



Province of the  
**EASTERN CAPE**  
EDUCATION

**NASIONALE  
SENIOR SERTIFIKAAT**

**GRAAD 12**

**SEPTEMBER 2018**

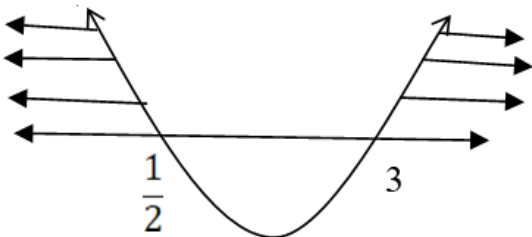
**TEGNIESE WISKUNDE V1  
NASIENRIGLYN**

**PUNTE: 150**

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Hierdie nasienriglyn bestaan uit 15 bladsye.

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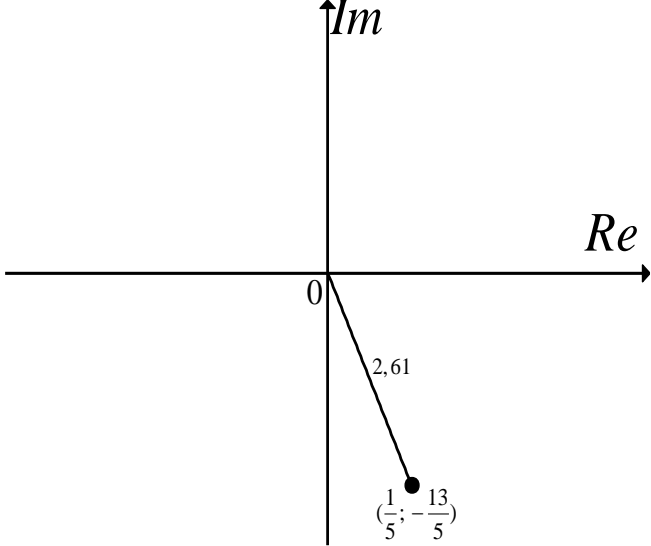
VRAAG 1				
1.1	1.1.1	$x(x-3)$ $x = 0$ of $x = 3$	$\checkmark x = 0$ $\checkmark x = 3$	(2)
	1.1.2	$3x^2 - 2x - 10 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-10)}}{2(3)}$ $x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-10)}}{2(3)}$ $x = 2,2$ or $x = -1,5$	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>-1 Punt vir verkeerde afronding</b> </div> $\checkmark$ Formule $\checkmark$ Vervanging  $\checkmark x = 2,2$ $\checkmark x = -1,5$	(4)
	1.1.3	$2x^2 - 7x + 3 \geq 0$ $(2x-1)(x-3) < 0$ Kritiese waardes : $x = \frac{1}{2}$ of $x = 3$  $x \leq \frac{1}{2}$ of $x \geq 3$	$\checkmark$ Kritiese waardes  $\checkmark x \leq \frac{1}{2}$ $\checkmark x \geq 3$	(3)
1.2		$\frac{x^2 - 4}{x + 2}$ $= \frac{(x+2)(x-2)}{x+2}$ $= x - 2$ $= 2\,000\,000\,000\,002 - 2$ $= 2\,000\,000\,000\,000$ $= 2 \times 10^{12}$	$\checkmark$ Faktore  $\checkmark$ Vervanging  $\checkmark 2 \times 10^{12}$	(3)

1.3	$2y + x = 3 \dots\dots\dots(1)$ $y = x^2 - x \dots\dots\dots(2)$ <p>Vervang (2) in (1):</p> $2(x^2 - x) + x = 3$ $2x^2 - 2x + x - 3 = 0$ $2x^2 - x - 3 = 0$ $x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(2)(-3)}}{2(2)}$ $x = -1 \text{ of } x = \frac{3}{2}$ $\Rightarrow y = (1)^2 - (1) \text{ of } y = \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)$ $y = 0 \qquad \text{of } y = \frac{3}{4}$	$\checkmark$ Vervanging $\checkmark$ Standaardvorm $\checkmark$ Vervanging $\checkmark x = -1$ $\checkmark x = \frac{3}{2}$ $\checkmark y = 0 \text{ of } y = \frac{3}{4}$	
	<p style="text-align: center;"><b>OF</b></p> $2y + x = 3 \dots\dots\dots(1)$ $y = x^2 - x \dots\dots\dots(2)$ <p>Vervang (2) in (1):</p> $2(x^2 - x) + x = 3$ $2x^2 - 2x + x - 3 = 0$ $2x^2 - x - 3 = 0$ $(x + 1)(2x - 3) = 0$ $x = -1 \text{ of } x = \frac{3}{2}$ $\Rightarrow y = (1)^2 - (1) \text{ of } y = \left(\frac{3}{2}\right)^2 - \left(\frac{3}{2}\right)$ $y = 0 \qquad \text{of } y = \frac{3}{4}$	<p style="text-align: center;"><b>OF</b></p> $\checkmark$ Vervanging $\checkmark$ Standaardvorm $\checkmark$ Faktore $\checkmark x = -1$ $\checkmark x = \frac{3}{2}$ $\checkmark y = 0 \text{ of } y = \frac{3}{4}$	(6)
1.4	$b^2 - 4ac < 0$ $(-3)^2 - 4(2)p < 0$ $9 - 8p < 0$ $p > \frac{9}{8}$	$\checkmark b^2 - 4ac < 0$ $\checkmark$ Vervanging $\checkmark p > \frac{9}{8}$	(3)
			<b>[21]</b>

