



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

WISKUNDE N2

21 November 2023

Hierdie nasienriglyn bestaan uit 7 bladsye.

VRAAG 1

$$\begin{aligned}
 1.1 \quad & -10q^2 - 11q + 6 = 0 \\
 & \Rightarrow (3 + 2q)(2 - 5q) = 0 \checkmark \\
 & \Rightarrow q = -\frac{3}{2} \checkmark \text{ or } p = \frac{2}{5} \checkmark
 \end{aligned}$$

ALTERNATIEF

$$\begin{aligned}
 & 10q^2 + 11q - 6 = 0 \checkmark \\
 & \Rightarrow (2q + 3)(5q - 2) = 0 \\
 & \Rightarrow q = -\frac{3}{2} \checkmark \text{ or } p = \frac{2}{5} \checkmark
 \end{aligned}$$

(3)

$$\begin{aligned}
 1.2 \quad & \text{Eqn. 1: } 2b + m = 50 \\
 & \text{Eqn. 2: } 8m - 2b = 220 \checkmark \\
 & \text{Eqn. 1} \Rightarrow m = 50 - 2b \text{ --- Eqn. 3} \\
 & \text{Eqn. 3 in Eqn. 2} \Rightarrow 8(50 - 2b) - 2b = 220 \checkmark \\
 & \Rightarrow b = \frac{180}{18} = 10 \text{ years } \checkmark \\
 & \text{Eqn. 3} \Rightarrow m = 50 - 2(10) = 30 \text{ jaar } \checkmark
 \end{aligned}$$

ALTERNATIEF

$$\begin{aligned}
 & \text{Eqn. 1: } 2b + m = 50 \\
 & \text{Eqn. 2: } 8m - 2b = 220 \checkmark \\
 & \text{Eqn. 1} + \text{Eqn. 2} \Rightarrow 9m = 270 \checkmark \\
 & \Rightarrow m = \frac{270}{9} = 30 \text{ jaar } \checkmark \\
 & \text{Eqn. 1} \Rightarrow b = \frac{50 - 30}{2} = 10 \text{ jaar } \checkmark
 \end{aligned}$$

(4)

$$\begin{aligned}
 1.3 \quad & k + (k + 3) - 9(k + 2) = 118 \\
 & \Rightarrow k + k + 3 - 9k - 18 = 118 \checkmark \\
 & \Rightarrow k = -19 \checkmark
 \end{aligned}$$

(2)

$$\begin{aligned}
 1.4 \quad 1.4.1 \quad & F = \sqrt{\frac{7}{e} + h^2} \\
 & \Rightarrow F^2 = \frac{7}{e} + h^2 \checkmark \\
 & \Rightarrow F^2 - h^2 = \frac{7}{e} \checkmark \\
 & \Rightarrow e(F^2 - h^2) = 7 \checkmark \\
 & \Rightarrow e = \frac{7}{F^2 - h^2} \checkmark
 \end{aligned}$$

(4)

$$1.4.2 \quad e = \frac{7}{(13)^2 - (3)^2} = \frac{7}{160} = 0,04375$$

(1)
[14]

VRAAG 2

$$\begin{aligned}
 2.1 \quad 2.1.1 \quad & \frac{3a-1}{a+4} + \frac{8a}{a^2+3a-4} \\
 &= \frac{3a-1}{a+4} + \frac{8a}{(a+4)(a-1)} \quad \checkmark \\
 &= \frac{(3a-1)(a-1) + 8a}{(a+4)(a-1)} \quad \checkmark \\
 &= \frac{3a^2 - 3a - a + 1 + 8a}{(a+4)(a-1)} \quad \checkmark \\
 &= \frac{3a^2 + 4a + 1}{(a-1)(a+4)} \quad \checkmark \\
 &= \frac{(3a+1)(a+1)}{(a+4)(a-1)} \quad \checkmark
 \end{aligned} \tag{6}$$

