

α -WISKUNDE/MATHEMATICS

Alpha Wiskunde Graad 10 / *Alpha Mathematics Grade 10*

Finale eksamen 2025 / *Final examination 2025*

MEMORANDUM

Totaal / *Total*: 130 punte / *marks*

Eksaminator / *Examiner*: Marco Botha

Moderator: Annelize Lippert

**Hierdie memorandum bestaan uit 10 bladsye. /
*This memorandum consists of 10 pages.***

Vraag / Question 1

[20 punte / marks]

1.1	A	B	C	D
1.2	A	B	C	D
1.3	A	B	C	D
1.4	A	B	C	D
1.5	A	B	C	D
1.6	A	B	C	D
1.7	A	B	C	D
1.8	A	B	C	D
1.9	A	B	C	D
1.10	A	B	C	D

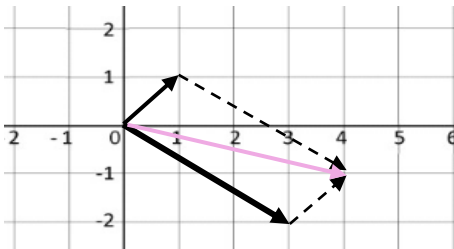
Vraag / Question 1

[20 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
1.1	B $x^2 = -9 \Rightarrow x = \sqrt{9}\sqrt{-1} = \pm 3i$	(2)
1.2	A $s = r\theta \Rightarrow 5\pi = (5)\theta \Rightarrow \theta = \pi$	(2)
1.3	B $b\cos\left(\frac{1}{2}\right) = \frac{\pi}{3}$	(2)
1.4	D $(2)(4) + (-3)(y) = 0 \Rightarrow y = \frac{-8}{-3} = \frac{8}{3}$	(2)
1.5	A $(4)(1) - (-2)(-2) = 4 - 4 = 0$	(2)
1.6	D $\frac{d}{dx}[x^3 + 2x] = 3x^2 + 2$	(2)
1.7	C $\frac{f(x)}{x^2-x} = \frac{f(x)}{x(x-1)} = \frac{A}{x} + \frac{B}{x-1}$	(2)
1.8	B $\frac{6^3}{4} = 15,75 \Rightarrow 15 \text{ res } 3 \Rightarrow i^3 = -i$	(2)
1.9	D $-f(g(1)) = -f(2) = -(2) = -2$	(2)
1.10	D $\int_0^a x^2 dx = \frac{1}{3}$ $\frac{1}{3} = \frac{ax^3}{3} \Big _0^a \Rightarrow \frac{1}{3} = \frac{a}{3} \Rightarrow a = 1$	(2)

Vraag / Question 2

[18 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
2.1	$(2i - 3)^* = -2i\checkmark - 3\checkmark$	(1)
2.2(a)	$\sqrt{-4}(-3i + \sqrt{2})$ $= 2i\checkmark(-3i + \sqrt{2})$ $= -6i^2 + 2\sqrt{2}i$ $= 6\checkmark + 2\sqrt{2}i\checkmark$	(3)
2.2(b)	$(2 + 3i)(1 - 2i)$ $= 2 - 4i + 3i - 6i^2\checkmark$ $= 2 - 4i + 3i - 6(-1)$ $= 2 - 4i + 3i + 6$ $= 8\checkmark - i\checkmark$	(3)
2.2(c)	$\frac{i^5}{1 + 2i} = \frac{i^5}{1 + 2i} \times \frac{1 - 2i}{1 - 2i}\checkmark$ $= \frac{i^5(1 - 2i)}{1^2 - (2i)^2}$ $= \frac{i\checkmark(1 - 2i)}{1 - 4i^2}$ $= \frac{i(1 - 2i)}{1 + 4} = \frac{i + 2}{5}\checkmark\checkmark$ $= \frac{2}{5} + \frac{1}{5}i$	(4)
2.3	$z = x + yi$ $Re(z) = 1$ $\Rightarrow x = 1\checkmark$ $x + y^2 = 5\checkmark$ $(1)^2 + y^2 = 5$ $y = \pm 2\checkmark$	(3)
2.4	$(3 - 2i) + (1 + i)$ 	$1 + i\checkmark$ $3 - 2i\checkmark$ $4 - i\checkmark$ <p>Finale antwoord/ final answer ✓</p> <p>(4)</p>

