



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN **NASIONALE SERTIFIKAAT**

WISKUNDE N3
31 Maart 2025

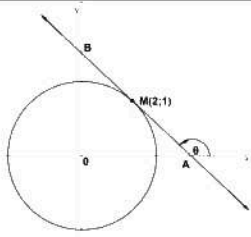
Hierdie nasienriglyn bestaan uit 11 bladsye.

NASIENLEGENDE	
SIMBOOL	VERDUIDELIKING VAN SIMBOOL

VRAAG 1		NASIENINSTRUKSIES	
1.1	$2a^2(a-b) + a(a-b) - 15(a-b)$ $= (a-b)(2a^2 + a - 15)$ $= (a-b)(2a-5)(a+3) \quad \checkmark$	1 M vir elke korrekte faktor	(3)
1.2	$f(x) = 8x^3 - ax^2 + 4x + 3$ $R = f\left(\frac{1}{2}\right) = 8\left(\frac{1}{2}\right)^3 - a\left(\frac{1}{2}\right)^2 + 4\left(\frac{1}{2}\right) + 3 \quad \checkmark$ $= 8 \times \frac{1}{8} - \frac{a}{4} + 2 + 3$ $= 1 - \frac{a}{4} + 5$ $= 6 - \frac{a}{4} \quad \checkmark$ $\therefore -5 = 6 - \frac{a}{4} \quad \checkmark$ $\therefore \frac{a}{4} = 6 + 5$ $\therefore \frac{a}{4} = 11 \quad \checkmark$ $\therefore a = 44 \quad \checkmark$	1 M vir die vervanging van x deur $\frac{1}{2}$ in gegewe funksie $\frac{1}{2}$ M vereenvoudiging 1 M vir die vorming van 'n vergelyking om op te los vir a $\frac{1}{2}$ M Oplossing 1 M vir die vind van a	(4)
1.3	$\frac{x-y}{x+y} \div \frac{x^2-2xy+y^2}{4x^2-y^2} \times \frac{x^2-y^2}{2x-y}$ $= \frac{x-y}{x+y} \times \frac{4x^2-y^2}{x^2-2xy+y^2} \times \frac{x^2-y^2}{2x-y} \quad \checkmark$ $= \frac{x-y}{x+y} \times \frac{(2x+y)(2x-y)}{(x-y)(x-y)} \times \frac{(x-y)(x+y)}{2x-y} \quad \checkmark$ $= 2x + y \quad \checkmark$	$\frac{1}{2}$ punt vir verandering van $\div$ teken na $\times$ teken $\frac{1}{2}$ punt vir resiproke 1 M elk vir die faktoriserings van die tellers en die noemer 1 M vir antwoord	(5)
1.4	$2a^2 - 12a - 14 = 0$ $\therefore a^2 - 6a - 7 = 0 \quad \checkmark$ $\therefore a^2 - 6a = 7$ $\therefore a^2 - 6a + 9 = 7 + 9 \quad \checkmark$ $\therefore (a-3)^2 = 16 \quad \checkmark$ $\therefore a-3 = \pm 4 \quad \checkmark$ $\therefore a = 3 \pm 4$ $\therefore a = 7 \text{ or } a = -1 \quad \checkmark \quad \checkmark$	1 M – deel beide kante van die vergelyking deur die koëffisiënt van x 1 M – voeg $\left(\frac{1}{2}\right)$ maal die koëffisiënt van x by aan beide kante van die vergelyking 1 M skryf die LK as 'n perfekte vierkantige trinomiaal 1 M bepaal die vierkantswortels van beide kante van die vergelyking met behulp van $\pm$ 1 M elk – los die vergelykings vir x c	