VRAAG 2					
2.1					
	2.1.1	$\frac{\sqrt{-18}.\sqrt{-12}}{\sqrt{-6}} = \frac{\sqrt{-3^2.2}.\sqrt{-2^2.3}}{\sqrt{-2.3}}$ $= \frac{3i.\sqrt{2}.2\sqrt{3}i}{\sqrt{2}.\sqrt{3}i}$ $= 6i$	$\checkmark \text{Priemfaktore}$ $\checkmark i = \sqrt{-1}$ $\checkmark 6i$		
		<p style="text-align: center;"><b>OF</b></p> $\frac{\sqrt{-18}.\sqrt{-12}}{\sqrt{-6}} = \frac{\sqrt{-6.3}.\sqrt{-4.3}}{\sqrt{-6}}$ $= \sqrt{3}.2i\sqrt{3}$ $= 6i$	<p style="text-align: center;"><b>OF</b></p> $\checkmark \text{Priemfaktore}$ $\checkmark i = \sqrt{-1}$ $\checkmark 6i$		
	2.1.2	$\log 6 + 2\log 20 - \log 3 - 3\log 2$ $\log 6 + \log (20)^2 - \log 3 - \log 2^2$ $= \log 6 + \log 400 - \log 3 - \log 8$ $= \log \left( \frac{6 \times 400}{3 \times 8} \right)$ $= \log 100$ $= \log 10^2 \text{ OR } = \log (10 \times 10) = \log 10 + \log 10$ $= 2$	$\checkmark \text{Magwet}$ $\checkmark \text{Optellingswet}$ $\checkmark \text{Aftrekkingswet}$ $\checkmark \text{Dieselfde basiswet}$ $\checkmark 2$	(3)	
2.2					
2.2.1					
	$\sqrt{\frac{5^{x+1} - 5^x}{5^{x-1}}} + 5 = 5$ $\text{L K} = \sqrt{\frac{5^x.5^1 - 5^x}{5^x.5^{-1}}} + 5$ $\text{L K} = \sqrt{\frac{5^x(5^1 - 1)}{5^x.5^{-1}}} + 5$ $\text{L K} = \sqrt{\frac{5 - 1}{5^{-1}}} + 5$ $\text{L K} = \sqrt{4.5} + 5$ $= \sqrt{25}$ $= 5$ $= \text{R K}$	$\checkmark \text{Magreël}$ $\checkmark \text{Faktore}$ $\checkmark \text{Vereenvoudiging}$ $\checkmark \sqrt{25}$	(4)		