Vraag / Question 3

[14 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
3.1	$\frac{2x^2 - 3x - 2}{x(x-1)(x+2)} \equiv \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+2} \checkmark$ $2x^2 - 3x - 2 \equiv A(x-1)(x+2) \checkmark + Bx(x+2) \checkmark + Cx(x-1) \checkmark$ $x = 0 \checkmark: -2 = -2A$ $A = 1 \checkmark$ $x = 1 \checkmark: 2 - 3 - 2 = 3B$ $B = -1 \checkmark$ $x = -2 \checkmark: 8 + 6 - 2 = 6C$ $C = \frac{12}{6} = 2 \checkmark$ $\frac{2x^2 - 3x - 2}{x(x-1)(x+2)} \equiv \frac{1}{x} + \frac{-1}{x-1} + \frac{2}{x+2} \checkmark$	(11)
3.2	$\frac{-2x^2 + 5x + 3}{x^3} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3}$ $-2x^2 + 5x + 3 = Ax^2 + Bx + C$ $\therefore A = -2, B = 5, C = 3 \checkmark \checkmark \checkmark$	(3)

Vraag / Question 4

[12 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
4.1(a)	$60^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{3}$	(1)
4.1(b)	$s = r\theta = (30) \left(\frac{\pi}{3}\right) \checkmark = 10\pi = 31,42 \text{ m} \checkmark$	<p style="color: red;">Max 1 if radians not used / Maks 1 indien nie radiale gebruik nie</p> <p>(2)</p>
4.1(c)	$A = \frac{1}{2}r^2\theta$ $= \frac{1}{2}(30)^2 \checkmark \left(\frac{\pi}{3}\right) \checkmark$ $= \frac{900\pi}{6} = 150\pi = 471,24 \text{ m}^2 \checkmark$	(3)
4.1(d)	$\theta = 2 \times \frac{\pi}{3} = \frac{2\pi}{3} \checkmark$ $s = d\theta = 10\pi$ $d \left(\frac{2\pi}{3}\right) = 10\pi$ $\therefore d = 15 \text{ m} \checkmark$	(2)
4.2(a)	$3\sin x + 1 = 4 \checkmark$ $\sin x = 1$ $x = \arcsin(1) \checkmark$ $x = \frac{\pi}{2} \checkmark$	(3)
4.2(b)	<p>Nuwe funksie / New function: $3\sin x - 2$</p> <p>$\therefore (0; -2) \checkmark$</p>	(1)

