



# higher education & training

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Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

## **NASIENRIGLYN**

### **NASIONALE SERTIFIKAAT**

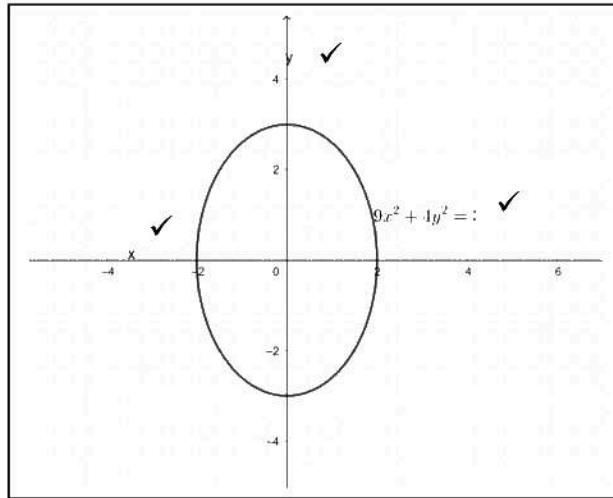
### **WISKUNDE N4**

**26 Maart 2026**

**Hierdie nasienriglyn bestaan uit 7 bladsye.**

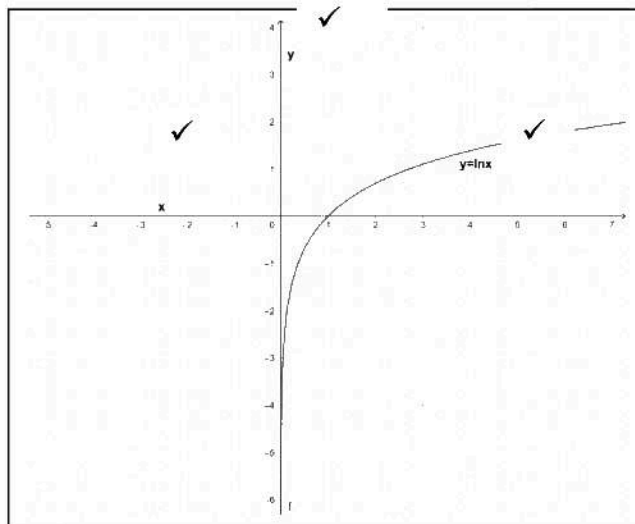
## VRAAG 1

1.1



(3)

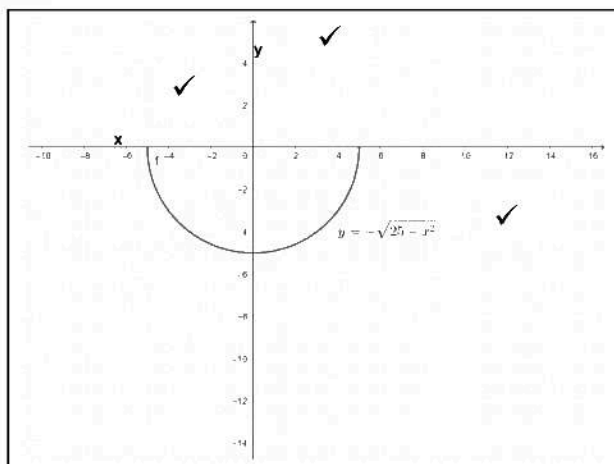
1.2



$x > 0$  ✓

(4)

1.3



(3)

## VRAAG 2

2.1  $5x - 15 + 3y + 12 = 105$  and  $2x + 4 - 7y + 42 = -42$   
 $5x = 3y = 108$  and  $2x - 7y = -88$  ✓✓

$$\Delta_0 = \begin{vmatrix} 5 & 3 \\ 2 & -7 \end{vmatrix} = -35 - 6 = -41 \quad \checkmark\checkmark$$

$$\Delta_x = \begin{vmatrix} 104 & 1 \\ -50 & -1 \end{vmatrix} = -756 + 264 = -492 \quad \checkmark$$

$$\Delta_y = \begin{vmatrix} 5 & 108 \\ 2 & -88 \end{vmatrix} = -440 - 216 = -656 \quad \checkmark$$

$$x = \frac{\Delta_x}{\Delta_0} = \frac{-492}{-41} = 12 \quad \checkmark$$

$$y = \frac{\Delta_y}{\Delta_0} = \frac{-656}{-41} = 16 \quad \boxed{\checkmark}$$

(8)

2.2  $\begin{vmatrix} 3 & 2 & 5 \\ 4 & 7 & 9 \\ 1 & 8 & 6 \end{vmatrix}$

2.2.1  $\Delta_0 = 3 \begin{vmatrix} 7 & 9 \\ 8 & 6 \end{vmatrix} - 2 \begin{vmatrix} 4 & 9 \\ 1 & 6 \end{vmatrix} + 5 \begin{vmatrix} 4 & 7 \\ 1 & 8 \end{vmatrix} \quad \checkmark$   
 $= 3(42 - 72) - 2(24 - 9) + 5(32 - 7) \quad \checkmark$   
 $= 5 \quad \checkmark$