2.2.2	$\sqrt{\frac{5^{x+1} - 5^x}{5^{x-1}}} + 5 = \left(\frac{1}{5}\right)^{x-2}$ $5 = \left(\frac{1}{5}\right)^{x-2}$ $5 = \frac{1}{5^{x-2}}$ $5^{x-2+1} = 1$ $5^{x-2+1} = 5^0$ $x - 1 = 0$ $x = 1$	✓Vervang 5 ✓Magte met basisse 5 ✓Dieselfde basisreël  ✓ $x = 1$	
	<b>OF</b>	<b>OF</b>	
2.2.3	$\sqrt{\frac{5^{x+1} - 5^x}{5^{x-1}}} + 5 = \left(\frac{1}{5}\right)^{x-2}$ $5 = \left(\frac{1}{5}\right)^{x-2}$ $5 = \frac{1}{5^{x-2}}$ $5^{x-2+1} = 1$ $5^{x-2+1} = 5^0$ $x - 1 = 0$ $x = 1$	✓Vervang 5  ✓Nuleksponentreël  ✓ $x = 1$	(4)
	<b>OF</b>	<b>OF</b>	
	$4 \log_2 x - 1 = \log_2 8$ $4 \log_2 x = \log_2 8 + \log_2 2$ $\log_2 x^4 = \log_2 16$ $x^4 = 16$ $x^4 = 2^4$ $x = 2$	✓ $1 = \log_2 2$  ✓Vereenvoudiging  ✓Gelyke basis logs  ✓ $x = 2$	(4)
	<b>OF</b>	<b>OF</b>	
	$4 \log_2 x - 1 = \log_2 2^3$ $\log_2 x^4 - 1 = 3 \log_2 2$ $\log_2 x^4 = 3 + 1 = 4$ $x^4 = 2^4$ $x = 2$	✓Magreël ✓ $1 = \log_2 2$  ✓Eksponeensiaalvorm  ✓ $x = 2$	(4)
			<b>[20]</b>

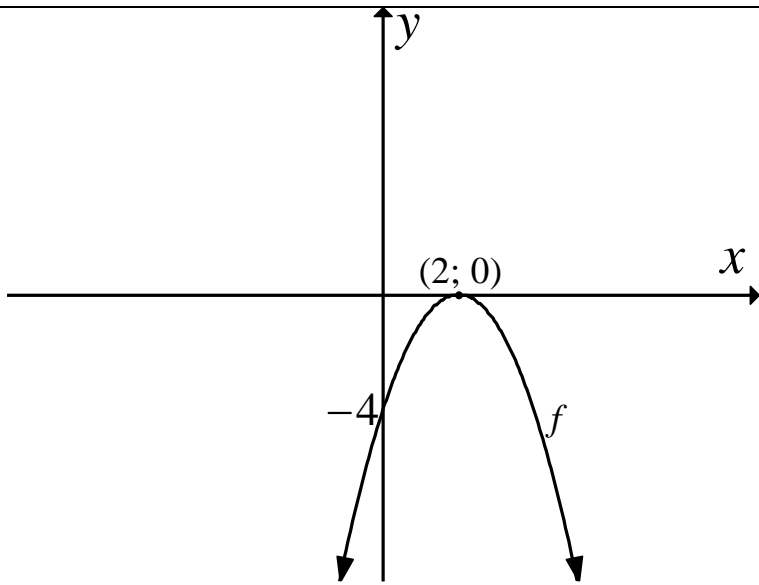
VRAAG 3				
3.1	3.1.1	$z_5 = z_1 + z_2$ $= 2+3i+(-3-2i)$ $= -1 + i$	✓ -1 Reële deel ✓ $i$ Imaginêre deel	(2)
	3.1.2	$z_6 = z_5 \times z_3$ $= (-1 + i)(-4 + i)$ $= 4 - i - 4i + i^2$ $= 3 - 5i$	✓ Uitbreiding ✓ $3 - 5i$	(2)
	3.1.3	$\text{Uitset} = \frac{z_6}{z_4} = \frac{3 - 5i}{2 + i}$ $= \frac{3 - 5i}{2 + i} \times \frac{2 - i}{2 - i}$ $= \frac{6 - 3i - 10i + 5i^2}{4 - i^2}$ $= \frac{1 - 13i}{5}$ $= \frac{1}{5} - \frac{13i}{5}$	✓ Gekonjugeerde produk ✓ Uitbreiding ✓ Vereenvoudiging $\frac{1}{5} - \frac{13i}{5}$	(4)
3.2	3.2.1	$ \text{Uitset}  = \sqrt{\left(\frac{1}{5}\right)^2 + \left(\frac{-13}{5}\right)^2}$ $= 2.61$	✓ Vervanging ✓ $ \text{Uitset} $	(2)

	3.2.2		✓Korrekte kwadrant  ✓Koördinate	(2)
	3.2.3	Nee, die leerder kon nie 'n sirkelvormige stuk sny nie, want die modulus van die uitset is minder as 5 en die argument van die uitset is in die vierde kwadrant; so 'n vierkant is uitgesny.	✓Gevolgtrekking  ✓Modulus en Argument	(2)
				[14]

