



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## **NASIONALE SENIOR SERTIFIKAAT**

**GRAAD 12**

**WISKUNDE V1**

**NOVEMBER 2010**

**MEMORANDUM**

**PUNTE: 150**

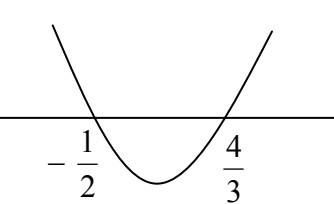
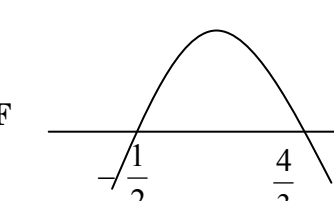
**Hierdie memorandum bestaan uit 26 bladsye.**

**NOTA:**

- As 'n kandidaat'n vraag TWEE keer beantwoord, merk net die EERSTE poging.
- As 'n kandidaat 'n antwoord deurhaal en nie oordoen nie, merk die deurgehaalde antwoord.
- Konstante Akkuraatheid moet deurgaans in die memorandum toegepas word.

**VRAAG 1**

1.1.1	$(3-x)(5-x) = 3$ $15 - 8x + x^2 = 3$ $x^2 - 8x + 12 = 0$ $(x-6)(x-2) = 0$ $x = 6 \text{ or } x = 2$  <b>OF</b> $(3-x)(5-x) = 3$ $15 - 8x + x^2 = 3$ $x^2 - 8x + 12 = 0$ $(x-4)^2 = 4$ $x-4 = 2 \text{ or } x-4 = -2$ $x = 6 \text{ or } x = 2$	<div style="border: 1px solid black; padding: 5px;"> <p><b>Nota:</b> Slegs antwoord : Volpunte</p> <p>As die kandidaat 'n lineêre vergelyking maak, geen punte</p> <p>Vir slegs 1 antwoord : 1 / 3</p> </div>	✓ uitbreiding ✓ faktore ✓ antwoorde (3)  ✓ uitbreiding ✓ voltooiing van kwadraat/vierkant ✓ antwoorde
1.1.2	$3x^2 = 2(x+2)$ $3x^2 - 2x - 4 = 0$ $x = \frac{-(-2) \pm \sqrt{(-2)^2 - 4(3)(-4)}}{2(3)}$ $= \frac{2 \pm \sqrt{52}}{6}$ $x = 1,54 \text{ or } -0,87$  <b>OF</b> $3x^2 = 2(x+2)$ $3x^2 - 2x - 4 = 0$ $x^2 - \frac{2}{3}x = \frac{4}{3}$ $\left(x - \frac{1}{3}\right)^2 = \frac{4}{3} + \frac{1}{9}$ $\left(x - \frac{1}{3}\right)^2 = \frac{13}{9}$ $x - \frac{1}{3} = \pm \frac{\sqrt{13}}{3}$ $x = \frac{1 \pm \sqrt{13}}{3}$ $x = 1,54 \text{ of } -0,87$	<div style="border: 1px solid black; padding: 5px;"> <p><b>Nota:</b> Geen penalisering vir verkeerde afronding van antwoorde.</p> <p>As kandidate 'n negatiewe getal onder die vierkantswortel kry, maksimum 2 / 4</p> <p>Substitusie in die verkeerde formule, geen punte</p> </div>	✓ standaardvorm ✓✓ substitusie ✓ antwoorde (4)  ✓ uitbreiding  ✓ voltooiing van kwadraat/vierkant  ✓ $\pm \frac{\sqrt{13}}{3}$ ✓ antwoorde

<p>1.1.3</p>	<div> <math display="block">4 + 5x &gt; 6x^2</math> <math display="block">0 &gt; 6x^2 - 5x - 4</math> <math display="block">0 &gt; (3x - 4)(2x + 1)</math> </div> <div> <math display="block">-6x^2 + 5x + 4 &gt; 0</math> <math display="block">6x^2 - 5x - 4 &lt; 0</math> <math display="block">(3x - 4)(2x + 1) &lt; 0</math> </div> <div> <p>Kritieke waardes: <math>x = \frac{5 \pm \sqrt{121}}{12}</math></p> <math display="block">x = -\frac{1}{2} \text{ or } \frac{4}{3}</math> </div> <div> <table style="margin: auto;"> <tr> <td style="text-align: center;">+</td><td style="text-align: center;">0</td><td style="text-align: center;">-</td><td style="text-align: center;">0</td><td style="text-align: center;">+</td></tr> <tr> <td></td><td style="text-align: center;"><math>-\frac{1}{2}</math></td><td></td><td style="text-align: center;"><math>\frac{4}{3}</math></td><td></td></tr> </table> <p style="text-align: center;"><b>OF</b></p>  </div> <div> <math display="block">-\frac{1}{2} &lt; x &lt; \frac{4}{3} \quad \textbf{OF} \quad x \in \left(-\frac{1}{2}; \frac{4}{3}\right) \quad \textbf{OF} \quad -\frac{1}{2} &lt; x \text{ en } x &lt; \frac{4}{3}</math> <p><b>OF</b></p> <math display="block">-6x^2 + 5x + 4 &gt; 0</math> <math display="block">(-3x + 4)(2x + 1) &gt; 0</math> <p>kritieke waardes: <math>-\frac{1}{2}</math> en <math>\frac{4}{3}</math></p> <div> <table style="margin: auto;"> <tr> <td style="text-align: center;">-</td><td style="text-align: center;">0</td><td style="text-align: center;">+</td><td style="text-align: center;">0</td><td style="text-align: center;">-</td></tr> <tr> <td></td><td style="text-align: center;"><math>-\frac{1}{2}</math></td><td></td><td style="text-align: center;"><math>\frac{4}{3}</math></td><td></td></tr> </table> <p style="text-align: center;"><b>OF</b></p>  </div> </div> <div> <math display="block">-\frac{1}{2} &lt; x &lt; \frac{4}{3} \quad \textbf{OF} \quad x \in \left(-\frac{1}{2}; \frac{4}{3}\right) \quad \textbf{OF} \quad -\frac{1}{2} &lt; x \text{ en } x &lt; \frac{4}{3}</math> </div>	+	0	-	0	+		$-\frac{1}{2}$		$\frac{4}{3}$		-	0	+	0	-		$-\frac{1}{2}$		$\frac{4}{3}$		<p>✓ korrekte ongelykheid</p> <p>✓ faktore</p> <p>✓ kritieke waardes <math>-\frac{1}{2}</math> en <math>\frac{4}{3}</math></p> <p>✓ antwoord</p> <p style="text-align: right;">(4)</p> <p>✓ korrekte ongelykheid</p> <p>✓ faktore</p> <p>✓ kritieke waardes <math>-\frac{1}{2}</math> en <math>\frac{4}{3}</math></p> <p>✓ antwoord</p> <p style="text-align: right;">(4)</p>
+	0	-	0	+																		
	$-\frac{1}{2}$		$\frac{4}{3}$																			
-	0	+	0	-																		
	$-\frac{1}{2}$		$\frac{4}{3}$																			
<p>1.2</p>	<div> <math display="block">3y = 2x</math> <math display="block">y = \frac{2x}{3}</math> <math display="block">x^2 - \left(\frac{2x}{3}\right)^2 + 2x - \left(\frac{2x}{3}\right) = 1</math> <math display="block">x^2 - \frac{4x^2}{9} + 2x - \frac{2x}{3} = 1</math> <math display="block">9x^2 - 4x^2 + 18x - 6x = 9</math> <math display="block">5x^2 + 12x - 9 = 0</math> <math display="block">(5x - 3)(x + 3) = 0</math> </div> <div> <p style="text-align: center;"><b>OF</b></p> <math display="block">x^2 - \left(\frac{2x}{3}\right)^2 + 2x - \left(\frac{2x}{3}\right) = 1</math> <math display="block">\frac{5x^2}{9} + \frac{4x}{3} - 1 = 0</math> <math display="block">x = \frac{-\frac{4}{3} \pm \sqrt{\left(\frac{4}{3}\right)^2 - 4\left(\frac{5}{9}\right)(-1)}}{2\left(\frac{5}{9}\right)}</math> <math display="block">= \frac{-\frac{4}{3} \pm \sqrt{\frac{16}{9} + \frac{20}{9}}}{\frac{10}{9}}</math> </div>	<p>✓ <math>y = \frac{2x}{3}</math></p> <p>✓ substitusie</p> <p>✓ vereenvoudiging</p> <p>✓ standaardvorme</p> <p>✓ faktore of substitusie in die korrekte formule</p> <p>✓ x-antwoorde</p>																				

