α-MATHEMATICS

Alpha Wiskunde Graad 10 / *Alpha Mathematics Grade 10*

Finale Eksamen 2023 / *Final Examination 2023*

MEMORANDUM

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

Eksaminator / *Examiner*: Lanice Liebenberg
Moderator: Rika Grobler

Hierdie memorandum bestaan uit 8 bladsye. /
This memorandum consists of 8 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* 2 **[16 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
2.1	$a + b$ $= 6 + 3i$ ✓✓	**(2)**
2.2	$2a.3b$ $= 2(2 - 3i).3(4 + 6i)$ ✓ $= (4 - 6i)(12 + 18i)$ ✓ $= 48 + 72i - 72i - 108i^2$ ✓ $= 156$ ✓	**(4)**
2.3	$i^{51}.a^2b$ $= -i(2 - 3i)^2(4 + 6i)$ ✓ $= -i(4 - 12i + 9)(4 + 6i)$ ✓ $= -i(-5 - 12i)(4 + 6i)$ $= -i(-20 - 30i - 48i + 72)$ ✓ $= 20i + 30i^2 + 48i^2 - 72i$ $= -78 - 52i$ ✓✓	**(5)**
2.4	$\frac{a}{b}$ $= \frac{2 - 3i}{4 + 6i} \times \frac{4 - 6i}{4 - 6i}$ ✓ $= \frac{-10 - 24i}{16 - 36i^2}$ ✓ $= \frac{-10 - 24i}{16 + 36}$ ✓ $= -\frac{5}{26}$ ✓$- \frac{6}{13}i$ ✓	**(5)**

Vraag / *Question* 3 **[12 punte / *marks*]**

ANTWOORD / *ANSWER*	**PUNTE / *MARKS***
$\frac{-8x-20}{(x^2-4)(x+1)} = \frac{-8x}{(x+2)(x-2)(x+1)}$ ✓$= \frac{A}{x+2} + \frac{B}{x-2} + \frac{C}{x+1}$ ✓ $-8x-20 = A(x-2)(x+1) + B(x+2)(x+1) + C(x+2)(x-2)$ ✓ $x = 2$ ✓ $-36 = 12B$ $B = -3$ ✓ $x = -2$ ✓ $-4 = 4A$ $A = -1$ ✓ $x = -1$ ✓ $-12 = -3C$ $C = 4$ ✓ $\frac{-8x-20}{(x^2-4)(x+1)} = \frac{-1}{x+2}$ ✓$- \frac{3}{x-2}$ ✓$+ \frac{4}{x+1}$ ✓	**(12)**

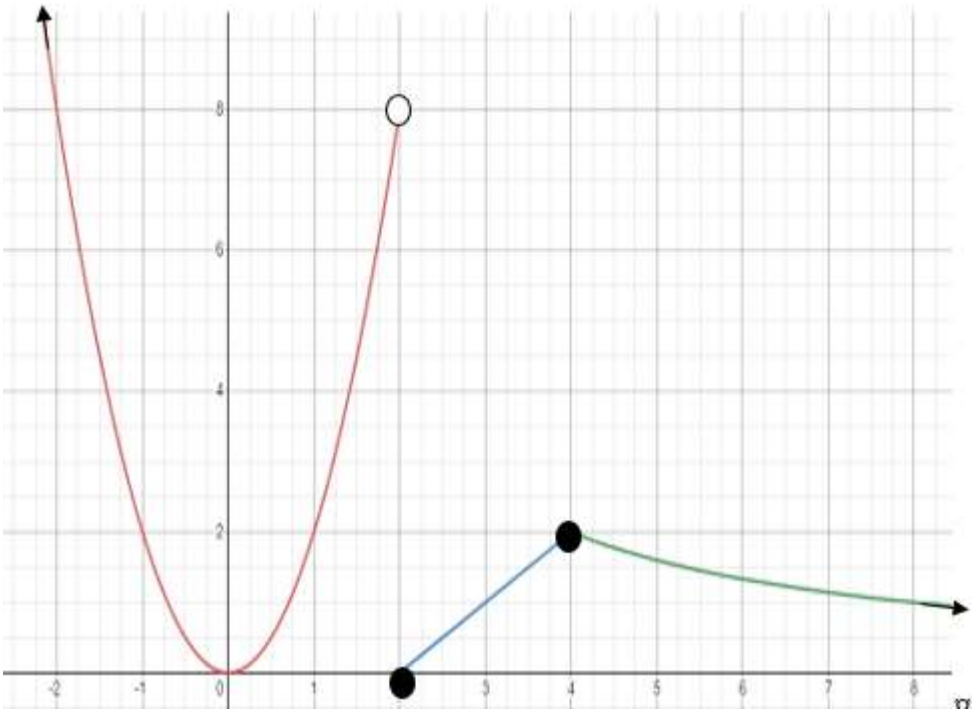
Vraag / *Question* 4 **[11 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
$2x - y + 3z = 6$ $4x - 2y + z = 1$ $x + y + z = 3$ $\begin{bmatrix}2 & -1 & 3\\4 & -2 & 1\\1 & 1 & 1\end{bmatrix}\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}6\\1\\3\end{bmatrix}$ ✓✓ $\begin{vmatrix}2 & -1 & 3\\4 & -2 & 1\\1 & 1 & 1\end{vmatrix} = 2\begin{vmatrix}-2 & 1\\1 & 1\end{vmatrix} + \begin{vmatrix}4 & 1\\1 & 1\end{vmatrix} + 3\begin{vmatrix}4 & -2\\1 & 1\end{vmatrix}$ ✓ $= 2(-2-1) + (4-1) + 3(4+2)$ ✓ $= 15$ ✓✓ $\begin{vmatrix}6 & -1 & 3\\1 & -2 & 1\\3 & 1 & 1\end{vmatrix} = 6\begin{vmatrix}-2 & 1\\1 & 1\end{vmatrix} + \begin{vmatrix}1 & 1\\3 & 1\end{vmatrix} + 3\begin{vmatrix}1 & -2\\3 & 1\end{vmatrix}$ ✓ $= 6(-2-1) + (1-3) + 3(1+6)$ ✓ $= 1$ ✓✓ $x = \frac{1}{15}$ ✓	