VRAAG 4				
4.1	4.1.1	$A = P(1 - i)^n$ $4\,000 = 12\,000(1 - i)^{30}$ $i = 1 - \sqrt[30]{\frac{4\,000}{12\,000}}$ $= 1 - \left(\frac{1}{3}\right)^{\frac{1}{30}}$ $Rate = 3,6\%$	✓Formule ✓Vervanging  $\checkmark 1 - \left(\frac{1}{3}\right)^{\frac{1}{30}}$ $\checkmark r = 3,6\%$	(4)
	4.1.2	$A = P(1 - i)^n$ $A = 12\,000(1 - 0,036)^{60}$ $A = 1329.85 \text{ Bacteria}$	✓Vervang A en $i$ ✓Vervang $n$  $\checkmark A = 1329.85$	(3)
4.2	4.2.1	18% of R600 000 = R108 000 Leningsbedrag = R600 000 – R108 000 Leningsbedrag = R492 000  <p style="text-align: center;"><b>OF</b></p> Persentasie geleen = 100% – 18% Persentasie geleen = 82%  Leningsbedrag = 82% of R600 000 Leningsbedrag = R492 600	✓11,9% van R600 000  ✓ Leningsbedrag  <p style="text-align: center;"><b>OF</b></p> ✓ Persentasie geleen  ✓ Leningsbedrag	(2)
	4.2.2	$A = P(1 + i)^n$ $1\,204\,860,32 = 492\,000 \left(1 + \frac{0,15}{12}\right)^{12 \times n}$ $12n = \log_{1,0125} \left(\frac{1\,204\,860,32}{492\,000}\right)$ $n = 6 \text{ jaar}$	✓Formule ✓Vervanging ✓Logaritme  $\checkmark x = 6 \text{ jaar}$	(4)
				[13]



VRAAG 5			
5.1	$q=2$	✓ Akkurate antwoord	(1)
5.2	$0 = \frac{a}{-2} + 2$ $a = 4$	✓ Vervanging  ✓ $a=4$	(2)
5.3	$x=0$ en $y=2$	✓ Horizontale asymptoot ✓ Vertikale asymptoot	(2)
5.4	$x \in \mathbb{R}$ , maar $x \neq 0$ of $x \in (-\infty; 0) \cup (0; \infty)$	✓ Uitgesluit $x=0$ ✓ $x$ waardes	(2)
			[7]
VRAAG 6			
6.1	A (-2; 0) en B(2; 0)	✓ A (-2; 0) ✓ B (2; 0)	(2)
6.2	$2 = 2^0 + q$ $q = 1$	✓ $q=1$	(1)
6.3	$m = \frac{0-2}{2-0} = -1$ $c = 2$ $y = -x + 2$	✓ $m = -x$  ✓ $c=2$	(2)
6.4	$-\frac{73}{50} < x < 0$ OF $x \in \left(-\frac{73}{50}; 0\right)$	✓ Notasie ✓ Waardes	(2)
			[7]

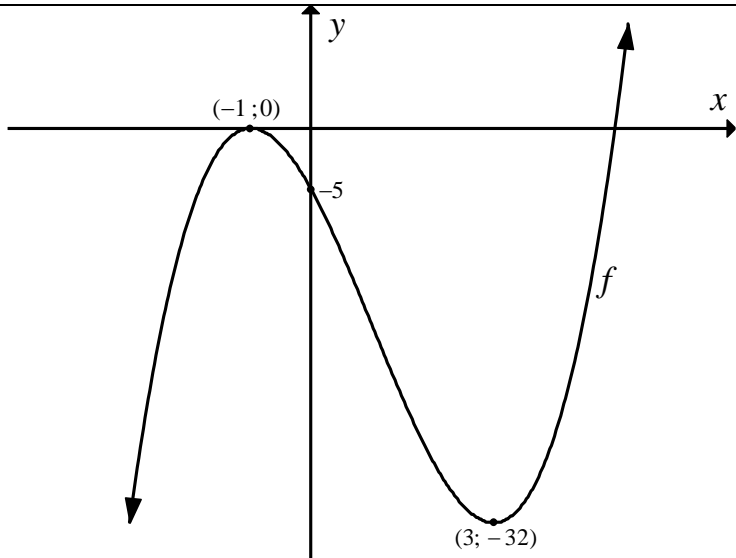
VRAAG 7			
7.1	$f(x) = -(x-2)^2 + 4$ $0 = -(x-2)^2 + 4$ $0 = [-(x-2) + 2][(x-2) + 2]$ $-(x-2) + 2 = 0$ of $(x-2) + 2 = 0$ $x = 4$ of $x = 0$  <b>OF</b> $0 = -(x-2)^2 + 4$ $(x-2)^2 = 4$ $x-2 = \pm 2$ $x = 4$ of $x = 0$  <b>OF</b> $0 = -(x-2)^2 + 4$ $0 = -(x^2 - 4x + 4) + 4$ $0 = -x^2 + 4x$ $0 = -x(x-4)$ $x = 4$ of $x = 0$	$\checkmark f(x) = 0$  $\checkmark$ Faktore  $\checkmark x = 4$ of $x = 0$  <b>OF</b> $\checkmark f(x) = 0$  $\checkmark$ Kwadreer beide kante  $\checkmark x = 4$ of $x = 0$  <b>OF</b> $\checkmark f(x) = 0$  $\checkmark$ Standaardvorm  $\checkmark x = 4$ of $x = 0$	(3)
7.2	$f(x) = -(x-2)^2 + 4$ $y = -(0-2)^2 + 4$ $y = 0$	$\checkmark y = 0$	(1)
7.3	(2;4)	$\checkmark$ Elke koördinaat	(2)
7.4		$\checkmark$ Vorm  $\checkmark$ x-afsnitte $\checkmark$ y-afsnit  $\checkmark$ Draaipunt	(4)