(3)

2.2.2  $(-1)^5 \begin{vmatrix} 3 & 5 \\ 4 & 9 \end{vmatrix} \quad \checkmark$   
 $= -(27 - 20) \quad \checkmark$   
 $= -7 \quad \checkmark$

(3)

2.3  $(5 \sqrt[3]{126^0 - 72^0})^3 \quad \checkmark$   
 $= (5 \sqrt[3]{54^0})^3 \quad \checkmark$   
 $= 5^3 \sqrt[3]{54 \times 3} \quad \checkmark$   
 $= 125 \sqrt[3]{162^0} \quad \checkmark$   
 $= 125(\cos 162^0 + i \sin 162^0) \quad \checkmark$   
 $= -118,88 + i38,63 \quad \checkmark$

(6)

### VRAAG 3

3.1  $3 \sin^2 \varphi - 4 \sin \varphi - 5 = 0$

$$\begin{aligned}\sin \varphi &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\ &= \frac{-(-4) \pm \sqrt{(-4)^2 - 4(3)(-5)}}{2(3)} \quad \checkmark \\ &= \frac{4 \pm \sqrt{76}}{6} \quad \checkmark\end{aligned}$$

$$\sin \varphi = \frac{4 + 8,718}{6} \quad \text{or} \quad \sin \varphi = \frac{4 - 8,718}{6}$$

$$\sin \varphi = 2,119 \quad \text{or} \quad \sin \varphi = -0,786$$

$$\begin{aligned}\varphi &= \sin^{-1}(2,119) \quad \text{or} \quad \varphi = \sin^{-1}(0,786) \\ &= \text{undefine} \quad \checkmark \quad \text{or} \quad \varphi = 51,813 \quad \checkmark\end{aligned}$$

$$3\text{rd quadrant } \varphi = 231,813^0 \quad \text{and 4th quadrant } \varphi = 308,187^0 \quad \checkmark$$

$$\text{G.S } \{231,813^0; 308,187^0\} \quad \checkmark$$

(6)

3.2

$$\begin{aligned}&\frac{1}{\sin x} + \frac{\cos x}{\sin x} \\ &= \frac{\sin x}{\sin x} + \sin x \quad \checkmark \\ &\frac{1 + \cos x}{\sin x}\end{aligned}$$

$$\begin{aligned}&= \frac{1 + \cos x}{\sin x} \quad \checkmark \\ &= \frac{\cos x}{\sin x} \times \frac{\cos x}{\sin x(1 + \cos x)} \quad \checkmark \\ &= \cot x \quad \checkmark\end{aligned}$$

(4)

3.3

$$\begin{aligned}\frac{1}{\sec 2\theta} &= \cos 2\theta \quad \checkmark \\ &= \cos(\theta + \theta) \\ &= \cos \theta \cdot \cos \theta - \sin \theta \cdot \sin \theta \quad \checkmark \\ &= \cos^2 \theta - \sin^2 \theta \quad \checkmark \\ &= 1 - \sin^2 \theta - \sin^2 \theta \\ &= 1 - 2\sin^2 \theta \quad \checkmark\end{aligned}$$

(4)

3.4

$$\begin{aligned}
 LHS &= \frac{\cos^2 x - \cos x - \sin^2 x}{2 \sin x \cos x + \sin x} \\
 &= \frac{\cos^2 x - \cos x - (1 - \cos^2 x)}{2 \sin x \cos x + \sin x} \quad \checkmark \\
 &= \frac{2 \cos^2 x - \cos x - 1}{2 \sin x \cos x + \sin x} \quad \checkmark \\
 &= \frac{(2 \cos x + 1)(\cos x - 1)}{\sin x(2 \cos x + 1)} \quad \checkmark \\
 &= \frac{\cos x - 1}{\sin x} \quad \checkmark \\
 &= \frac{\cos x}{\sin x} - \frac{1}{\sin x} \quad \checkmark \\
 &= \cot x - \operatorname{cosec} x \quad \checkmark \\
 &= \text{RHS}
 \end{aligned}$$

(6)

#### VRAAG 4

4.1

$$\begin{aligned}
 (x + 2y)^7 &= x^7 + \frac{7x^6(2y)}{1!} + \frac{7(6)x^5(2y)^2}{2!} + \frac{7(6)(5)x^4(2y)^3}{3!} \\
 &= x^7 + 14x^6y + 84x^5y^2 + 280x^4y^3 \quad \checkmark \checkmark \checkmark \checkmark
 \end{aligned}$$

(4)

4.2

$$\begin{aligned}
 \lim_{x \rightarrow \frac{1}{2}} \left( \frac{2x^2 + x - 1}{2x^2 - x} \right) \\
 &= \frac{(2x - 1)(x + 1)}{x(2x - 1)} \quad \checkmark \checkmark \\
 &= \frac{x + 1}{x} \quad \checkmark \\
 &= 3 \quad \checkmark
 \end{aligned}$$

(4)