$x = \frac{3}{5}$ of $x = -3$ $y = \frac{2}{5}$ of $y = -2$ $(x; y) = \left(\frac{3}{5}; \frac{2}{5}\right)$ of $(-3; -2)$ <b>OF</b> $3y = 2x$ $x^2 - y^2 + 2x - y = 1$ $4x^2 - 4y^2 + 8x - 4y = 4$ $(2x)^2 - 4y^2 + 8x - 4y = 4$ $(3y)^2 - 4y^2 + 4(3y) - 4y = 4$ $9y^2 - 4y^2 + 8y = 4$ $5y^2 + 8y - 4 = 0$ $(5y - 2)(y + 2) = 0$ $y = \frac{2}{5}$ of $y = -2$ $x = \frac{3}{5}$ of $x = -3$ $(x; y) = \left(\frac{3}{5}; \frac{2}{5}\right)$ of $(-3; -2)$ <b>OF</b> $3y = 2x$ $x = \frac{3y}{2}$ $\left(\frac{3y}{2}\right)^2 - y^2 + 2\left(\frac{3y}{2}\right) - y = 1$ $\frac{9y^2}{4} - y^2 + 3y - y = 1$ $9y^2 - 4y^2 + 8y = 4$ $5y^2 + 8y - 4 = 0$ $(5y - 2)(y + 2) = 0$ $y = \frac{2}{5}$ of $y = -2$ $x = \frac{3}{5}$ of $x = -3$ $(x; y) = \left(\frac{3}{5}; \frac{2}{5}\right)$ of $(-3; -2)$	$x = 0,6$ of $x = -3$ $y = 0,4$ of $y = -2$ <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <b>Nota:</b>          As daar 'n wiskundige          afbreek is,          d.i. as <math>y = 2x - 3</math> gebruik word,          maks 3 / 7       </div>	✓ y-antwoorde (7)  ✓ vereenvoudiging van oorspronklike kwadratiese vgl ✓ substitusie $2x = 3y$  ✓ vereenvoudiging  ✓ standaardvorm  ✓ faktore of substitusie in die korrekte formule ✓ x-antwoorde  ✓ y-antwoorde (7)   ✓ $x = \frac{3y}{2}$ ✓ substitusie   ✓ vereenvoudiging  ✓ standaardvorme  ✓ faktore of substitusie in korrekte formule ✓ y-antwoorde  ✓ x-antwoorde (7)
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<p>1.3</p>	$\frac{5^{2007} + 5^{2010}}{5^{2008} + 5^{2009}}$ $= \frac{5^{2007} + 5^{2007} \cdot 5^3}{5^{2008} + 5^{2008} \cdot 5}$ $= \frac{5^{2007}(1 + 5^3)}{5^{2008}(1 + 5)}$ $= \frac{126}{5 \times 6}$ $= \frac{126}{30}$ $= \frac{21}{5}$ $= 4\frac{1}{5}$ $\approx 4$ <p><b>OF</b></p> $\frac{5^{2007} + 5^{2010}}{5^{2008} + 5^{2009}} \quad (\text{deel elke term deur } 5^{2007})$ $= \frac{5^{2007} + 5^{2007} \cdot 5^3}{5^{2007} \cdot 5 + 5^{2007} \cdot 5^2}$ $= \frac{1 + 5^3}{5 + 5^2}$ $= \frac{126}{30}$ $\approx 4$ <p><b>OF</b></p> <p>stel <math>x = 2009</math></p> $\frac{5^{x-2} + 5^{x+1}}{5^{x-1} + 5^x}$ $= \frac{5^x(5^{-2} + 5)}{5^x(5^{-1} + 1)}$ $= \frac{1}{25} + 5$ $= \frac{1}{5} + 1$ $= \frac{21}{5}$ $= 4\frac{1}{5}$ $\approx 4$ <p><b>OF</b></p> <p>stel <math>x = 2007</math></p> $\frac{5^x + 5^{x+3}}{5^{x+1} + 5^{x+2}}$ $= \frac{5^x(1 + 5^3)}{5^x(5 + 5^2)}$ $= \frac{1 + 125}{5 + 25}$ $= \frac{126}{30}$ $= \frac{21}{5}$ $= 4\frac{1}{5}$ $\approx 4$ <p><b>OF</b></p> <p>stel <math>x = 2010</math></p> $\frac{5^{x-3} + 5^x}{5^{x-2} + 5^{x-1}}$ $= \frac{5^x(5^{-3} + 1)}{5^x(5^{-2} + 5^{-1})}$ $= \frac{\frac{1}{125} + 1}{\frac{1}{25} + \frac{1}{5}}$ $= \frac{12256}{30}$ $= \frac{21}{5}$ $= 4\frac{1}{5}$ $\approx 4$	<p>✓ <math>\frac{5^{2007} + 5^{2007} \cdot 5^3}{5^{2008} + 5^{2008} \cdot 5}</math></p> <p>✓ vereenvoudiging na <math>\frac{1 + 5^3}{5 + 5^2}</math> of <math>\frac{126}{30}</math> of <math>\frac{21}{5}</math></p> <p>✓ antwoord = 4 (3)</p> <p>✓ <math>\frac{5^{2007} + 5^{2007} \cdot 5^3}{5^{2007} \cdot 5 + 5^{2007} \cdot 5^2}</math></p> <p>✓ vereenvoudiging na <math>\frac{1 + 5^3}{5 + 5^2}</math> of <math>\frac{126}{30}</math> of <math>\frac{21}{5}</math></p> <p>✓ antwoord = 4</p> <p>✓ <math>\frac{5^{x-2} + 5^{x+1}}{5^{x-1} + 5^x}</math> of <math>\frac{5^x + 5^{x+3}}{5^{x+1} + 5^{x+2}}</math> of <math>\frac{5^{x-3} + 5^x}{5^{x-2} + 5^{x-1}}</math></p> <p>✓ vereenvoudiging na <math>\frac{1 + 5^3}{5 + 5^2}</math> of <math>\frac{\frac{1}{125} + 1}{\frac{1}{25} + \frac{1}{5}}</math> of <math>\frac{1}{5} + 5</math> of <math>\frac{25}{1} + 1</math></p> <p>✓ antwoord = 4 (3)</p> <p>[21]</p>
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**VRAAG 2**