7.5	$y < 4$ of $y \in (-\infty; 4)$	✓ Akkurate antwoord	(1)
7.6	(3;3)	✓ x-koördinaat ✓ y-koördinaat	(2)
			[13]

**VRAAG 8**

8.1	$f(1) = 2(1)^2 + (1) - 1 = 2$ $f(3) = 2(3)^2 + (3) - 1 = 20$ Gemiddelde gradiënt = $\frac{f(3) - f(1)}{3 - 1}$ Gemiddelde gradiënt = $\frac{20 - 2}{2} = 9$	✓ $f(1)$ ✓ $f(3)$  ✓ Gemiddelde gradiënt formule  ✓ Vervanging  ✓ Gemiddelde gradiënt = 9	(5)
8.2	$f(x) = 3x$ $f'(x) = \lim_{x \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{x \rightarrow 0} \frac{3(x+h) - 3x}{h}$ $f'(x) = \lim_{x \rightarrow 0} \frac{3h}{h}$ $f'(x) = 3$	✓ Formule  ✓ Vervanging  ✓ Vereenvoudiging  ✓ $f'(x) = 3$	(4)
	<b>-1 Punt vir verkeerde notasie in 8.2 of 8.3</b>		
8.3			
8.3.1	$3x - 2y = \sqrt{x}$ $y = \frac{3x - \sqrt{x}}{2}$ $y = \frac{3x}{2} - \frac{x^{\frac{1}{2}}}{2}$ $\frac{dy}{dx} = \frac{3}{2} - \frac{x^{-\frac{1}{2}}}{4}$	✓ $y = \frac{3x - \sqrt{x}}{2}$ ✓ Eksponensiaalvorm  ✓ $\frac{3}{2}$  ✓ $\frac{x^{-\frac{1}{2}}}{4}$	(4)

	8.3.2	$y = 6 - \frac{4}{\sqrt[3]{x}} + \frac{1}{x^4}$ $y = 6 - \frac{4}{x^{\frac{1}{3}}} + \frac{1}{x^4}$ $y = 6 - 4x^{-\frac{1}{3}} + x^{-4}$ $\frac{dy}{dx} = \frac{4}{3}x^{-\frac{4}{3}} - 4x^{-5}$ $\frac{dy}{dx} = \frac{4}{3x^{\frac{4}{3}}} - \frac{4}{x^5} = \frac{4}{3\sqrt[3]{x^4}} - \frac{4}{x^5}$	<p>✓ Eksponensiaalvorm</p> <p>✓ <math>\frac{4}{3}x^{-\frac{4}{3}}</math></p> <p>✓ <math>-4x^{-5}</math></p> <p>✓ <math>\frac{4}{3x^{\frac{4}{3}}} - \frac{4}{x^5}</math> (positiewe eksponente)</p>	(4)
8.4	$g'(x) = 2x + 2 = -2$ $x = -4$ $g(-4) = (-4)^2 + 2(-4) - 3$ $g(-4) = 5$ $(-4; 5)$	<p>✓ <math>g'(x)</math></p> <p>✓ <math>g'(x) = -2</math></p> <p>✓ <math>g(-4)</math></p> <p>✓ <math>(-4; 5)</math></p>	(4)	
				[21]

