



**NATIONAL
SENIOR CERTIFICATE /
NASIONALE
SENIORSERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2024

**TECHNICAL MATHEMATICS P1/
TEGNIESE WISKUNDE V1
MARKING GUIDELINE/NASIENRIGLYN**

MARKS/ PUNTE: 150

MARKING CODES/NASIENKODES	
A	Accuracy/ <i>Akkuraatheid</i>
CA	Consistent accuracy/ <i>Volgehoue akkuraatheid</i>
M	Method/ <i>Metode</i>
R	Rounding/ <i>Afronding</i>
NPR	No penalty for rounding/ <i>Geen penalisering vir afronding nie</i>
NPU	No penalty for units omitted <i>Geen penalisering vir eenhede weggelaat nie</i>
S	Simplification/ <i>Vereenvoudiging</i>
SF	Substitution in correct formula/ <i>Vervanging in korrekte formule</i>

This marking guideline consist of 14 pages./
Hierdie nasienriglyn bestaan uit 14 bladsye.

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- The method of consistent accuracy marking must be applied to all aspects of the marking guideline where applicable as indicated with the marking code **CA**.
- If a candidate strikes off a response to a question and does not attempt the question again, then the struck off question should be marked.

LET WEL:

- Indien 'n kandidaat 'n vraag twee keer beantwoord, merk slegs die EERSTE poging.
- Die metode van volgehou akkuraatheidnasien moet toegepas word op alle aspekte van die nasienriglyn waar van toepassing soos aangedui met die nasiekode **CA**.
- Indien 'n kandidaat 'n antwoord op 'n vraag deurhaal en nie poog om die vraag nie, moet die vraag wat deur gehaal is, gemerk word.

QUESTION/ VRAAG 1			
1.1.1	$-x(x+9)=0$ $x=0$ or $x=-9$	$\checkmark x=0$ $\checkmark x=-9$	A A (2)
1.1.2	$x - \frac{2}{x} = 0$ $x^2 - 2 = 0$ $x = \frac{-0 \pm \sqrt{0^2 - 4(1)(-2)}}{2(1)}$ $x = \pm 1,4$ <p style="text-align: center;">OR/OF</p> $x - \frac{2}{x} = 0$ $x^2 - 2 = 0$ $x^2 = 2$ $x = \pm\sqrt{2}$ $x = \pm 1,4$	\checkmark Standard form/ <i>standaardvorm</i> A \checkmark Substitution/ <i>vervanging</i> CA $\checkmark x = \pm 1,4$ CA <p style="text-align: center;">OF/OF</p> \checkmark Standard form/ <i>standaardvorm</i> \checkmark Square Root (3)	
1.1.3	$2x^2 + 7 \leq 9x$ $2x^2 - 9x + 7 \leq 0$ CVs/ <i>KWs</i> : $(x-1)(2x-7)=0$ or/of $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(2)(7)}}{2(2)}$ $x=1$ and/en $x = \frac{7}{2}$ $1 \leq x \leq \frac{7}{2}$	\checkmark Standard form/ <i>standaardvorm</i> A \checkmark Factorisation/ <i>Faktorisering</i> SF CA \checkmark Both critical values/ <i>beide kritiese waardes</i> CA \checkmark Correct notation / <i>korrekte notasie</i> A	(4)