2.1	$\sum_{n=1}^{20} 3^{n-2}$ $= \frac{1}{3} + 1 + 3 + \dots \text{ tot 20 terme}$ $= \frac{1}{3} (3^{20} - 1)$ $= \frac{3^{20} - 1}{3 - 1} \quad ; \quad r = 3; n = 20$ $= \frac{3^{20} - 1}{6}$ $= 581130733,33 \quad \text{OF} \quad 581130733\frac{1}{3} \quad \text{OF} \quad 581130733,3$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota:</b> Die punt vir <math>n = 20</math> kan geïmpliseer word deur substitusie in die formule</p> <p><b>Nota:</b> As slegs gelaat word as</p> <math display="block">\frac{1}{3} + 1 + 3 + 9 + 27 + 81 + 243 + 729 + 2187 + 6561 + 19683</math> <math display="block">+ 59049 + 177147 + 531441 + 1594323 + 4782969</math> <math display="block">+ 14348907 + 43046721 + 129140163 + 387420489</math> <p>,dan 2 / 4</p> <p><b>Nota:</b> Die 20<sup>ste</sup> term is <b>387 420 489</b></p> <p><b>Slegs antwoord:</b> 3 / 4</p> </div>	$\checkmark a = \frac{1}{3}$ $\checkmark r = 3$ $\checkmark n = 20$  $\checkmark$ antwoord (4)
2.2.1	$5x ; x^2 ; \frac{x^3}{5} ; \dots$ $r = \frac{x}{5}$ $-1 < \frac{x}{5} < 1$ $-5 < x < 5$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota:</b> As antwoord <math>-1 &lt; x &lt; 1</math>, slegs <b>1 punt</b></p> <p><b>Nota:</b> As antwoord <math>-5 \leq x \leq 5</math> is, slegs <b>2 / 3</b></p> </div> <p><b>Antwoord kan geskryf word as</b> <math>x \in (-5 ; 5)</math></p>	$\checkmark r = \frac{x}{5} \text{ of } \frac{x^2}{5x}$ $\checkmark -1 < r < 1$ $\checkmark$ antwoord (3)
2.2.2	$r = \frac{2}{5} \text{ en } a = 10$ $S_{\infty} = \frac{10}{1 - \frac{2}{5}}$ $= \frac{50}{3} \text{ of } 16,67$	$\checkmark a = 10$  $\checkmark$ antwoord (2)

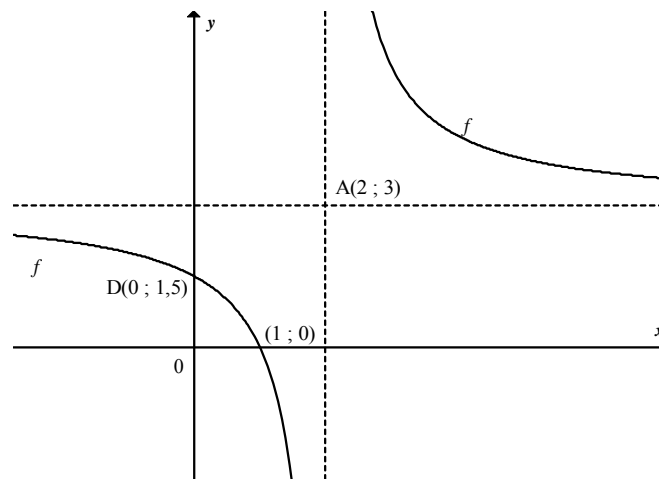
2.3.1	$T_n = 20 + 3(n-1)$ $101 = 20 + (n-1)3$ $84 = 3n$ $n = 28$  <b>OF</b>  $T_n = 3n + 17$ $101 = 3n + 17$ $84 = 3n$ $n = 28$	<b>Nota:</b> As $n = -\frac{17}{3}$ slegs 1 / 2 punte  <b>Slegs antwoord:</b> Volpunte	✓ $101 = 20 + 3(n-1)$ of $101 = 3n + 17$ ✓ antwoord (2)   ✓ substitusie ✓ antwoord (2)
2.3.2	$23 + 29 + \dots$ tot 14 terme  $= \frac{14}{2}[2(23) + (14-1)6]$ OR $\frac{14}{2}[23 + 101]$ $= 868$  <b>OF</b> Ewe getalle = 20 ; 26 ; ... ; 98   $98 = 20 + (6-1)n$ $98 = 6n + 14$ $84 = 6n$ $14 = n$ $S_{\text{oorblywende}} = \frac{28}{2}[2(20) + (27)(3)] - \frac{14}{2}[2(20) + (13)(6)]$ $= 14(121) - 7(118)$ $= 1694 - 826$ $= 868$  <b>OF</b>  Ry is 20; 23; 26; 29; 32; 35; 38; 41; 44; 47; 50; 53; 56; 59; 62; 65; 68; 71; 74; 77; 80; 83; 86; 89; 92; 95; 98; 101 Somme van die onewe getalle $= 23 + 29 + 35 + 41 + 47 + 53 + 59 + 65 + 71 + 77 + 83 + 89 + 95 + 101$ $= 868$	<b>Nota:</b> As “tot 14 terme” weggelaat word, moenie penaliseer nie  <b>Nota:</b> As verkeerde waarde vir $n$ , maks 4 / 6  <b>Nota:</b> As verkeerde formule, maks 2 / 6   <b>Note:</b> If the candidate only works out the even numbers i.e. 826, then 3 / 6 marks  If only 1694 max 1 / 6 marks	✓ $23 + 29 + \dots$ ✓ $a = 23$ ✓ $n = 14$  ✓ $d = 6$ of $l = 101$ ✓ substitusie in korrekte formule ✓ antwoord (6)  <b>OF</b>  ✓ $98 = 20 + (6-1)n$ <b>OF</b> ✓ $98 = 6n + 14$ ✓ $14 = n$  ✓ substitusie in korrekte formule ✓ 1694  ✓ 826 ✓ antwoord (6)  Volpunte  <b>[17]</b>