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
5.1	$\begin{bmatrix} 1 & 1 & -1 \\ 1 & 1 & 0 \\ 4 & 0 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -1 \\ -2 \\ 2 \end{bmatrix} \checkmark$ $\det A = \begin{vmatrix} 1 & 1 & -1 \\ 1 & 1 & 0 \\ 4 & 0 & -2 \end{vmatrix}$ $= 1 \begin{vmatrix} 1 & 0 \\ 0 & -2 \end{vmatrix} \checkmark - \begin{vmatrix} 1 & 0 \\ 4 & -2 \end{vmatrix} \checkmark - \begin{vmatrix} 1 & 1 \\ 4 & 0 \end{vmatrix} \checkmark$ $= -2 + 2 + 4$ $= 4 \checkmark$ $\det A_y = \begin{vmatrix} 1 & -1 & -1 \\ 1 & -2 & 0 \\ 4 & 2 & -2 \end{vmatrix}$ $= 1 \begin{vmatrix} -2 & 0 \\ 2 & -2 \end{vmatrix} + \begin{vmatrix} 1 & 0 \\ 4 & -2 \end{vmatrix} - \begin{vmatrix} 1 & -2 \\ 4 & 2 \end{vmatrix}$ $= 4 - 2 - 10$ $= -8 \checkmark$ $y = \frac{-8}{-4} = 2 \checkmark$	(7)
5.2	$\begin{vmatrix} 1 & a \\ 1 & -2 \end{vmatrix} \checkmark = 0 \checkmark$ $\therefore -2 - a = 0$ $a = -2 \checkmark$	(3)
5.3.1	Indentiteits matriks / Identity Matrix \checkmark	(1)
5.3.2(a)	$A^T = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \checkmark$	(1)
5.3.2(b)	Onmoontlik / Not Possible \checkmark Dimensions not the same / Dimensies nie dieselfde \checkmark (2×1 and / en 2×2)	(2)
5.3.2(c)	$\begin{bmatrix} -1 & 5 \\ 7 & 4 \end{bmatrix} \begin{bmatrix} -1 & 5 \\ 7 & 4 \end{bmatrix}$ $= \begin{bmatrix} (-1)(-1) + (5)(7) & (-1)(5) + (5)(4) \\ (7)(-1) + (4)(7) & (7)(5) + (4)(4) \end{bmatrix}$ $= \begin{bmatrix} 36 \checkmark & 15 \checkmark \\ 21 \checkmark & 51 \checkmark \end{bmatrix}$	(4)
5.3.3(d)	$\begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} -2 \\ 4 \end{bmatrix} = (1)(-2) + (2)(4) = 6 \checkmark \checkmark$	(2)

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
6.1		<p>(0; -1) ✓toe/closed (0; -2) ✓ooploopen (2; 2) ✓ooploopen (3; 5) ✓ooploopen $(-\frac{1}{2}; 0)$ ✓Afsnit/ intercept ✓Vorm/form</p> <p style="text-align: right;">(6)</p>
6.2	$(g \circ f)(2) = g(f(2)) \checkmark = \sqrt{((2) - 2)^3 + 1} = \sqrt{1} = 1 \checkmark$	(2)
6.3	$F(x) = -(x - 1)^3 + 2(x - 1) + 4 \checkmark$ $f(x) = -x^3 + 2x + 4 \checkmark$ $g(x) = x - 1 \checkmark$ OF / OR $F(x) = (x - 1)^3 - 2(1 - x) + 4 \checkmark$ $f(x) = x^3 - 2x + 4 \checkmark$ $g(x) = 1 - x \checkmark$	(3)

Vraag / Question 7

[13 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
7.1(a)	$ a = \sqrt{2^2 + 4^2} = \sqrt{20} = 2\sqrt{5} \checkmark$ $ b = \sqrt{3^2 + 1^2} = \sqrt{10} \checkmark$	(2)
7.1(b)	Eenheidsvektor/Unit vector = $\left(\frac{3}{\sqrt{10}}; \frac{1}{\sqrt{10}}\right) \checkmark$	(1)
7.1(c)	$a \cdot b = (-2)(3) + (4)(1) = -2 \checkmark$ $a \cdot b = a b \cos \theta$ $\theta = \text{bgcos}\left(\frac{-2}{2\sqrt{5}\sqrt{10}}\right) \checkmark$ $\theta = 1,71 \checkmark$	(3)
7.2(a)	$x - 1$ is 'n faktor slegs as / is a factor only if $x = 1$ 'n oplossing / a solution. $g(1) = -(1)^3 + 2(1)^2 + 5(1) - 6 = 0 \checkmark$ $\therefore x = 1$ a solution, so $x - 1$ a factor. \checkmark OF/ OR Langdeling / long division $ \begin{array}{r} -x^2 + x + 6 \checkmark \\ x - 1 \overline{) -x^3 + 2x^2 + 5x - 6} \\ \underline{-x^3 + x^2} \\ x^2 + 5x \\ \underline{x^2 - x} \\ -6x - 6 \\ \underline{-6x - 6} \\ 0 \end{array} $ Geen res/ no residual \therefore 'n faktor / a factor \checkmark	(2)
7.2(b)	Deur inspeksie of deling / By inspection or division: $g(x) = (x - 1)(-x^2 + x + 6) \checkmark\checkmark\checkmark$ $g(x) = (x - 1)(-x^2 + x + 6)$ $= -(x - 1)(x^2 - x - 6)$ $= -(x - 1)(x + 2)(x - 3) \checkmark$ $x = 1$ of / or $x = 2$ - of/or $x = 3 \checkmark$	(5)