VRAAG 9			
Gegee $f(x) = (x - 5)(x + 1)^2$			
9.1	$f(0) = (0 - 5)((0) + 1)^2 = -5$ $(0; -5)$	✓ $(0; -5)$	(1)
9.2	$f(5) = (5 - 5)(5 + 1)^2 = 0$ Dan, $(5; 0)$ is die $x$ -afsnit van $f$ . $(-1; 0)$ is die ander $x$ -afsnit van $f$ . <b>OF</b> $0 = (x - 5)(x + 1)^2$ $(x - 5) = 0$ of $(x + 1)^2 = 0$ $x = 5$ is die afsnit van $f$ $(-1; 0)$ is die ander $x$ -afsnit van $f$ .	✓ $f(5) = 0$ ✓ $(-1; 0)$ <b>OF</b> ✓ $f(x) = 0$ ✓ $(-1; 0)$	(2)
9.3	$f(x) = x^3 - 3x^2 - 9x - 5$ $f'(x) = 3x^2 - 6x - 9$ $0 = 3x^2 - 6x - 9$ $0 = x^2 - 2x - 3$ $0 = (x - 3)(x + 1)$ $x = 3$ of $x = -1$ $x = -1$ ; $y = -1 - 3 + 9 - 5 = 0$ Draaipunt: $(-1; 0)$ $x = 3$ ; $y = 27 - 27 - 27 - 5 = -32$ Draaipunt : $(3; -32)$	✓ $3x^2 - 6x - 9$ ✓ Faktore ✓ Beide $x$ waardes ✓ $(-1; 0)$ ✓ $(3; -32)$	(5)
9.4		✓ Vorm ✓ $x$ -afsnitte ✓ $y$ -afsnit $= -5$ ✓ Draaipunt $(-1; 0)$ ✓ Draaipunt $(3; -32)$	(5)
			[13]

<b>VRAAG 10</b>			
10.1	$A = 6 + 4t - t^2$ $A = 6 + 4(0) - (0)^2$ $A = 6 \text{ cm}^2$	✓Vervang 0  ✓ $A = 6 \text{ cm}^2$	(2)
10.2	$\frac{dA}{dt} = 4 - 2t$ $A = 4 - 2(1)$ $= 2 \text{ cm}^2$	✓ $4 - 2t$ ✓Vervanging deur 1  ✓ $2 \text{ cm}^2$	(3)
10.3	$\frac{dA}{dt} = 4 - 2t$ $\frac{dA}{dt} = 4 - 2t = 0$ $2t = 4$ $t = 2 \text{ sekondes}$	✓ $\frac{dA}{dt} = 0$  ✓ $t = 2 \text{ sekondes}$	(2)
10.4	$A = 6 + 4(2) - 2^2$ $= 10 \text{ cm}^2$	✓Vervanging  ✓ $A = 10 \text{ cm}^2$	(2)
			<b>[9]</b>

VRAAG 11			
11.1	$\int (2x - 4) dx$ $= x^2 - 4x + C$	$\checkmark x^2$ $\checkmark -4x$ $\checkmark C$	(3)
11.2	$A_1 = \int_1^3 (x^3 - 3x^2 - x + 3) dx$ $= \left[ \frac{x^4}{4} - x^3 - \frac{x^2}{2} + 3x \right]_1^3$ $= \left[ \frac{3^4}{4} - 3^3 - \frac{3^2}{2} + 3(3) \right] - \left[ \frac{1^4}{4} - 1^3 - \frac{1^2}{2} + 3(1) \right]$ $= 4$ $A_2 = \int_{-1}^1 (x^3 - 3x^2 - x + 3) dx$ $= \left[ \frac{x^4}{4} - x^3 - \frac{x^2}{2} + 3x \right]_{-1}^1$ $= \left[ \frac{1^4}{4} - 1^3 - \frac{1^2}{2} + 3(1) \right] - \left[ \frac{(-1)^4}{4} - (-1)^3 - \frac{(-1)^2}{2} + 3(-1) \right]$ $= 3,75$ $\therefore A_1 + A_2 = 4 + 3,75$ $= 7,75 \text{ vierkante eenhede}$	$\checkmark A_1$ bepaalde integraal formule  $\checkmark$ Vereenvoudig $A_1$ integraal  $\checkmark$ Vervanging in $A_1$  $\checkmark A_1$ waarde  $\checkmark A_2$ bepaalde integraal formule  $\checkmark$ Vervanging in $A_2$  $\checkmark A_2$ waarde  $\checkmark A_1 + A_2$ $\checkmark 7,75$ vierkante eenhede	(9)
			[12]
		<b>TOTAAL:</b>	<b>150</b>