**VRAAG 3**

3.1	<div style="text-align: center;"> </div> <p>Eerste verskil : 5; <math>x - 9</math>; <math>37 - x</math>  Tweede verskil : <math>x - 14</math>; <math>-2x + 46</math>  <math>x - 14 = 46 - 2x</math>  <math>3x = 60</math>  <math>x = 20</math></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>Nota:</b>  Slegs antwoord:  Volpunte </div> <p><b>OF</b></p> $(x - 9) + (x - 14) = 37 - x$ $2x - 23 = 37 - x$ $3x = 60$ $x = 20$ <p style="text-align: center;"><b>OF</b></p> $x + (x - 9) + (x - 14) = 37$ $3x - 23 = 37$ $3x = 60$ $x = 20$ <p><b>OF</b></p> $(x - 9) - 5 = (37 - x) - (x - 9)$ $x - 14 = -2x + 46$ $3x = 60$ $x = 20$	✓ eerste verskille 5; $x - 9$ ; $37 - x$ ✓ tweede verskil ✓ antwoord  ✓ gelykstel aan  ✓ manipulasie ✓ antwoord  ✓ gelykstel aan ✓ manipulasie  ✓ antwoord  (3)
3.2	<div style="text-align: center;"> </div> <p><math>2a = 6</math>  <math>a = 3</math>  <math>T_n = 3n^2 + bn + c</math>  <math>3 + b + c = 4 \quad \dots T_1</math>  <math>b + c = 1</math>  <math>12 + 2b + c = 9 \quad \dots T_2</math>  <math>2b + c = -3</math>  <math>\therefore 9 + b = 5</math>  <math>b = -4</math>  en  <math>c = 4 - (-1) = 5</math>  <math>\therefore T_n = 3n^2 - 4n + 5</math></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>Nota:</b>  As <math>x</math> verkeerd is in  3.1 dan maks 2 / 4 </div>	✓ $a = 3$  ✓ $T_n = 3n^2 + bn + c$  ✓ $b = -4$ ✓ $c = 5$  (4)



$2a = 6$ $a = 3$ $T_0 = 5$ $c = 5$ $T_n = 3n^2 + bn + 5$ $4 = 3(1)^2 + b + 5$ $b = -4$ $T_n = 3n^2 - 4n + 5$  <b>OF</b> $a + b + c = 4 \quad \dots \text{i}$ $4a + 2b + c = 9 \quad \dots \text{ii}$ $16a + 4b + c = 37 \quad \dots \text{iii}$ $3a + b = 5$ $12a + 2b = 28$ $6a + b = 14$ $3a = 9$ $a = 3$ $b = -4$ $c = 5$ $T_n = 3n^2 - 4n + 5$	<b>OF</b> $2a = 6$ $a = 3$ $3a + b = 5$ $b = -4$ $a + b + c = 4$ $3 - 4 + c = 4$ $c = 5$ $T_n = 3n^2 - 4n + 5$  <b>OF</b> $T_n = 4 + (n-1)5 + \frac{6(n-1)(n-2)}{2}$ $= 4 + 5n - 5 + 3n^2 - 9n + 6$ $= 3n^2 - 4n + 5$	<b>OF</b> $\checkmark a = 3$ $\checkmark c = 5$ $\checkmark$ metode $\checkmark b = -4$  $\checkmark a = 3$ $\checkmark c = 5$ $\checkmark$ metode $\checkmark b = -4$  (4) [7]
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**VRAAG 4**

4.1	$x = 2$ $y = 3$  As $x = p ; y = q$ , dan 1 punt  <b>Nota:</b> As die kandidaat slegs die getal 2 of 3 neerskryf of slegs koördinate (2 ; 3), <b>geen punte</b>	<b>OF</b> $x$ -asimptoot = 2 $y$ -asimptoot = 3	✓ antwoord ✓ antwoord
4.2	$f(x) = \frac{a}{x-2} + 3$ $0 = \frac{a}{1-2} + 3$ $0 = -a + 3$ $a = 3$ $f(x) = \frac{3}{x-2} + 3$  <b>OF</b>  $y = \frac{a}{x-2} + 3$ $y - 3 = \frac{a}{x-2}$ $(x-2)(y-3) = a$ Maar (1;0) is op die grafiek $\therefore (-1)(-3) = a = 3$ $\therefore (x-2)(y-3) = 3$	<div>As die asimptote omgeruil word, dan is <math>f(x) = \frac{a}{x-3} + 2</math> <math>0 = \frac{a}{1-3} + 2</math> <math>a = 4</math> <math>f(x) = \frac{4}{x-3} + 2</math></div>	✓ substitusie van asimptote ✓ subs van (1 ; 0)  ✓ antwoord (3)  <b>OF</b>  ✓ vergelyking  ✓ subs van (1 ; 0) ✓ antwoord (3)
4.3	Wanneer $x = 0$ , $y = \frac{3}{0-2} + 3$ $= \frac{3}{2}$  $D\left(0; \frac{3}{2}\right)$	<div>As asimptote omgeruil word: <math>x = 0</math> <math>y = \frac{4}{0-3} + 2</math> <math>y = \frac{2}{3}</math> <math>D\left(0; \frac{2}{3}\right)</math></div>	✓ $x = 0$ ✓ $y = \frac{3}{2}$  (2)

4.4	$m_{AD} = \frac{3-1,5}{2-0}$ $= \frac{3}{4}$ $y = \frac{3}{4}x + \frac{3}{2}$ <p><b>OF</b></p> $4y = 3x + 6$ <p><b>OF</b></p> $y = mx + \frac{3}{2}$ $3 = m(2) + \frac{3}{2}$ $m = \frac{3}{4}$ $y = \frac{3}{4}x + \frac{3}{2}$	<p>✓ substitusie</p> <p>✓ gradient <math>\frac{3}{4}</math></p> <p>✓ antwoord (3)</p> <p>✓ substitusie van (2;3) en <math>c = \frac{3}{2}</math></p> <p>✓ gradient <math>\frac{3}{4}</math></p> <p>✓ antwoord</p>
4.5	$\frac{p+0}{2} = 2$ $p = 4$ $\frac{q+\frac{3}{2}}{2} = 3$ $q = 4\frac{1}{2}$ <p>Die ander snypunt is <math>\left(4; 4\frac{1}{2}\right)</math></p> <p><b>OF</b></p> <p>Die reël om die snypunt deur simmetrie te bereken is</p> $(x; y) \rightarrow \left(x+2; y+\frac{3}{2}\right)$ <p>Die ander snypunt is</p> $\left(2+2; 3+\frac{3}{2}\right)$ $= \left(4; 4\frac{1}{2}\right)$	<p>✓ <math>\frac{p+0}{2} = 2</math></p> <p>✓ <math>p = 4</math></p> <p>✓ <math>\frac{q+\frac{3}{2}}{2} = 3</math></p> <p>✓ <math>q = 4\frac{1}{2}</math></p> <p><b>Slegs antwoord: Volpunte</b></p> <p>Om te help met die toepassing van KA, die y-koordinaat sal <math>3 + (3 - y)</math> wees</p> <p>✓✓ x-antwoord</p> <p>✓✓ y-antwoord (4)</p>