VRAAG 2			
		<u>NASIENINSTRUKSIES</u>	
2.1	$\frac{5^{2x+1} + (25)^x}{(5^x)^2}$ $= \frac{5^{2x+1} + (5^2)^x}{5^{2x}}$ $= \frac{\sqrt[5]{5^{2x}} \cdot 5^1 + 5^{2x}}{5^{2x}}$ $= \frac{5^{2x}(5+1)}{5^{2x}} \checkmark$ $= 6 \checkmark$	1 M ($\frac{1}{2}$ M + $\frac{1}{2}$ M) vir die verhoging van die terme tot magte en skeiding van eksponent 1 M deur die gemeenskaplike faktor uit te haal 1 M vir antwoord	(3)
2.2	$2 = 10^{0,301} \quad \log 3 = 0,477$ $\therefore \log 2 = 0,301 \text{ en } \log 3 = 0,477$ $\therefore \log 24 = \log (8 \times 3) \checkmark$ $= \log 8 + \log 3$ $= \log 2^3 + \log 3 \checkmark$ $= 3 \log 2 + \log 3 \checkmark$ $= 3(0,301) + 0,477 \checkmark$ $= 0,903 + 0,477$ $= 1,38 \checkmark$	1 M vir die verdeling van die logaritme 2 M vir die toepassing van die logaritmiese wet 1 M vir die vervanging van die logaritmes met die gegewe waardes. 1 M vir antwoord	(5)
2.3	$\sqrt{8x} - 2x = 1$ $\sqrt{8x} = 2x + 1 \checkmark$ $(\sqrt{8x})^2 = (2x + 1)^2 \checkmark$ $8x = 4x^2 + 4x + 1$ $4x^2 - 4x + 1 = 0$ $(2x - 1)(2x - 1) = 0 \checkmark$ $\checkmark$ $\therefore x = \frac{1}{2} \text{ of } x = \frac{1}{2} \checkmark$	1 M om die wortel te isoleer 1 M vir die verheffing van beide kante tot die mag van 2 om die wortelvorm te kanselleer 1 M vir die oplossing van die vergelyking 1 M elk vir antwoord	(5)
			[13]

VRAAG 3				
			<u>NASIEN- INSTRUKSIES</u>	
3.1	$\log\left(\frac{AB^a}{D}\right) = 0$ $\therefore \log AB^a - \log D = 0 \quad \checkmark$ $\therefore \log AB^a = \log D$ $\therefore \log A + \log B^a = \log D \quad \checkmark$ $\therefore a \log B = \log D - \log A$ $a = \frac{\log D - \log A}{\log B} \quad \checkmark$ Of $a = \frac{\log \frac{D}{A}}{\log B}$		1 M vir die toepassing van logaritmiese wette 1 M vir die toepassing van logaritmiese wette 1 M vir die manipulering van a	(3)
.2	Laat die getalle x en y wees $\therefore 3(x - y) = 30 \quad \checkmark$ en $\therefore \frac{1}{4}(x + y) = 16 \quad \checkmark$ $\therefore x - y = 10 \dots \dots (1) \quad \checkmark$ en $\therefore x + y = 64 \dots \dots (2) \quad \checkmark$ Add : (1) and (2) Tel (1) en (2) bymekaar $x - y = 10$ $x + y = 64$ $2x = 74$ $\therefore x = 37 \quad \checkmark$ Substitute $x = 37$ in... (1) $\therefore 37 - y = 10$ Vervang $x = 37$ in (1) $-y = -27$ $y = 27 \quad \checkmark$ $\therefore$ Die getalle is 27 en 37	<u>Alternatiewe antwoord</u> $3(x - y) = 30 \quad \checkmark$ $\frac{1}{4}(x + y) = 16 \quad \checkmark$ $\therefore x - y = 10 \dots \dots (1) \quad \checkmark$ $x + y = 64 \dots \dots (2) \quad \checkmark$ Van (1): $x = y + 10 \dots \dots (3)$ Van (2) en (3): $y + 10 + y = 64$ $\therefore 2y = 54$ $\therefore y = 27 \quad \checkmark$ Van (3): $x = 27 + 10$ $\therefore x = 37 \quad \checkmark$	1 M elk vir die formulering van die 2 vergelykings 2 M vir vereenvoudiging 1 M elk vir x en y	(6)
				[9]