$$\begin{aligned}
 2.1.2 \quad & \frac{n^2-9}{n-2} \div \frac{n^2-n-6}{n^2-4} \\
 &= \frac{(n+3)(n-3) \checkmark}{(n-2)} \times \frac{(n-2)(n+2) \checkmark}{(n-3)(n+2) \checkmark} \\
 &= n+3 \quad \checkmark
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 2.2 \quad 2.2.1 \quad & 3p+3q-9-pq = (3-q)(p-3) \quad \checkmark \checkmark \\
 & 45-5p^2 = -5(p+3)(p-3) \quad \checkmark \checkmark \checkmark \\
 & p^2-9p+18 = (p-3)(p-6) \quad \checkmark \checkmark
 \end{aligned} \tag{7}$$

$$\begin{aligned}
 2.2.2 \quad & \text{HCF} = (p-3) \quad \checkmark \\
 & \text{LCM} = -5(p-3)(p+3)(p-6)(3-q) \quad \checkmark \checkmark
 \end{aligned} \tag{3}$$

[20]

VRAAG 3

$$\begin{aligned}
 3.1 \quad 3.1.1 \quad & \log_3(\log_2 512) + \sqrt[3]{2\frac{10}{27}} \\
 &= \log_3(\log_2 2^9) + \left(\frac{64}{27}\right)^{\frac{1}{3}} \quad \checkmark \\
 &= \log_3 3^2 + \left(\frac{4^3}{3^3}\right)^{\frac{1}{3}} \quad \checkmark \\
 &= 2 + \frac{4}{3} \\
 &= \frac{10}{3} \text{ or } 3\frac{1}{3} \quad \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 3.1.2 \quad \log_{64} 8 &= \frac{\log_2 8}{\log_2 64} \checkmark \\
 &= \frac{\log_2 2^3}{\log_2 2^6} \checkmark \\
 &= \frac{3}{6} = \frac{1}{2} \checkmark
 \end{aligned}$$

ALTERNATIEF

$$\begin{aligned}
 \log_{64} 8 &= \frac{\log_4 8}{\log_4 64} \checkmark \\
 &= \frac{\log_4 4^{3/2}}{\log_4 4^3} \checkmark \\
 &= \frac{3/2}{3} \\
 &= \frac{1}{2} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 3.1.3 \quad \frac{(8x^2y)(6xy^3)}{\sqrt[3]{4y^{36}x^{18}}} &= \frac{48x^{(2+1)}y^{(3+1)}}{x^{18 \times \frac{1}{3} \times \frac{1}{4}} \times y^{36 \times \frac{1}{3} \times \frac{1}{4}}} \checkmark \\
 &= \frac{48x^3y^4}{x^{\frac{3}{2}} \times y^3} \checkmark \\
 &= 48x^{3/2}y \text{ OR } 48y\sqrt{x^3} \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 3.2 \quad x^{-3/4} &= 27 \\
 \Rightarrow x &= (27)^{-4/3} \checkmark \\
 &= (3^3)^{-4/3} \\
 &= \frac{1}{81} \checkmark
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 3.3 \quad R &= \frac{31,4}{(3,02)^5 \times \sqrt[3]{652}} \\
 \Rightarrow \log R &= \log 31,4 - \left[5 \log 3,02 + \frac{1}{3} \log 652 \right] \checkmark \\
 \Rightarrow \log R &= 1,4969 - [2,4000 + 0,9381] \checkmark \\
 &= -1,842 \checkmark \\
 \Rightarrow R &= 10^{-1,8412} \\
 &= 0,0144 \checkmark
 \end{aligned} \tag{4}$$

[15]