	<p><b>OF</b></p> $\frac{3}{4}x + \frac{3}{2} = \frac{3}{x-2} + 3$ $3x(x-2) + 6(x-2) = 12 + 12(x-2)$ $3x^2 - 6x + 6x - 12 = 12 + 12x - 24$ $3x^2 - 12x = 0$ $3x(x-4) = 0$ $x = 0 \text{ and } x = 4$ <p>Die ander snypunt is <math>\left(4; 4\frac{1}{2}\right)</math></p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>As asimptote omgeruil word:</p> <math display="block">\frac{7}{6}x + \frac{2}{3} = \frac{4}{x-3} + 2</math> <math display="block">7x(x-3) + 4(x-3) = 4(6) + 2(6)(x-3)</math> <math display="block">7x^2 - 29x = 0</math> <math display="block">x(7x-29) = 0</math> <math display="block">x = 0 \text{ or } x = \frac{29}{7}</math> <p>Die ander snypunt is <math>\left(\frac{29}{7}; \frac{11}{2}\right)</math></p> </div>	<p>✓ gelykstel aan</p> <p>✓ standaardvorm</p> <p>✓ <math>x = 4</math></p> <p>✓ <math>y = 4\frac{1}{2}</math></p> <p style="text-align: right;">(4) [14]</p>
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**VRAAG 5**

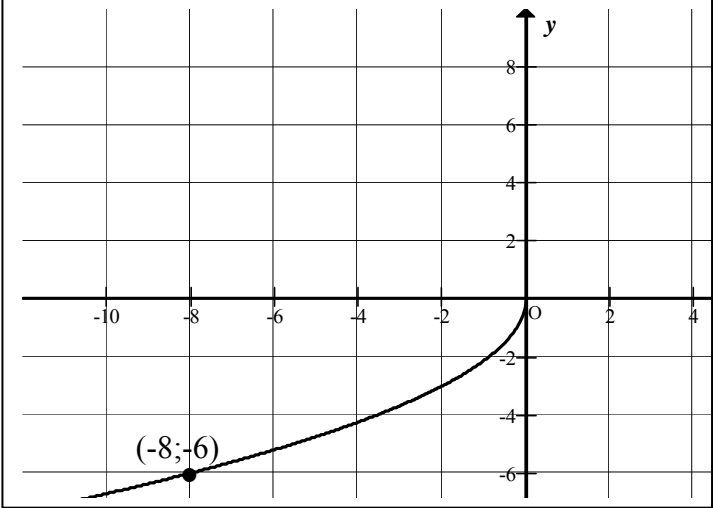
5.1	<p><math>f(x) = 4^{-x} - 2</math></p> <p>y-afsnit: <math>x = 0; y = 4^0 - 2 = -1; (0; -1)</math></p> <p>x-afsnit:</p> $4^{-x} - 2 = 0$ $4^{-x} = 2$ $\log 4^{-x} = \log 2$ $-x = \frac{\log 2}{\log 4}$ $-x = \frac{\log 2}{2 \log 2}$ $x = -\frac{1}{2}$ <p style="text-align: center;">x-afsnit is <math>\left(-\frac{1}{2}; 0\right)</math></p>	<p>✓✓ x-koordinaat</p> <p>✓✓ y-koordinaat</p> <p style="text-align: right;">(4)</p>
5.2	$y = -2$	<p>✓ vergelyking</p> <p style="text-align: right;">(1)</p>

## NSS – Memorandum

5.3		✓ asimptoot ✓ y-afsnit of x-afsnit ✓ vorm (dalend/afnemend) (3)
5.4	$g(x) = 4^{-x} - 2 + 2$ $g(x) = 4^{-x}$ <b>OF</b> $g(x) = \left(\frac{1}{4}\right)^x$ <b>OF</b> $g(x) = 2^{-2x}$ <b>OF</b> $g(x) = \left(\frac{1}{2}\right)^{2x}$	✓ vergelyking (1)
5.5	$4^{-x} - 2 = 3$ $4^{-x} = 5$ $-x \log 4 = \log 5$ $x = -\frac{\log 5}{\log 4}$ <b>OF</b> $x = -\log_4 5$ <b>OF</b> $x = \log_{\frac{1}{4}} 5$ <b>OF</b> $x = \log_4 \frac{1}{5}$ <b>OF</b> $x = -1,16$ <b>OF</b> $x = \frac{\log 5}{\log \frac{1}{4}}$ <b>OF</b> $x = \frac{\log \frac{1}{5}}{\log 4}$	✓ $4^{-x} = 5$ ✓ $-x \log 4 = \log 5$ ✓ antwoord (3) <b>[12]</b>

## VRAAG 6

6.1	$f(x) = ax^2$ $-8 = a(-6)^2$ $-8 = 36a$ $a = -\frac{8}{36}$ <b>OF</b> $a = -\frac{2}{9}$	✓ substitusie ✓ antwoord (2)
6.2	$f(x): y = -\frac{2}{9}x^2$	

	$x = -\frac{2}{9}y^2$ $9x = -2y^2$ $-\frac{9x}{2} = y^2$ $y = \pm\sqrt{\frac{-9x}{2}}, \text{ omdat } y \leq 0$ $y = -\sqrt{\frac{-9x}{2}} \text{ OF } y = -3\sqrt{\frac{-x}{2}}$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota:</b> As kandidaat nie die waarde van <math>a</math> vervang nie, is die antwoord  <math>y = -\sqrt{\frac{x}{a}}</math>  dan 2 / 3 punte</p> </div>	✓ ruil $x$ en $y$ om  ✓ $y^2 = -\frac{9x}{2}$ or $y = \pm\sqrt{\frac{-9x}{2}}$  ✓ $y = -\sqrt{\frac{-9x}{2}}$  (3)
6.3	$y \leq 0$  <b>OF</b>  $y \in (-\infty ; 0]$	✓ antwoord  (1)
6.4		✓ vorm (derde kwadrant) (konkaaf opwaarts) ✓ Enige punt op die grafiek, behalwe (0 ; 0)  Die punt wat vanuit oorspronklike grafiek ooreenstem (- 8 ; - 6)  (2)
6.5	$y = -f^{-1}(x)$ $= \sqrt{\frac{-9x}{2}}$ <b>OF</b> $y = -\frac{2}{9}x^2$  Releksie in $y = x$ : $x = -\frac{2}{9}y^2$ $-\frac{9}{2}x = y^2$ $y = -\sqrt{\frac{-9x}{2}}$  Releksie in $y$ -as: $y = \sqrt{\frac{-9x}{2}}$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota:</b> As kandidaat <math>(x ; y) \rightarrow (y ; -x)</math>, dan 2 / 3 punte</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota:</b> As kandidaat nie die waarde van <math>a</math> vervang nie, is die antwoord  <math>y = \sqrt{\frac{x}{a}}</math>  dan volpunte.</p> </div>	✓✓ $-f^{-1}(x)$  ✓ antwoord  ✓ $x = -\frac{2}{9}y^2$ ✓ $y = -\sqrt{\frac{-9x}{2}}$  ✓ $y = \sqrt{\frac{-9x}{2}}$  (3) <b>[11]</b>