VRAAG 4		NASIENINSTRUKSIES	
			
4.1.	$x^2 + y^2 = r^2$ $\therefore (2)^2 + (1)^2 = r^2$ $\therefore 4 + 1 = r^2$ ✓ $\therefore r^2 = 5$ $\therefore x^2 + y^2 = 5$ ✓	1 M SF 1 A	(2)
4.2	$M_{OM} = \frac{1}{2}$ ✓	1 A	(1)
4.3	$M_{OM} \times M_{BA} = -1$ ($BA \perp OM$) $\therefore \frac{1}{2} \times M_{BA} = -1$ ✓ $\therefore M_{BA} = -2$ ✓ $\therefore y - y_1 = m(x - x_1)$ $\therefore y - 1 = -2(x - 2)$ ✓ $\therefore y - 1 = -2x + 4$ $\therefore y = -2x + 5$ ✓	1 M M 1 M CA (dra fout van 4.2) 1 M SF 1 M A	(4)
4.4	Die vergelyking van lyn AB is $y = -2x + 5$ x - afsnit: Laat $y = 0$ $\therefore 2x = 5$ $\therefore x = \frac{5}{2} = 2,5$ $\therefore$ Koördinate van A: $(\frac{5}{2}; 0)$ ✓ Koördinate van B: $(0; 5)$ ✓	1 M CA (dra fout van 4.3) 1 M A	(2)
4.5	Oppervlakte van $\triangle AOB = \frac{1}{2} \times \text{basis} \times \text{hoogte}$ $= \frac{1}{2} \times \frac{5}{2} \times 5$ ✓ $= \frac{25}{4}$ of $6\frac{1}{4}$ of $6,25$ eenhede ² ✓	1 M CA (dra fout van 4.4) 1 M A	(2)
4.6	$\theta = \tan^{-1}(-2)$ $\therefore \theta = 116,565^\circ$ ✓ ✓	1 M SF 1 M CA (dra fout van 4.3)	(2)
4.7	$M_{AB} =$ as AB FGM _{FG} $y = -2x$ ✓ ✓	2 M CA (Dra fout van 4.3)	(2)