VRAAG 4

$$\begin{aligned}
 4.1 \quad 4.1.1 \quad \pi r^2 h_{cyl} &= \frac{1}{3} \pi r^2 h_{cone} \text{ where } h_{cyl} = r \text{ and } h_{cone} = 9cm \\
 \Rightarrow \pi r^3 &= 3\pi r^2 \text{ since } h_{cyl} = r \text{ and } h_{cone} = 9cm \checkmark \\
 \Rightarrow \pi r^3 - 3\pi r^2 &= 0 \checkmark \\
 \Rightarrow \pi r^2(r - 3) &= 0 \\
 \Rightarrow r &= 3cm \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 4.1.2 \quad \text{S. A. of cylinder} &= 2\pi r^2 + 2\pi rh \\
 &= 2\pi(3)^2 + 2\pi(3)(3) \checkmark \\
 &= 133,097 \checkmark
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 4.1.3 \quad \text{S.A. of cone} &= \pi r^2 + \pi r \sqrt{h^2 + r^2} \\
 &= \pi(3)^2 + \pi(3)\sqrt{9^2 + 3^2} \checkmark \\
 &= 117,686 \text{ cm}^2 \checkmark
 \end{aligned}
 \tag{2}$$

$$\begin{aligned}
 4.2 \quad 21135 &= \left[\frac{120 + 118}{2} + 125 + 135 + 140 + 145 + 160 + 155 + 150 + 145 \right. \\
 &\quad \left. + 135 \right] d \checkmark \\
 \Rightarrow 21135 &= 1409d \checkmark \\
 \Rightarrow d &= 15 \checkmark
 \end{aligned}
 \tag{4}$$

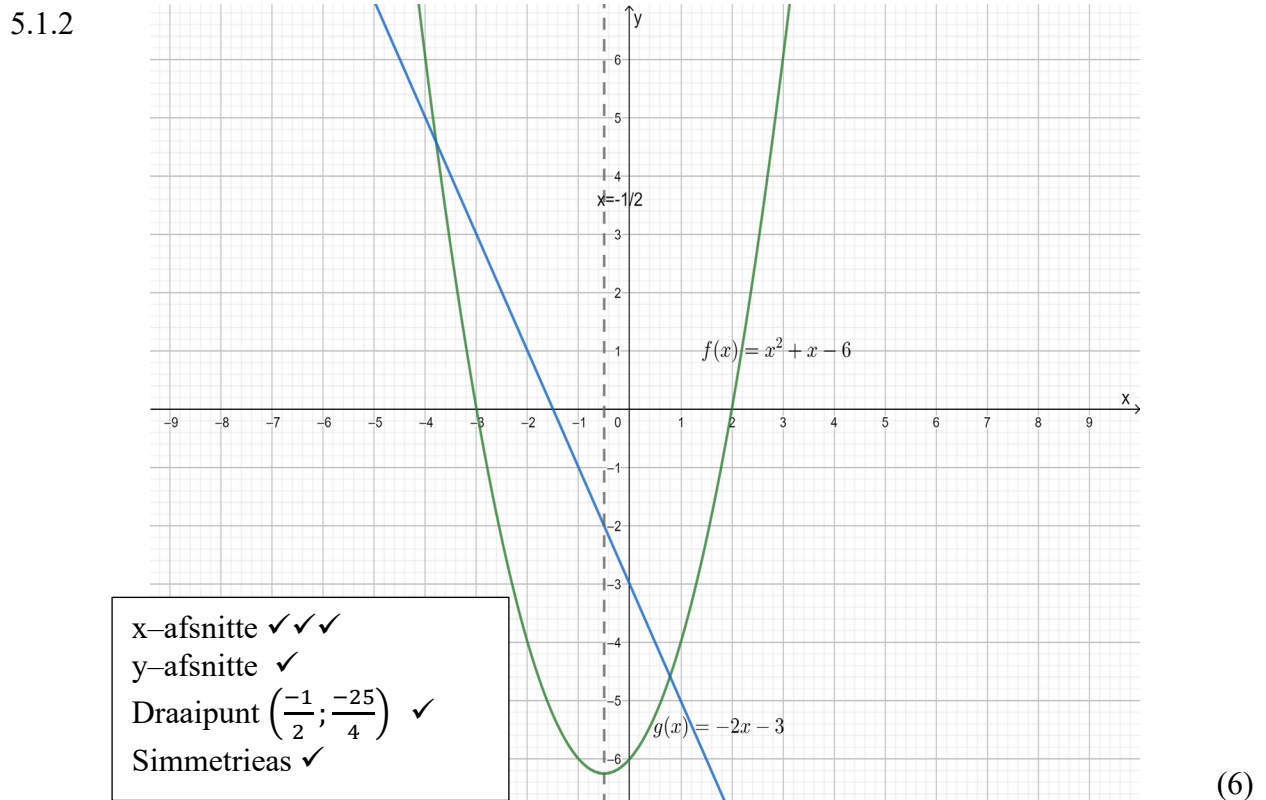
[11]