**VRAAG 7**

7.1	$A = P(1+i)^n$ $2P = P\left(1 + \frac{r}{4}\right)^{6 \times 4}$ $2 = \left(1 + \frac{r}{4}\right)^{24}$ $1 + \frac{r}{4} = 2^{\frac{1}{24}}$ $r = 4\left(2^{\frac{1}{24}} - 1\right)$ $r = 4\left(2^{\frac{1}{24}}\right) - 4$ $r = 0,1172 \dots$ <p>koers = 11,72% p.j. kwartaalliks saamgestel</p> <p><b>OF</b></p> $A = P(1+i)^n$ $2P = P\left(1 + \frac{r}{400}\right)^{6 \times 4}$ $2 = \left(1 + \frac{r}{400}\right)^{24}$ $1 + \frac{r}{400} = 2^{\frac{1}{24}}$ $r = 400\left(2^{\frac{1}{24}} - 1\right)$ $r = 400\left(2^{\frac{1}{24}}\right) - 400$ $r = 11,72\% \text{ p.j.}$ <div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p><b>Nota:</b> Penaliseer met 1 vir verkeerde afronding.</p> </div>	<p>✓ 2P</p> <p>✓ <math>\frac{r}{4}</math> en 24</p> <p>✓ <math>1 + \frac{r}{4} = 2^{\frac{1}{24}}</math></p> <p>✓ <math>r = 4\left(2^{\frac{1}{24}}\right) - 4</math></p> <p>✓ antwoord</p> <p>✓ 2P</p> <p>✓ <math>\frac{r}{400}</math> en 24</p> <p>✓ <math>1 + \frac{r}{400} = 2^{\frac{1}{24}}</math></p> <p>✓ <math>r = 400\left(2^{\frac{1}{24}} - 1\right)</math></p> <p>✓ antwoord</p> <p style="text-align: right;">(5)</p>
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7.2.1	$A = 10000 \left( 1 + \frac{0,095}{12} \right)^5$ $= R\ 10\ 402,15$	✓ substitusie in korrekte formule  ✓ antwoord  (2)
7.2.2	$10402,15 = \frac{450 \left[ 1 - \left( 1 + \frac{0,095}{12} \right)^{-n} \right]}{\frac{0,095}{12}}$ $0,183000787 = 1 - \left( 1 + \frac{0,095}{12} \right)^{-n}$ $\left( 1 + \frac{0,095}{12} \right)^{-n} = 0,816999213$ $\log \left( 1 + \frac{0,095}{12} \right)^{-n} = \log 0,816999213$ $-n \log \left( 1 + \frac{0,095}{12} \right) = \log 0,816999213 \dots$ $n = 25,63151282 \dots$ $n = 25,63 \text{ maande}$ $n = 26$ <p>Aanvaar: <math>n = 31</math> (a.g.v. eerste 5 maande)</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <b>Nota:</b>          Verkeerde          Formule          Geen punte       </div> <p><b>OF</b></p> $10402,15 \left( 1 + \frac{0,095}{12} \right)^n = \frac{450 \left[ \left( 1 + \frac{0,095}{12} \right)^n - 1 \right]}{\frac{0,095}{12}}$ $10402,15 \left( 1 + \frac{0,095}{12} \right)^n = 56842,10526 \left[ \left( 1 + \frac{0,095}{12} \right)^n - 1 \right]$ $56842,10526 = 46439,95526 \left( 1 + \frac{0,095}{12} \right)^n$ $\log 1,223991387 = n \log \left( 1 + \frac{0,095}{12} \right)$ $n = \frac{\log 1,223991387}{\log \left( 1 + \frac{0,095}{12} \right)}$ $n = 25,63 \text{ maande}$ $n = 26$ <p>Aanvaar: <math>n = 31</math> (a.g.v. eerste 5 maande)</p>	✓ 10 402,15 ✓ substitusie in huidige waarde formule   ✓ toepassing van logs   ✓ antwoord  (4)   ✓ 10 402,15 ✓ substitusie in toekomstige waarde formule   ✓ toepassing van logs   ✓ antwoord  (4)

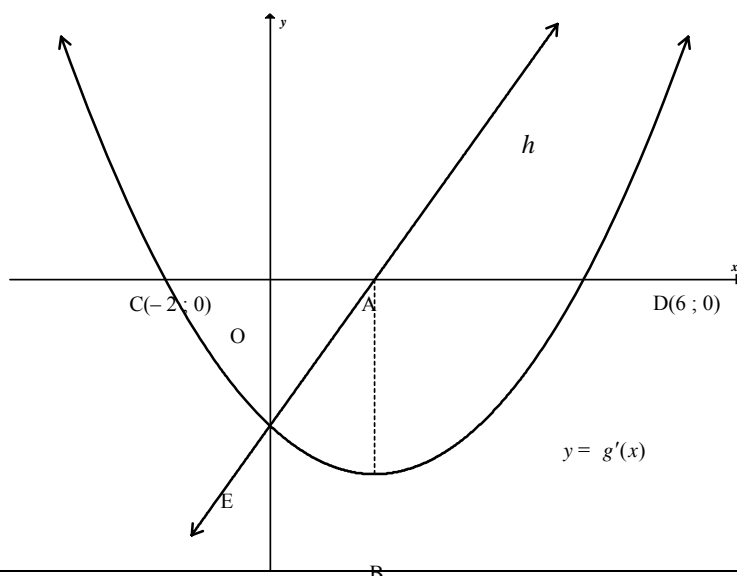


	<div style="border: 1px solid black; padding: 5px;"> <p><b>Nota:</b> As R 10 000 as die huidige waarde gebruik word, dan word <math>n = 25,53</math> verkry. Maks 3 / 4 punte.</p> </div>	
7.2.3	<p>Balans uitstaande na 25 maande</p> $= 10402,15 \left( 1 + \frac{0,095}{12} \right)^{25} - \frac{450 \left[ \left( 1 + \frac{0,095}{12} \right)^{25} - 1 \right]}{\frac{0,095}{12}}$ <p>= R 282,36</p> <p><b>OF</b></p> <p>Balans Uitstaande na 25 maande</p> $= 10000 \left( 1 + \frac{0,095}{12} \right)^{30} - \frac{450 \left[ \left( 1 + \frac{0,095}{12} \right)^{25} - 1 \right]}{\frac{0,095}{12}}$ <p>= R 282,36</p> <p><b>OF</b></p> <p>Balans Uitstaande na 25 maande</p> $= \frac{450 \left[ 1 - \left( 1 + \frac{0,095}{12} \right)^{-0,631512804} \right]}{\frac{0,095}{12}}$ <p>= R 282,36</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><b>Nota: Aanvaar</b> As 'n kandidaat – 0,63 gebruik, is die finale antwoord R 281,68</p> </div>	<p>✓ korrekte formule ✓</p> $\frac{450 \left[ \left( 1 + \frac{0,095}{12} \right)^{25} - 1 \right]}{\frac{0,095}{12}}$ <p>✓ antwoord</p> <p style="text-align: right;">(3) <b>[14]</b></p>