VRAAG 5

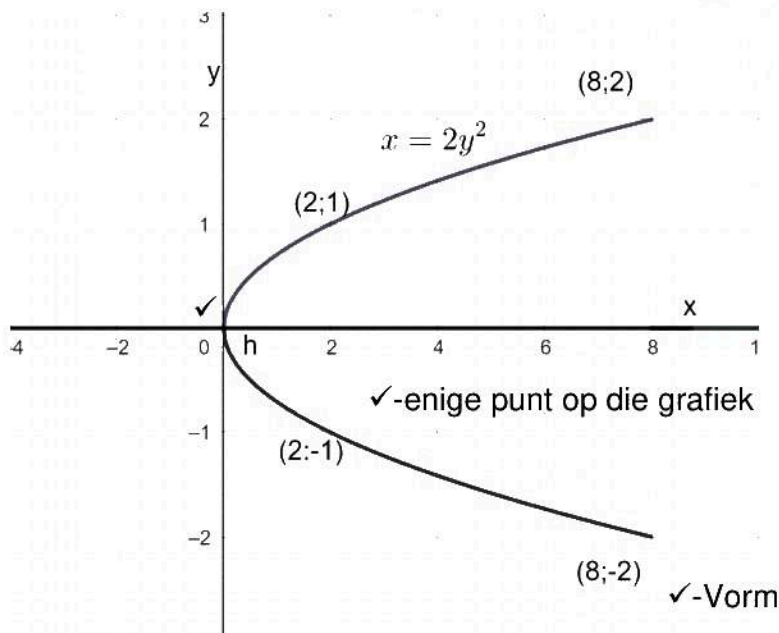
NASIEN- INSTRUKSIES

5.1

$$x = 2y^2, x \in [0; 8]$$

$$\therefore y = \pm \sqrt{\frac{x}{2}}$$

x	0	2	4	8
$y = \pm \sqrt{\frac{x}{2}}$	0	± 1	$\pm 1,4$	± 2



1 Punt = draaipunt (0;0)

1 Punt = enige korrekte punt (8;2) of (2;1)

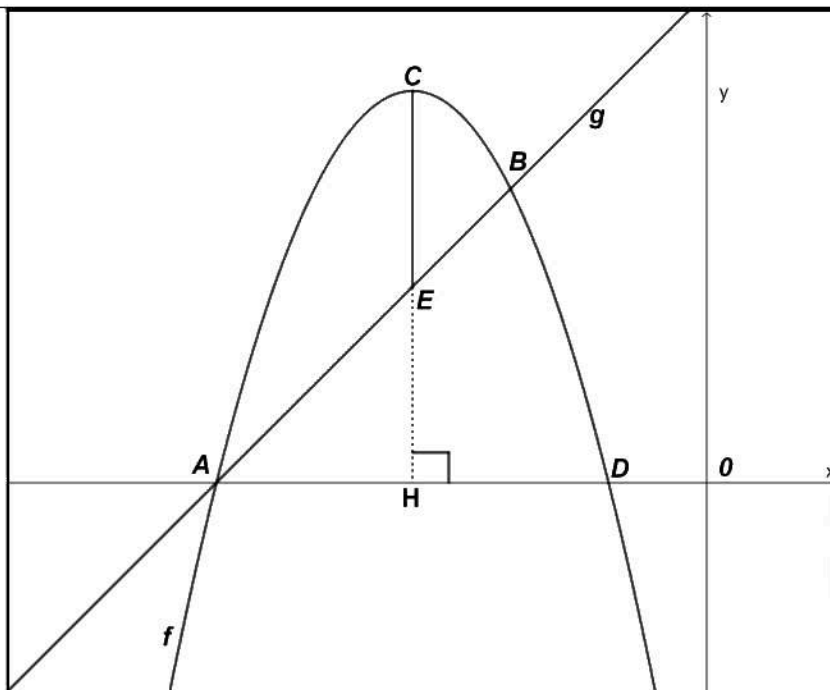
1 Punt = vorm

1 M draaipunt by
(0;0)
1 M enige
korrekte punt op
grafiek
1 M korrekte vorm

(3)

**NASIEN-
INSTRUKSIES**

5.2



5.2.1

$y = -x^2 - 6x - 5$
 x – koördinaat van draaipunt:

$$x = \frac{-b}{2a} = \frac{-(-6)}{2(-1)} = -3 \quad \checkmark$$

$$\begin{aligned} \text{y-koördinaat: } f(-3) &= -(-3)^2 - 6(-3) - 5 \\ &= -9 + 18 - 5 \\ &= 4 \\ \therefore C &= (-3; 4) \end{aligned}$$

1 M elk vir korrekte
koördinate

(2)

5.2.2

$$\begin{aligned} y &= -x^2 - 6x - 5 \dots\dots\dots (1) \\ \text{en } y &= x + 5 \dots\dots\dots (2) \\ \text{Van (1) en (2): } -x^2 - 6x - 5 &= x + 5 \\ -x^2 - 7x - 10 &= 0 \\ x^2 + 7x + 10 &= 0 \\ (x + 2)(x + 5) &= 0 \\ x &= -2 \text{ or } x = -5 \end{aligned}$$