<p>1.2</p> <p>$2x + 6y = -12 \dots\dots\dots(1)$</p> <p>$-2xy + 4y^2 - 10 = 0 \dots\dots\dots(2)$</p> <p>$x = -3y - 6 \dots\dots\dots(3)$</p> <p>Substitute (3) into (2) <i>Vervang (3) in (2)</i></p> <p>$-2(-3y - 6)y + 4y^2 - 10 = 0$</p> <p>$6y^2 + 12y + 4y^2 - 10 = 0$</p> <p>$10y^2 + 12y - 10 = 0$</p> $y = \frac{- (12) \pm \sqrt{(12)^2 - 4(10)(-10)}}{2(10)}$ <p>$y = 0,57$ or/of $y = -1,77$</p> <p>Then/<i>dan</i>:</p> <p>$x = -7,71$ or/of $x = -0,69$</p> <p style="text-align: center;">OR/OF</p> <p>$2x + 6y = -12 \dots\dots\dots(1)$</p> <p>$-2xy + 4y^2 - 10 = 0 \dots\dots\dots(2)$</p> <p>$y = -\frac{x}{3} - 2 \dots\dots\dots(3)$</p> <p>Substitute (3) into (2): <i>Vervang (3) in (2)</i></p> <p>$-2x\left(-\frac{x}{3} - 2\right) + 4\left(-\frac{x}{3} - 2\right)^2 - 10 = 0$</p> <p>$\frac{2}{3}x^2 + 4x + 4\left(\frac{1}{9}x^2 + \frac{4}{3}x + 4\right) - 10 = 0$</p> <p>$\frac{2}{3}x^2 + 4x + \frac{4}{9}x^2 + \frac{16}{3}x + 16 - 10 = 0$</p> <p>$10x^2 + 84x + 54 = 0$</p> $x = \frac{- (84) \pm \sqrt{(84)^2 - 4(10)(54)}}{2(10)}$ <p>$x = -0,70$ or/of $x = -7,70$</p> <p>$y = -\frac{(-0,70)}{3} - 2$ and/en $y = -\frac{(-7,70)}{3} - 2$</p> <p>$y = -1,77$ and/en $y = 0,57$</p>	<p>✓ Equation/<i>Vergelyking</i> (3) A</p> <p>✓ Substitution/<i>vervanging</i> CA</p> <p>✓ Correct standard form/ <i>korrekte standaardvorm</i> CA</p> <p>✓ Factors/<i>faktore</i> CA</p> <p>✓ Both <i>y</i>-values/<i>beide y-waardes</i> CA</p> <p>✓ Both <i>x</i>-values/<i>beide x-waardes</i> CA</p> <p style="text-align: center;">OR/OF</p> <p>✓ Equation/<i>Vergelyking</i> (3) A</p> <p>✓ Substitution/<i>vervanging</i> CA</p> <p>✓ Correct standard form/ <i>korrekte standaardvorm</i> CA</p> <p>✓ Factors/<i>Substitution/Faktore</i> <i>/Vervanging</i> CA</p> <p>✓ Both <i>x</i>-values/<i>beide x-waardes</i> CA</p> <p>✓ Both <i>y</i>-values/<i>beide y-waardes</i> CA NPR (6)</p>
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1.3.1	$W = \frac{1}{2} kx^2$ $2W = kx^2$ $x^2 = \frac{2W}{k}$ $\therefore x = \sqrt{\frac{2W}{k}}$	$\checkmark x^2 = \frac{2W}{k}$ $\checkmark x = \sqrt{\frac{2W}{k}}$	A CA (2)																					
1.3.2	$250 = \frac{1}{2}(200)x^2$ $x^2 = \frac{250 \times 2}{200}$ $x = \sqrt{\frac{500}{200}}$ $x = 1,58 \text{ m}$ $x = \sqrt{\frac{2W}{K}}$ OR/OF $x = \sqrt{\frac{2 \times 250}{200}}$ $x = 1,58 \text{ m}$	\checkmark Substitution/ <i>vervanging</i> $\checkmark x = 1,58 \text{ m}$	CA NPU (2)																					
1.3.3	$1,58 \times 10^0$	$\checkmark 1,58 \times 10^0$	CA (1)																					
1.4.1	30	$\checkmark 30$	A (1)																					
1.4.2	<table border="1" style="display: inline-table; vertical-align: middle;"> <thead> <tr> <th></th> <th>30</th> <th>Remain/Res</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>15</td> <td>0</td> </tr> <tr> <td>2</td> <td>7</td> <td>1</td> </tr> <tr> <td>2</td> <td>3</td> <td>1</td> </tr> <tr> <td>2</td> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0</td> <td>1</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> $30 = 111110_2$		30	Remain/Res	2	15	0	2	7	1	2	3	1	2	1	1	2	0	1				\checkmark Method/ <i>metode</i> \checkmark Answer/ <i>antwoord</i>	CA CA (2)
	30	Remain/Res																						
2	15	0																						
2	7	1																						
2	3	1																						
2	1	1																						
2	0	1																						
			[23]																					