**VRAAG 8**

8.1	$g(x) = x^2 - 5$ $g'(x) = \lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 - 5 - (x^2 - 5)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - 5 - x^2 + 5}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h)}{h}$ $= \lim_{h \rightarrow 0} (2x + h)$ $= 2x$ <p><b>OF</b></p> $g(x) = x^2 - 5$ $g'(x) = \lim_{h \rightarrow 0} \frac{g(x+h) - g(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 - 5 - (x^2 - 5)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 - x^2}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h+x)(x+h-x)}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x+h)}{h}$ $= \lim_{h \rightarrow 0} (2x+h)$ $= 2x$	<p><b>Nota:</b> As die notasie verkeerd is, penaliseer met 1 punt</p> <p>As kandidate aftrek en <math>x^2 + 2xh + h^2 - 5 - x^2 - 5</math> in die noemer verkry en dan hulself korrigeer, maks 2 / 5</p> <p>Slegs antwoord: 0 / 5</p> <ul style="list-style-type: none"> <li>✓ formule</li> <li>✓ substitusie</li> <li>✓ uitbreiding</li> <li>✓ <math>2x + h</math></li> <li>✓ antwoord</li> </ul>
8.2	$y = \frac{x^6}{2} + 4\sqrt{x}$ $y = \frac{1}{2}x^6 + 4x^{\frac{1}{2}}$ $\frac{dy}{dx} = 3x^5 + 2x^{-\frac{1}{2}}$	<p><b>Nota:</b> As <math>\frac{dy}{dx}</math> of <math>y'</math> weggelaat word, penaliseer met 1 punt</p> <p>As 'n kandidaat die korrekte afgeleide van 'n verkeerde funksie kry, dan maks 1 / 3</p> <ul style="list-style-type: none"> <li>✓ <math>+4x^{\frac{1}{2}}</math></li> <li>✓ <math>3x^5</math></li> <li>✓ <math>2x^{-\frac{1}{2}}</math></li> </ul>

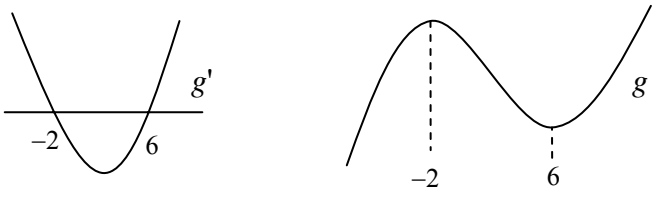
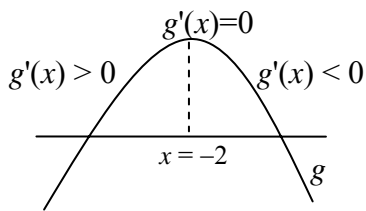
8.3	$g(x) = ax^2 + \frac{b}{x}$ $g(x) = ax^2 + bx^{-1}$ $g'(x) = 2ax - bx^{-2}$ $0 = 2a(4) - \frac{b}{(4)^2}$ $8a = \frac{b}{16}$ $b = 128a$ $96 = a(4)^2 + \frac{b}{4}$ $96 = 16a + \frac{1}{4}(128a)$ $96 = 48a$ $a = 2$ $b = 256$ <p><b>OF</b></p> $g'(x) = 2ax - \frac{b}{x^2}$ $g'(4) = 8a - \frac{b}{16} = 0$ $g(4) = 16a + \frac{b}{4} = 96$ $32a - \frac{b}{4} = 0$ $48a = 96$ $a = 2$ $b = 256$	$\checkmark g'(x) = 2ax - bx^{-2}$ $\checkmark 0 = g'(x)$ $\checkmark 2a(4) - \frac{b}{(4)^2}$ $\checkmark \text{subs } (4 ; 96)$ $\checkmark a = 2$ $\checkmark b = 256$ <p style="text-align: right;">(6)</p> $\checkmark g'(x) = 2ax - \frac{b}{x^2}$ $\checkmark g'(4) = 8a - \frac{b}{16}$ $\checkmark g'(x) = 0$ $\checkmark g(4) = 16a + \frac{b}{4} = 96$ $\checkmark a = 2$ $\checkmark b = 256$ <p style="text-align: right;">(6) [14]</p>
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**VRAAG 9**

9.1	Die y-afsnit van g is E(0 ; - 4) <b>OF</b> $x = 0$ en $y = - 4$	✓ antwoord (1)
9.2	$y = a(x + 2)(x - 6)$ $- 4 = a(0 + 2)(0 - 6)$ $- 4 = - 12a$ $- 12a = - 4$ $a = \frac{1}{3}$ $y = \frac{1}{3}(x + 2)(x - 6)$ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$ <b>OF</b> $g'(0) = - 4 = c$ $g'(x) = ax^2 + bx - 4$ $g'(-2) = 0$ $4a - 2b - 4 = 0$ $b = 2a - 2$ $g''(2) = 0$ $2a(2) + b = 0$ $b = - 4a$ $2a - 2 = - 4a$ $a = \frac{1}{3}$ $b = - \frac{4}{3}$ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$	✓ Opstel van vergelyking ✓ subs (0;-4)  ✓ $a = \frac{1}{3}$  ✓ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$    ✓ substitusie $x = -2$ en $g'(x) = 0$    ✓ $g''(2) = 0$    ✓ $a = \frac{1}{3}$    ✓ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$