Vraag / Question 8

[13 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
8.1(a)	$f(x) = x^4 - 2x^{\frac{1}{3}} + \frac{1}{2}x^{-4} + \pi$ $f'(x) = 4x^{4-1} \checkmark - \frac{2}{3}x^{\frac{1}{3}-1} \checkmark + \frac{1}{2}(-4)x^{-4-1} \checkmark + 0$ <p>OF/OR</p> $f'(x) = 4x^3 \checkmark - \frac{2}{3}x^{-\frac{2}{3}} \checkmark - 2x^{-5} \checkmark + 0$	(3)
8.1(b)	$f(x) = 2(x^2 + 3x - 1)^{-1}$ $f'(x) = -2 \checkmark (x^2 + 3x - 1)^{-2} \checkmark (2x + 3) \checkmark$	(3)
8.2(a)	$\int (3x^{-5} + 1)dx$ $= \frac{3}{-4}x^{-4} \checkmark + x \checkmark + k$	<p>-1 geen konstante/no constant</p> <p>(2)</p>
8.2(b)	$\int \left(\frac{1}{2}x - 5x^{\frac{1}{2}} \right) dx$ $= \frac{\frac{1}{2}x^2}{2} \checkmark - 5 \frac{x^{\frac{3}{2}}}{\frac{3}{2}} \checkmark + k$ <p>OF/OR</p> $= \frac{1}{4}x^2 \checkmark - \frac{10}{3}x^{\frac{3}{2}} \checkmark + k$	(2)
8.3	$\int (2x - 3)dx$ $= x^2 - 3x + k \checkmark$ $\therefore f(x) = x^2 - 3x + k$ $f(0) = (0)^2 - 3(0) + k = 1 \checkmark \text{ (In vervang / substitute)}$ $k = 1$ $\therefore f(x) = x^2 - 3x + 1 \checkmark \text{ (finale Antwoord/ final answer)}$	(3)

Vraag / Question 9

[9 punte / marks]

NR. NO.	ANTWOORD / ANSWER	PUNTE / MARKS
9.1(a)	$\int_0^3 \sqrt{6x+1} dx = \int_0^3 (6x+1)^{\frac{1}{2}} dx$ $= \frac{(6x+1)^{\frac{3}{2}}}{\frac{3}{2}(6)} \Big _0^3$ $= \left(\frac{(6(3)+1)^{\frac{3}{2}}}{\frac{3}{2}(6)} \right) - 0 \checkmark$ $= 9,2 \text{ eenhede}^2 / \text{unit}^2 \checkmark$	(4)
9.1(b)	$V = \pi \int_0^3 (\sqrt{6ax^2+1})^2 dx \checkmark = 57\pi \checkmark$ $\int_0^3 (6ax^2+1) dx = 57$ $\frac{6ax^3}{3} \checkmark + x \checkmark \Big _0^a = 57$ $2a(3)^3 + (3) = 57$ $54a = 54$ $a = 1 \checkmark$	(5)

- EINDE VAN DIE MEMORANDUM / END OF THE MEMORANDUM -