 - 3x - 5 = x^3 - 1 \checkmark$ $x^2 - 3x - 4 = 0 \checkmark$ $(x - 4)(x + 1) = 0$ $x = -1; 4 \checkmark$ $A = \int_{-1}^4 (x^3 + x^2 - 3x - 5 - x^3 + 1)dx \checkmark$ $= \int_{-1}^4 (x^2 - 3x - 4)dx \checkmark$ $= \left. \frac{x^3}{3} - \frac{3x^2}{2} - 4x \right _{-1}^4 \checkmark$ $= \left( \frac{(4)^3}{3} - \frac{3(4)^2}{2} - 4(4) \right) - \left( \frac{(-1)^3}{3} - \frac{3(-1)^2}{2} - 4(-1) \right) \checkmark$ $= -20,83$ $\therefore \text{Area} = 20,83 \checkmark$	(8)

- EINDE VAN DIE MEMORANDUM / END OF THE MEMORANDUM -