	$c = -4$ $4a - 2b - 4 = 0$ $36a + 6b - 4 = 0$ $48a - 16 = 0$ $a = \frac{1}{3}$ $b = -\frac{4}{3}$ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$ <p><b>OF</b></p> $y = a(x+2)(x-6)$ $= a(x^2 - 4x - 12)$ $= ax^2 - 4ax - 12a$ $-12a = -4$ $a = \frac{1}{3}$ $y = \frac{1}{3}(x+2)(x-6)$ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$ <p><b>OF</b></p>	<p>✓ opstel van vergelyking</p> <p>✓ gelyktydige vergelyking</p> <p>✓ <math>a = \frac{1}{3}</math></p> <p>✓ <math>y = \frac{1}{3}x^2 - \frac{4}{3}x - 4</math></p> <p>✓ opstel van vergelyking</p> <p>✓ <math>ax^2 - 4ax - 12a</math></p> <p>✓ <math>-12a = -4</math></p> <p>✓ <math>y = \frac{1}{3}x^2 - \frac{4}{3}x - 4</math></p> <p>(4)</p>
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	$\frac{dy}{dx} = 2ax + b$ $0 = 2a(2) + b$ $b = -4a$ <p>HIERDIE EEN OF DIE ANDER EEN</p> <p>subs (6 ; 0)</p> $0 = 36a + 6b - 4$ $4 = 36a + 6b$ $2 = 18a + 3b$ $2 = 18a + 3(-4a)$ $2 = 6a$ $a = \frac{1}{3}$ $b = -\frac{4}{3}$ $y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$	$\checkmark b = -4a$ $\checkmark \text{ gelyktydige vergelyking}$ $\checkmark a = \frac{1}{3}$ $\checkmark y = \frac{1}{3}x^2 - \frac{4}{3}x - 4$ <p>(4)</p>
9.3	<p>By draaipunt <math>g'(x) = 0</math></p> <p><math>x = -2</math> en <math>x = 6</math></p>	$\checkmark x = -2$ $\checkmark x = 6$ <p>(2)</p>
9.4	$x = \frac{-2+6}{2}$ $x = 2$ <p><b>OF</b></p> <p><math>x</math>-waarde van infleksiepunt van <math>g</math> is by A.</p> $g''(x) = 0$ $\frac{2x}{3} - \frac{4}{3} = 0$ $2x - 4 = 0$ $2x = 4$ $x = 2$ <p><b>OF</b></p> $x = -\frac{b}{2a}$ $x = \frac{\frac{4}{3}}{2(\frac{1}{3})}$ $x = 2$ <p><b>OF</b></p> $g'(x) = \frac{1}{3}(x-2)^2 - \frac{16}{3}$ $x = 2$	$\checkmark x = \frac{-2+6}{2}$ $\checkmark \text{ antwoord}$ <p>(2)</p> <p><b>OF</b></p> $\checkmark 2x - 4 = 0$ <p>antwoord</p> <p>(2)</p>
✓9.5	$g'(x) > 0 \text{ vir } x < -2, \text{ so } g \text{ is stygend vir } x < -2.$ $g'(x) < 0 \text{ vir } x > -2, \text{ so } g \text{ is dalend vir } x > -2.$ $\therefore g \text{ het 'n lokale maksimum by } x = -2, \text{ omdat die grafiek stygend}$	$\checkmark g'(x) > 0$ $\checkmark g \text{ is stygend vir } x < -2$ $\checkmark g \text{ is dalend vir } x > -2$

	<p>is en daarna dalend</p> <p><b>OF</b></p>  <p><math>\therefore g</math> het 'n lokale maksimum by <math>x = -2</math></p> <p><b>OF</b></p>  <p><b>OF</b></p> <p><math>g'(-2) = 0</math> en <math>g''(-2) &lt; 0</math> so die grafiek is konkaf afwaarts by <math>x = -2</math>, so <math>g</math> het 'n lokale maksimum</p>	<p><math>x &gt; -2</math></p> <p>(3)</p> <p>✓ <math>g'(x) &gt; 0</math> vir <math>x &lt; -2</math></p> <p>✓ <math>g'(x) &lt; 0</math> vir <math>x &gt; -2</math></p> <p>✓ maks by <math>x = -2</math></p> <p>(3)</p> <p>✓ <math>g'(-2) = 0</math></p> <p>✓ <math>g''(-2) &lt; 0</math></p> <p>✓ lokale maksimum</p> <p>(3)</p> <p><b>[12]</b></p>
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**VRAAG 10**

10.1	$V = \pi r^2 h + 2 \times \frac{1}{2} \times \frac{4}{3} \pi r^3$ $\frac{\pi}{6} = \pi r^2 h + \frac{4}{3} \pi r^3$ $\pi r^2 h = \frac{\pi}{6} - \frac{4}{3} \pi r^3$ $h = \frac{\pi}{6\pi r^2} - \frac{4\pi r^3}{3\pi r^2}$ $h = \frac{1}{6r^2} - \frac{4r}{3}$	✓ vergelyking vir volume ✓ substitusie van $\frac{\pi}{6}$ ✓ vereenvoudiging (3)
10.2	$S = 2 \times 2\pi r^2 + 2\pi r h$ $S = 4\pi r^2 + 2\pi r \left( \frac{1}{6r^2} - \frac{4r}{3} \right)$ $S = 4\pi r^2 + \frac{\pi}{3r} - \frac{8\pi r^2}{3}$ $= \frac{4}{3} \pi r^2 + \frac{\pi}{3r}$	✓ vergelyking vir buite-oppervlakte ✓ substitusie van $h$ ✓ vereenvoudiging (3)
10.3	$S = \frac{4}{3} \pi r^2 + \frac{\pi}{3} r^{-1}$ $\frac{dS}{dr} = \frac{8\pi r}{3} - \frac{\pi}{3r^2}$ $= 0$ $8r = \frac{1}{r^2}$ $8r^3 = 1$ $r = \frac{1}{2}$ <p>Dan is <math>S = \frac{4}{3} \pi \left( \frac{1}{2} \right)^2 + \frac{\pi}{3} (2)</math></p> $S = \pi \text{ vierkante meter}$ $= 3,14 \text{ vierkante meter}$	✓ $\frac{\pi}{3} r^{-1}$ ✓ $\frac{dS}{dr} = \frac{\pi}{3} \left( 8r - \frac{1}{r^2} \right)$ ✓ $\frac{dS}{dr} = 0$ ✓ vereenvoudiging  ✓ $r = \frac{1}{2}$ ✓ $S = \pi$ (6) <b>[12]</b>



**VRAAG 11**

11.1	<div><div><math>x, y \in \mathbb{N}_0</math></div><div><math>x + 2y \leq 28</math>    of    <math>y \leq -\frac{x}{2} + 14</math></div><div><math>3x + y \leq 24</math>    of    <math>y \leq -3x + 24</math></div></div> <div><div>Nota:</div><div>As die tekens van ongelijkheid verkeerd is of gelykaan tekens gebruik is: maks 3 / 4 punte</div></div>	<div>✓✓ Eerste ongelijkheid</div> <div>✓✓ Tweede ongelijkheid</div> <div>(4)</div>
11.2		<div>✓✓ een vir elke grafiek</div> <div>✓ toelaatbare gebied</div> <div>(3)</div>
11.3.1	8	✓ antwoord (1)
11.3.2	14	✓ antwoord (1)
11.4	4 Tipe A 12 Tipe B	<div>✓ 4 Tipe A</div> <div>✓ 12Tipe B</div> <div>(2)</div>

11.5	$x \geq y$ $y \leq x$ $3x + x = 24$ $x = 6$ $y = 6$ Maksimeer $x + y$ Antwoord: $6 + 6 = 12$ braaistaanders Masjinerings tyd = $x + 2y$ $= 6 + 2 \times 6$ $= 6 + 12$ $= 18$ ure	✓ $y \leq x$  ✓ (6 ; 6) ✓✓ 12  ✓ 18 ure (5) <b>[16]</b>
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**TOTAAL: 150**