α-WISKUNDE/ MATHEMATICS

Maart/ March 2023
Graad/ Grade 12

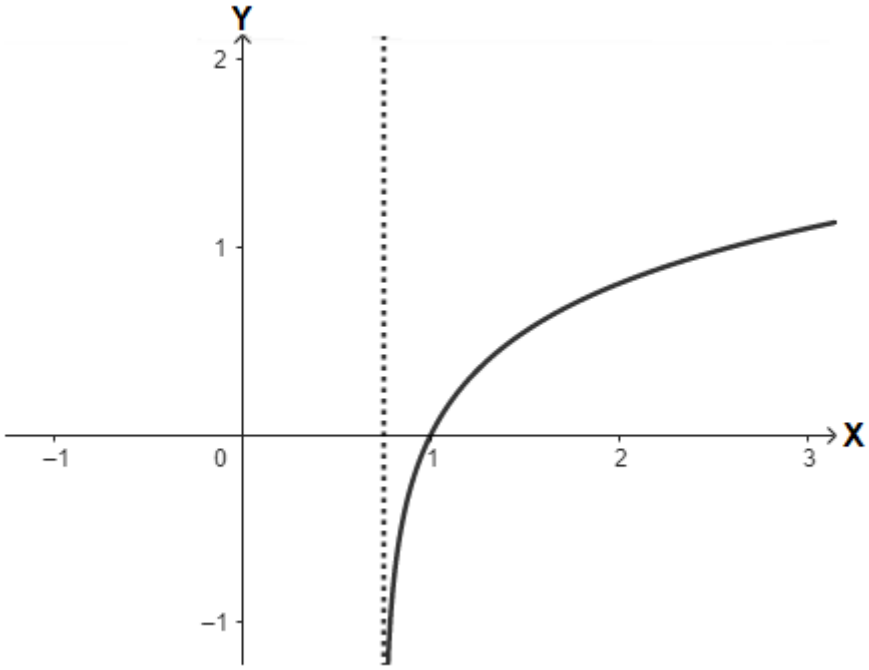
Tyd/ Time: 1 uur/ *hour*
Totaal/ Total: 70 PUNTE/ *MARKS*

VRAAG/ *QUESTION* 1 [14 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**

VRAAG/ *QUESTION* 2 [18 PUNTE/ *MARKS*]

2.1 (a)	$P(5)$✓ $= 25 + 230e^{-0.1(5)}$✓ $= 164{,}50\ ^\circ C$✓	1: Vervang/ *Substitute* 1: Vereenvoudig/ *Simplify* 1:Antwoord/ *Answer* **[3]**
(b)	$80 = 25 + 230e^{-0.1t}$✓ $\therefore -0{,}1t = \ln\left(\frac{11}{46}\right)$✓ $\therefore t = 14{,}31$ min✓	1: Vervang/ *Substitute* 1: Vereenvoudig/ *Simplify* 1:Antwoord/ *Answer* **[3]**

2.2 (a)	$x = \frac{\ln(4y-3)}{2}$ ✓ $\therefore e^{2x} = 4y - 3$ ✓ $\therefore f^{-1}(x) = \frac{e^{2x}+3}{4}$ ✓	1: Ruile x en y/ *Swop x and y* 1: e 1: Antwoord/ *Answer* **[3]**
(b)	✓ x-afsnit/*intercept*: $0 = \frac{\ln(4x-3)}{2}$ $x = 1$ ✓ y-afsnit/*intercept*: $y = \frac{\ln(4(0)-3)}{2}$ ✓ Geen oplossing/ *no solution* $\therefore$ geen y-afsnit/*no y intercept* ✓	1: $x = 0$ 1: Antwoord/ *Answer* 1: y= 0 1: Antwoord/ *Answer* **[4]**
(c)	Vertikaal/ *vertical* ✓ $4x - 3 = 0 \therefore x = \frac{3}{4}$ ✓	1: Vertikaal/ *vertical* 1: Antwoord/ *Answer* **[2]**
(d)		1: asimptoot*asymptote* 1: x-afsnit/*intercept* 1:vorm/*form* **[3]**

VRAAG/ *QUESTION* 3 [18 PUNTE/ *MARKS*]