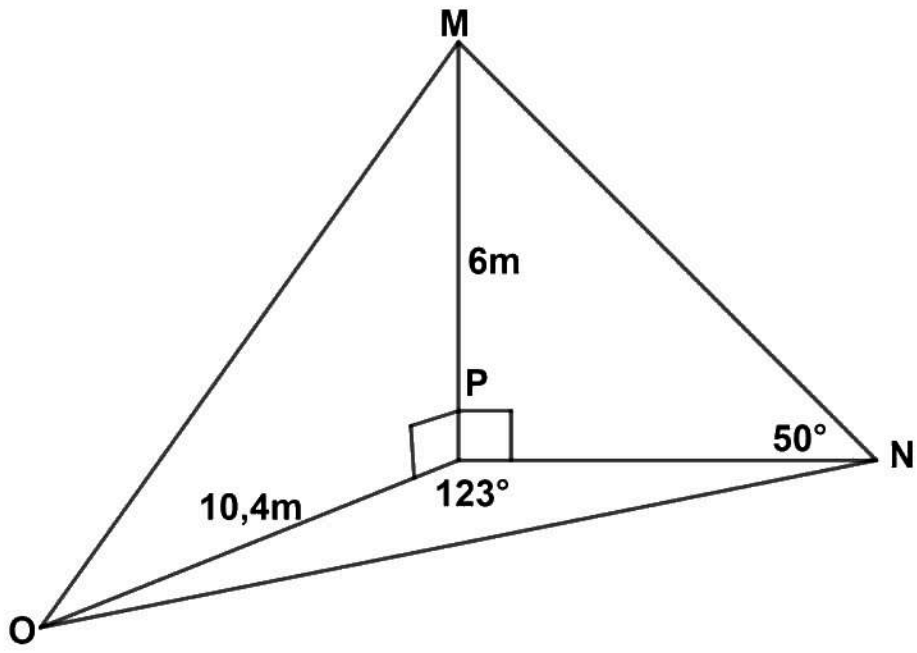
$$\begin{aligned} \text{Van (2); as } x &= -2 \text{ dan } y = -2 + 5 \\ y &= 3 \\ \text{as } x &= -5 \text{ dan } y &= -5 + 5 = 0 \\ \therefore \text{Koördinate van A: } &(-5; 0) \quad \checkmark \\ \text{Koördinate van B : } &(-2; 3) \quad \checkmark \quad \checkmark \end{aligned}$$

$$\begin{aligned} y &= -x^2 - 6x - 5 \\ \text{As } y &= 0 \text{ dan } x^2 + 6x + 5 = 0 \\ \therefore (x + 1)(x + 5) &= 0 \\ \therefore x &= -1 \text{ of } x = -5 \quad \checkmark \quad \checkmark \\ \text{Koördinate van D: } &(-1; 0) \end{aligned}$$

2 M vir oplossing van
A
2 M vir oplossing van B

2 M vir die oplossing
van D

	2.3	Van $y = x + 5$ As $x = -3$ dan $y = -3 + 5$ $\therefore y = 2$ $\therefore EH = 2$ ✓ $\therefore CE = CH - EH$ $= 4 - 2 = 2$ $CE = 2$ eenhede ✓	½ M om EH te vind ½ M vir die vind van CH – (dra fout van 5.2.1) 1 M A	(2)
5.3		$y = 3\sqrt{x} + \frac{1}{\sqrt{x}}$ $\therefore y = 3x^{\frac{1}{2}} + x^{-\frac{1}{2}}$ $\frac{dy}{dx} = \frac{1}{2} \times 3x^{\frac{1}{2}-1} - \frac{1}{2} x^{-\frac{1}{2}-1}$ $= \frac{3}{2} x^{-\frac{1}{2}} - \frac{1}{2} x^{-\frac{3}{2}}$ $= \frac{3}{2\sqrt{x}} - \frac{1}{2\sqrt{x^3}}$	½ M vir elke term, omskakeling van die radikale na fraksionele vorm (die voorbereidingstap) 1 M vir die onderskeid van elke term, met behulp van die magsreël ½ M vir elke afgeleide in radikale vorm	(4)
5.4	5.4.1	$y = ax^3 + bx^2$ (1) ✓ $\frac{dy}{dx} = 3ax^2 + 2bx$ (2) ✓ Van (1): As $x = 4$ en $y = 32$ dan $32 = 64a + 16b$ $\therefore 2 = 4a + b$ (3) ✓ Van (2) : as $x = 4$ en $\frac{dy}{dx} = 0$ dan $0 = 48a + 8b$ $\therefore 0 = 6a + b$ (4) ✓ (3) – (4): $2 = -2a$ $\therefore a = -1$ ✓ Van (3) as $a = -1$ dan $2 = -4 + b$ $\therefore b = 6$ ✓	1 M vind vergelyking 1 1 M vind vergelyking 2 1 M vervang x en y met gegewe punt om vergelyking 3 te vind 1 M vervang x en y deur inligting uit grafiek ½ M bewys dat $a = -1$ ½ M bewys dat $b = 6$ (hierdie punte kan slegs toegeken word as die voorafgaande stappe korrek is)	(5)
	5.4.2	$y = -x^3 + 6x^2$ Vir x – afsnitte; Laat $y = 0$ $\therefore -x^3 + 6x^2 = 0$ ✓ $\therefore x^3 - 6x^2 = 0$ $\therefore x^2(x - 6) = 0$ $\therefore x = 0$ of $x = 0$ of $x = 6$ $\therefore$ Koördinate van B = (6; 0) ✓ ✓	1 M SF 2 M vir koördinate van B	(2)