Vraag / *Question* 5 **[18 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
5.1.1	$\|a\| = \sqrt{3^2 + 8^2}$ ✓ $= \sqrt{73}$ ✓ Unit vector is: $\left(\frac{3}{\sqrt{73}}; \frac{8}{\sqrt{73}}\right)$ ✓	**(3)**
5.1.2	$a.b = -5$ ✓ -5 ✓ $= \sqrt{73}.\sqrt{2}\cos\theta$ ✓ $\theta \approx 2$ ✓✓	**(5)**
5.2.1	$v.u = 0$ ✓✓	**(2)**
5.2.2	The vectors are perpendicular. / Die vektore is loodreg op mekaar. ✓✓	**(2)**
5.2.3	$\frac{\pi}{2}$ ✓✓	**(2)**
5.2.4	$6v + 2u$ $= (-84; -84)$ ✓ $+ (4; -4)$ ✓ $= (-80; -88)$ ✓✓	**(4)**

Vraag / *Question* 6 **[20 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
6.1		**(7)** **One mark for each end point** ✓✓✓✓✓ **One mark for shape** ✓✓

6.2	$F(x) = \frac{2}{x+1} - \sqrt[3]{2+x-1} + x + 1$ $f(x) = \frac{2}{x} - \sqrt[3]{x} + x$ ✓✓ $g(x) = x + 1$ ✓	**(3)**
6.3.1	$(f \circ g)(x) = 2\left(\sqrt{x^2+9}\right)^2$ ✓ $- \sqrt{x^2+9}$ ✓ $+ 1$ ✓ $= 2x^2 + 19 - \sqrt{x^2+9}$ ✓	**(4)**
6.3.2	$(f \circ g)(-4) = 2(-4)^2 + 19 - \sqrt{(-4)^2+9}$ ✓ $= 46$ ✓	**(2)**
6.3.3	$(g \circ f)(x) = \sqrt{(2x^2 - x + 1)^2 + 9}$ ✓✓	**(2)**
6.3.4	$(f \circ f)(x) = 2(2x^2 - x + 1)^2 - (2x^2 - x + 1) + 1$ ✓✓	**(2)**

Vraag / *Question* 7 **[14 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
7.1.1	$f'(x) = 15x^4$ ✓ $- 21x^2$ ✓ $+ \frac{1}{2}x^{-\frac{3}{2}}$ ✓ $+ 25x^{-6}$ ✓	**(4)**
7.1.2	$\int \left(3x^5 - 7x^3 + 2x^{\frac{1}{4}} - 5x^{-5}\text{ ✓}\right) dx$ $= \frac{x^6\text{ ✓}}{2} - \frac{7x^4\text{ ✓}}{4} + \frac{8x^{\frac{5}{4}}\text{ ✓}}{5} + \frac{5x^{-4}\text{ ✓}}{4} + c$	**(5)**
7.2	$\mathrm{V} = \pi \int_0^3 [(2x+3)^4]^2 \ dx$ $= \pi \int_0^3 (2x+3)^8 dx$ ✓ $= \pi \left(\frac{(2x+3)^9}{9(2)}\right)\Big\vert_0^3$ ✓✓ $= 67\,614\,195{,}9\ units^2$ ✓✓	**(5)**

Vraag / *Question* 8 **[9 punte / *marks*]**

NR. NO	ANTWOORD / *ANSWER*	PUNTE / *MARKS*
8.1	$f(-2) = 0$ $x = -2$ ✓✓	**(2)**
8.2	$(x + 2)$ ✓✓	**(2)**
8.3	$x \quad +2 \;\big|\; x^2 \quad +x \quad -12$ $x^3 \quad 3x^2 \quad -10x \quad -24$ $-x^3 \quad -2x^2$ $x^2 \quad -10x \quad -24$ $-x^2 \quad -2x$ $-12x \quad -24$ $12x \quad +24$ 0 $x^2 + x - 12$ ✓✓✓	**(3)**
8.4	$(x + 2)(x^2 + x - 12) = 0$ $(x + 2)(x + 4)(x - 3) = 0$ ✓ $x = -4\,;\, -2\,;\, 3$ ✓	**(2)**

- EINDE VAN DIE MEMORANDUM / *END OF THE MEMORANDUM* -