3.1	✓ ✓ ✓ ✓ ✓ $\frac{dy}{dx} = 3^{\sin(e^{2x})}.\ln 3.\cos(e^{2x}).e^{2x}.2$	1:$3^{\sin(e^{2x})}$ 1:$\ln 3$ 1:$\cos(e^{2x})$ 1:e^{2x} 1: 2 **[5]**
3.2	✓ ✓ ✓ ✓ $f'(x) = 7[\log_4(\tan(3x))]^6 \left[\frac{\sec^2(3x).3}{\tan(3x).\ln 4}\right]$ ✓ ✓	1: 7 1:$[\log_4(\tan x)]^6$ 1:$\sec^2(3x)$ 1: 3 1: $\tan x$ 1:$\ln 4$ **[6]**
3.3	✓ ✓ $\frac{2^{3x}}{3\ln 2} + x^3 + k$ ✓ ✓	1: 2^{3x} 1: 3 1: $\ln 2$ 1: x^3 **[4]**
3.4	✓ ✓ ✓ $x\ln 5 + \ln(-x-1) + k$	1: $x\ln 5$ 1: + 1:$\ln(-x-1)$ **[3]**

VRAAG/ *QUESTION* 4 [20 PUNTE/ *MARKS*]

4.1 (a)	✓ ✓ $a = 2\left(\cos\left(\frac{2\pi}{3}\right) + i\sin\left(\frac{2\pi}{3}\right)\right)$ ✓ ✓ $b = \sqrt{2}\left(\cos\left(\frac{-\pi}{4}\right) + i\sin\left(\frac{-\pi}{4}\right)\right)$ OF/*OR* $b = \sqrt{2}\left(\cos\left(\frac{7\pi}{4}\right) + i\sin\left(\frac{7\pi}{4}\right)\right)$	1:2 1: $\frac{2\pi}{3}$ 1: $\sqrt{2}$ 1: $\frac{-\pi}{4}$ OF/*OR* $\frac{7\pi}{4}$ **[4]**
(b)	✓ ✓ $b^4 = 4(\cos(-\pi) + i\sin(-\pi))$ $= 4(-1+0i)$✓ $= -4$✓ OF/*OR* ✓ ✓ $b^4 = 4(\cos(7\pi) + i\sin(7\pi))$ $= 4(-1+0i)$✓ $= -4$✓	1:4 1:$-\pi$ OF/*OR* 7π 1:Vereenvoudig/ *Simplify* 1: Antwoord **[4]**

(c)	$a = 2\text{cis}\left(\frac{2\pi}{3}\right) = 2\text{cis}\left(\frac{8\pi}{3}\right) = 2\text{cis}\left(\frac{14\pi}{3}\right)$ ✓ ✓ ✓ ✓ $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{2\pi}{9}\right)$ en/*and* $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{8\pi}{9}\right)$ en/*and* $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{14\pi}{9}\right)$ ✓ OF/*OR* $\sqrt[3]{a} = \sqrt[3]{r}\text{cis}\left(\frac{\frac{2\pi}{3}+2k\pi}{3}\right), k = 0,1,2$ ✓ ✓ ✓ ✓ $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{2\pi}{9}\right)$ en/*and* $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{8\pi}{9}\right)$ en/*and* $\sqrt[3]{a} = \sqrt[3]{2}\text{cis}\left(\frac{14\pi}{9}\right)$ ✓	1:a 1:$\sqrt[3]{2}$ 3:Drie antwoorde/ *Three answers* 1: Formule/ Formula 1:$\sqrt[3]{2}$ 3:Drie antwoorde/ *Three answers* **[5]**
4.2	✓ ✓ ✓ ✓ ✓ $\frac{1}{y+1}.\frac{dy}{dx} = e^y.\frac{dy}{dx} + 1$ $\therefore \frac{dy}{dx} = \frac{1✓}{\frac{1}{y+1} - e^y✓}$	1: $\frac{1}{y+1}$ 1:$\frac{dy}{dx}$ 1:e^y 1: $\frac{dy}{dx}$ 1: 1 1: 1 1: $\frac{1}{y+1} - e^y$ **[7]**