VRAAG 5

5.1 5.1.1

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	6	0	-4	-6	-6	-4	0	6	14
$g(x)$	5	3	1	-1	-3	-5	-7	-9	-11

(2)



$$5.1.3 \quad x \approx 0.8 \text{ en } x \approx -3.8 \text{ [Aanvaar akkuraatheid van } \pm 0.1] \checkmark\checkmark
 \tag{2}$$

$$5.1.4 \quad x = \frac{-1}{2(1)} = -\frac{1}{2} \checkmark
 \tag{1}$$

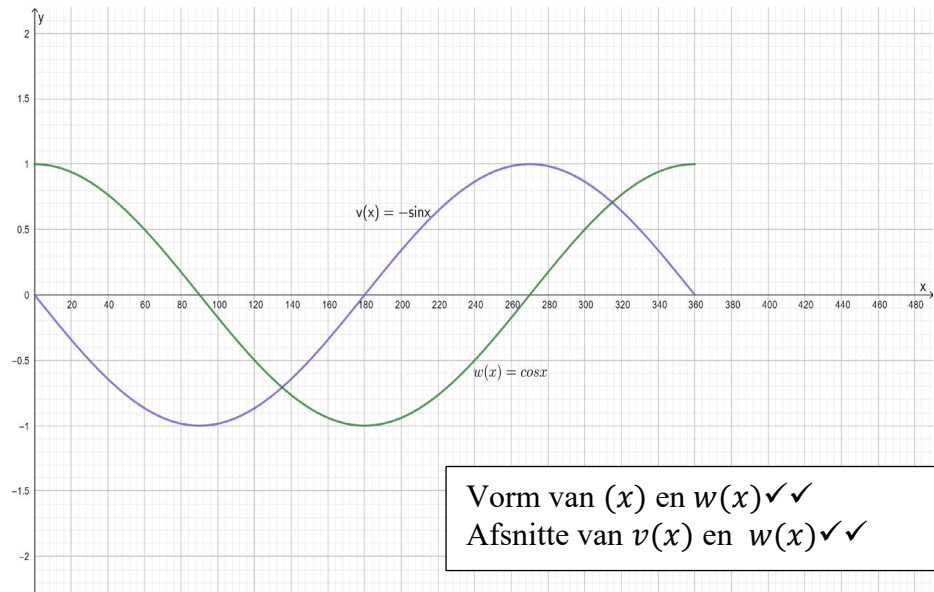
$$5.1.5 \quad y = \left(-\frac{1}{2}\right)^2 - \frac{1}{2} - 6 = -6,25 = -\frac{25}{4} \checkmark
 \tag{1}$$

5.2 5.2.1

x	0	30	60	90	120	150	180	210	240	270	300	330	360
$v(x)$	0	-0,5	-0,9	-1	-0,9	-0,5	0	0,5	0,9	1	0,9	0,5	0✓
$w(x)$	1	0,9	0,5	0	-0,5	-0,9	-1	-0,9	-0,5	0	0,5	0,9	1✓

(2)

5.2.2



(4)

5.2.3 $x = 135^\circ$ en $x = 315^\circ$ ✓✓

(2)
[20]