QUESTION / VRAAG 2			
2.1.1	$x + 9 = 0$ $x = -9$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">AO: 2 Marks/ Punte</div>	$\checkmark x + 9 = 0$ A \checkmark Answer/antwoord CA (2)
2.1.2	$-x + 3 < 0$ $x > 3$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">AO: 2 Marks / Punte</div>	$\checkmark -x + 3 < 0$ A $\checkmark x > 3$ CA (2)
2.2	$b^2 - 4ac > 0$ $(2q)^2 - 4(-3)(-1) > 0$ $4q^2 - 12 > 0$ $q^2 > 3$ $q > \pm\sqrt{3}$ $\therefore q > \sqrt{3}$		$\checkmark \Delta > 0$ A \checkmark Substitution/Vervanging A $\checkmark q > \sqrt{3}$ CA (3)
			[7]
QUESTION / VRAAG 3			
3.1.1	$= \log_2 2^6$ $= 6 \log_2 2$ $= 6$	<div style="border: 1px solid black; padding: 2px; display: inline-block;">AO: NO MARK / GEEN PUNTE</div>	$\checkmark \log_2 2^6$ A \checkmark Answer/antwoord CA (2)
3.1.2	$= \frac{2^{3x-3} \cdot 3^{-x-1}}{\left(\frac{1}{2^2}\right)^{-x} \cdot 2^{x-3} \cdot 3^{x-3} \cdot (3^2)^{-x+1}}$ $= \frac{2^{3x-3} \cdot 3^{-x-1}}{2^{2x} \cdot 2^{x-3} \cdot 3^{x-3} \cdot 3^{-2x+2}}$ $= 2^{3x-3-2x-x+3} \cdot 3^{-x-1-x+3+2x-2}$ $= 2^0 \cdot 3^0$ $= 1$		\checkmark Prime factors/priemfaktore A \checkmark Simplification/vereenvoudiging CA \checkmark Same base rule/dieselde basis reël CA \checkmark Simplification/vereenvoudiging CA $\checkmark 1$ CA (5)

3.1.3	$\frac{\sqrt{9 \times 7} - 2\sqrt{16 \times 7}}{\sqrt{4 \times 7}} \text{ OR / OF } \frac{\sqrt{3^2 \times 7} - 2\sqrt{2^2 \times 7}}{\sqrt{2^2 \times 7}}$ $= \frac{3\sqrt{7} - 8\sqrt{7}}{2\sqrt{7}} \text{ OR / OF } \frac{\sqrt{7}(3-8)}{2\sqrt{7}}$ $= \frac{-5\sqrt{7}}{2\sqrt{7}}$ $= -\frac{5}{2}$	✓ Factors/Faktore ✓ S ✓ $-\frac{5}{2}$	A CA CA (3)
3.2	$\log_2(x+1)(x-1) = 3$ $x^2 - 1 = 2^3$ $x^2 - 9 = 0$ $(x+3)(x-3) = 0$ $x = -3 \text{ or/of } x = 3$ $\therefore x = 3$	✓ Log property/eienskap ✓ Standard form / standaardvorm ✓ Factors/Faktore/Substitution /Vervanging ✓ $x = 3$	A CA CA CA (4)
3.3.1	$\frac{\pi}{3} \times \frac{180}{\pi} = 60^\circ$	✓ 60°	A (1)
3.3.2	$z = 2\cos 60^\circ$ $z = 2\cos 60^\circ + i\sin 60^\circ$ $= 2\left(\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)$ $z = 1 + \sqrt{3}i$	✓ $\frac{1}{2}$ ✓ $\frac{\sqrt{3}}{2}$ ✓ $z = 1 + \sqrt{3}i$	CA CA CA (3)
3.4	$p + 2qi - 3qi^2 = 5 - 14i$ $p + 2qi - 3q(-1) = 5 - 14i$ $p + 2qi + 3q = 5 - 14i$ $2qi = -14i$ $q = -7$ $p + 3q = 5$ $p + 3(-7) = 5$ $p = 26$	✓ Expand/Brei uit ✓ $i^2 = -1$ ✓ Equating/gelykstelling ✓ $q = -7$ ✓ $p = 26$	A CA CA CA CA (5)
			[23]