6.3				
6.3.1	In $\triangle MPN$ $\frac{6}{PN} = \tan 50^\circ \quad \checkmark$$\therefore PN = \frac{6}{\tan 50^\circ} \quad \checkmark$$\therefore PN = 5,035 \text{ m}$	1 M S 1 M A	(2)	
6.3.2	In $\triangle OPN$ $ON^2 = (10,4)^2 + (5,035)^2 - 2(10,4)(5,035)\cos 123^\circ \quad \checkmark$$\therefore ON^2 = 190,55$$\therefore ON = 13,804 \text{ m} \quad \checkmark$	1 M CA (dra fout van 6.3.1) 1 M A	(2)	
6.3.3	Oppervlakte van $\triangle OPN$ $= \frac{1}{2}(10,4)(5,035)\sin 123^\circ \quad \checkmark$$= 21,958 \text{ m}^2 \quad \checkmark$	1 M CA (dra fout van 6.3.1) 1 M A	(2)	

6.4	6.4.1	$f(x) = 2 \cos 2x$ <table><tr><td>x</td><td>0°</td><td>15°</td><td>30°</td><td>45°</td><td>60°</td><td>75°</td><td>90°</td><td>105°</td><td>120°</td><td>135°</td><td>150°</td><td>165°</td><td>180°</td></tr><tr><td>f(x)</td><td>2</td><td>1,73</td><td>1</td><td>0</td><td>-1</td><td>-0,87</td><td>1</td><td>-0,87</td><td>-1</td><td>0</td><td>1</td><td>1,73</td><td>2</td></tr></table> $\frac{1}{2}$ M vir elke DP ('TP'): (0°;-2) (90°;-2) (180°; 2) $\frac{1}{2}$ M vir elke x – afsnit: (45°; 0) (135°;0) $\frac{1}{2}$ punt vir vorm $\frac{1}{2}$ punt elk [3=DP'e by (0× 0,5 = 1,5 m°; 2), (90°;-2) en (180°; 2) $\frac{1}{2}$ punt elk [2 =x-afsnitte by (45× 0,5 = 1] °; 0) en (135°; 0) $\frac{1}{2}$ punt vir vorm 6 × $\frac{1}{2}$ = 3 punte	x	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	f(x)	2	1,73	1	0	-1	-0,87	1	-0,87	-1	0	1	1,73	2	(3)
x	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°																		
f(x)	2	1,73	1	0	-1	-0,87	1	-0,87	-1	0	1	1,73	2																		
	6.4.2	(30°; 1) en (150°; 1). 1 M vir elke punt (30°; 1) en (150°; 1) (2)	[20]																												
TOTAAL: 100																															