VRAAG 6

6.1 $13,4 = 13,4 \times 57,3^\circ$
 $= 767,82^\circ$ ✓
 $= 767 + 0,82 \times 60'$
 $= 767^\circ, 49'$ ✓

ALTERNATIEF
 $13,4 = 13,4 \times \frac{180^\circ}{\pi}$
 $= 767,76^\circ$ ✓
 $= 767 + 0,76 \times 60'$
 $= 767^\circ, 47'$ ✓

(2)

6.2 6.2.1 $r = \frac{l}{\theta} = \frac{12,5}{1,25} = 10 \text{ cm}$

(1)

6.2.2 $\text{Oppervlakte} = \frac{1}{2} \times r^2 \theta$
 $= \frac{1}{2} \times (10)^2 (1,25)$ ✓
 $= 62,5 \text{ cm}^2$ ✓
 $= \frac{125}{2} \text{ cm}^2$

ALTERNATIEF
 $\text{Oppervlakte} = \frac{l^2}{2\theta}$
 $= \frac{(12,5)^2}{2(1,25)}$ ✓
 $= 62,5$ ✓
 $= \frac{125}{2} \text{ cm}^2$

(2)

$$\begin{aligned}
 6.3 \quad 6.3.1 \quad \omega &= 2\pi N \\
 &\Rightarrow 150 = 2\pi N \quad \checkmark \\
 &\Rightarrow N = 1502\pi = 23,873 \text{ rev. per sekonde} \quad \checkmark
 \end{aligned} \tag{2}$$

$$6.3.2 \quad N = 23,873 \times 60 \approx 1432 \text{ rev. per minuut} \tag{1}$$

$$\begin{aligned}
 6.4 \quad D &= \frac{x^2}{4h} + h \\
 \Rightarrow 2x &= \frac{x^2}{4h} + h \quad \checkmark \\
 \Rightarrow 8xh &= x^2 + 4h^2 \\
 \Rightarrow x^2 - 8xh + 4h^2 &= 0 \quad \checkmark \\
 \Rightarrow \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
 \Rightarrow \frac{8h \pm \sqrt{64h^2 - 16h^2}}{2} \quad \checkmark \\
 \Rightarrow x &= (4 + 2\sqrt{3})h \quad \checkmark \quad \text{OR} \quad x = (4 - 2\sqrt{3})h \\
 \Rightarrow x &= 7,73h \quad \text{OR} \quad 0,27h
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 6.5 \quad aangrensend &= \sqrt{17^2 - (-8)^2} = 15 \quad \checkmark \\
 \Rightarrow 1 + \tan^2 \theta &= 1 + \left(\frac{-8}{15}\right)^2 \quad \checkmark \\
 &= \frac{289}{225} \\
 &= 1,284 \quad \checkmark
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 6.6 \quad \tan 27^\circ &= \frac{DM}{20} \quad \checkmark \\
 \Rightarrow DM &= 20 \tan 27^\circ = 10,191m \quad \checkmark \\
 \tan 47^\circ &= \frac{BM}{20} \quad \checkmark \\
 \Rightarrow BM &= 20 \tan 47^\circ = 21,447m \quad \checkmark \\
 BD &= BM + DM = 10,191 + 21,447 \\
 \Rightarrow BD &= 31,638m \quad \checkmark
 \end{aligned}$$

ALTERNATIEF	
$\tan 63^\circ = \frac{20}{DM}$	$\checkmark$
$\Rightarrow DM = \frac{20}{\tan 63^\circ}$	$= 10,191m \quad \checkmark$
$\tan 43^\circ = \frac{20}{BM}$	$\checkmark$
$\Rightarrow BM = \frac{20}{\tan 43^\circ}$	$= 21,447m \quad \checkmark$
$BD = BM + DM$	$= 10,191 + 21,447$
$\Rightarrow BD = 31,638m$	$\checkmark$

(5)
[20]

TOTAAL: 100