4.3

$$\begin{aligned}
 y &= \sqrt[3]{x^2 - 1} = u^{\frac{1}{3}} & u &= x^2 - 1 \\
 \frac{dy}{du} &= \frac{1}{3} u^{-\frac{2}{3}} \quad \checkmark & \frac{du}{dx} &= 2x \quad \checkmark \\
 \therefore \frac{dy}{dx} &= \frac{dy}{du} \times \frac{du}{dx} \\
 &= \frac{1}{3} u^{-\frac{2}{3}} \times 2x \quad \checkmark \\
 &= \frac{2x}{3\sqrt[3]{(x^2 - 1)^2}} \quad \checkmark
 \end{aligned}$$

(4)

4.4

$$\frac{dy}{dx} = \frac{(-\sin x) \cdot 3 \ln x - \cos x \cdot \frac{3}{x}}{(3 \ln x)^2} \quad (4)$$

4.5

$$4.5. \frac{dy}{dx} = 2 \sec x \cdot \tan x + 8 \operatorname{cosec} 2x \cdot \cot 2x + \frac{6}{x} + 4 \cdot 5^{4x} \cdot \ln 5 + 2 \sec^2 x - \frac{9}{2} x^{-\frac{5}{2}} + 0 - \frac{1}{4} e^x + 3x^2 \quad (9)$$

[25]

## VRAAG 5

5.1

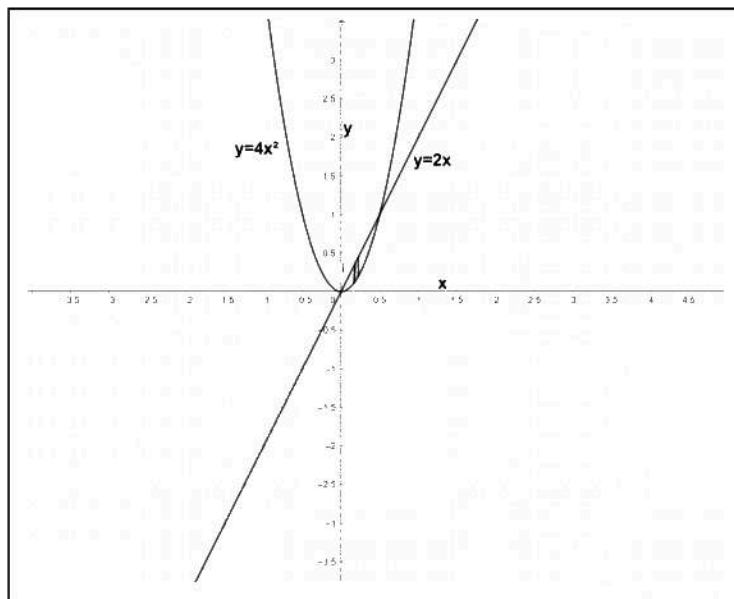
$$\begin{aligned} \int_0^{\frac{\pi}{2}} \frac{2 \sin x \cdot \cos x}{\cos x} dx & \checkmark \\ &= \int_0^{\frac{\pi}{2}} 2 \sin x dx \checkmark \\ &= 2[-\cos x]_0^{\frac{\pi}{2}} \checkmark \\ &= 2\left[-\cos \frac{\pi}{2} - (-\cos 0)\right] \checkmark \\ &= 2 \checkmark \end{aligned} \quad (5)$$

5.2

$$\begin{aligned} \int (3 \tan x + \pi \cdot \frac{1}{x} + 7) dx & \checkmark \checkmark \\ &= 3 \ln \sec x + \pi \ln x + 7x + c \checkmark \end{aligned} \quad (6)$$

5.3

$$\begin{aligned} 5.3.1 \quad 4x^2 &= 2x \\ 4x^2 - 2x &= 0 \\ 2x(2x - 1) &= 0 \\ x = 0 \quad \text{or} \quad x &= 0,5 \\ y = 0 \quad \text{or} \quad y &= 1 \\ (0,0) \quad \text{and} \quad (0,5;1) \end{aligned}$$



- ✓✓ vir elke grafiek
- ✓✓ vir elke koördinator
- ✓ vir die strook
- ✓ vir die gebied

(6)

5.3.2

$$\begin{aligned}
 A_x &= \int_{x_1}^{x_2} (y_2 - y_1) dx \\
 &= \int_0^{0.5} (2x - 4x^2) dx \quad \checkmark \\
 &= \left[ \frac{2x^2}{2} - \frac{4x^3}{3} \right]_0^{0.5} \quad \checkmark \\
 &= \frac{2(0.5)^2}{2} - \frac{4(0.5)^3}{3} - \left( \frac{2(0)^2}{2} - \frac{4(0)^3}{3} \right) \quad \checkmark \\
 &= \frac{1}{12} / 0,083u^2 \quad \checkmark
 \end{aligned}$$

(4)

5.4

$$= 6 \sin \frac{1}{2} x + a^{-x} \cdot \ln a + \frac{3}{2} x^{\frac{2}{3}} + c$$

(4)

[25]

**TOTAAL: 100**