QUESTION / <i>VRAAG 4</i>			
4.1.1	$(-1; -16)$	✓ $x = -1$ ✓ $y = -16$	A A (2)
4.1.2	$x^2 + 2x - 15 = 0$ $(x + 5)(x - 3) = 0$ $x = -5$ or/of $x = 3$	✓ Standard form/ <i>standaardvorm</i> ✓ Factors/ <i>Faktore</i> /Substitution / <i>Vervanging</i> ✓ Both x -values/ <i>Beide x-</i> <i>waardes</i>	A CA CA (3)
4.1.3	Range/ <i>Waardevers</i> : $0 \leq y \leq 3$ OR/OF $y \in [0 ; 3]$	✓ Correct notation/ <i>Korrekte</i> <i>notasie</i> ✓ Critical values/ <i>Kritiese</i> <i>waardes</i>	A A (2)
4.1.4		$f(x)$: ✓ x -intercepts/ <i>afsnitte</i> ✓ y -intercept/ <i>afsnit</i> ✓ Turning points/ <i>draaipunte</i> ✓ Shape/ <i>vorm</i>	CA CA CA CA
		$g(x)$: ✓ Intercepts / <i>afsnitte</i> ✓ Shape / <i>vorm</i>	CA CA (6)

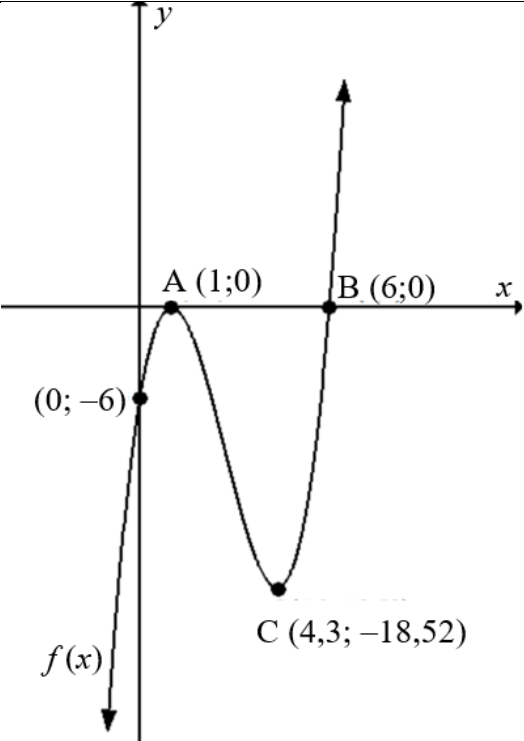
4.1.5	$x > -1$	✓ Critical value/ <i>Kritiese waardes</i> ✓ Notation/ <i>notasie</i>	CA A (2)
4.2.1	$(4 ; 0)$	✓ $y = 0$ ✓ $x = 4$	A A (2)
4.2.2	$x + p = 0$ $1 + p = 0$ $p = -1$ $q = 2$	✓ $p = -1$ ✓ $q = 2$	A A (2)
4.2.3	$k(x) = \frac{m}{x-1} + 2$ $0 = \frac{m}{-4-1} + 2$ $-2 = \frac{m}{-5}$ $m = 10$	✓ Substitution/ <i>vervanging</i> ✓ Simplification/ <i>vereenvoudiging</i> ✓ $m = 10$	A CA CA (3)
4.2.4	$f(x) = g(x)$ $\frac{10}{x-1} + 2 = 2x - 8$ $\frac{10}{x-1} = 2x - 10$ $(x-1)(2x-10) = 10$ $x^2 - 12x + 10 - 10 = 0$ $x^2 - 12x = 0$ $x(x-12) = 0$ $x = 0$ or/ of $x = 12$	✓ Equating/ <i>gelykstelling</i> ✓ Simplification / <i>vereenvoudiging</i> ✓ Standard form/ <i>standaardvorm</i> ✓ Factors/ <i>Faktore</i> ✓ $x = 0$ ✓ $x = 12$	A CA A CA CA (5)

<p>4.3</p>	$y = a^x + 1$ $4 = a^{-1} + 1$ $3 = \frac{1}{a}$ $a = 3^{-1}$ $\therefore y = 3^{-x} + 1$ <p style="text-align: center;">OR/OF</p> $y = \left(\frac{1}{3}\right)^x + 1$	<p>✓ $q = 1$ A</p> <p>✓ Substitution/<i>vervanging</i> A</p> <p>✓ $y = 3^{-x} + 1$ CA</p> <p style="text-align: right;">(3)</p>
		[29]
QUESTION / VRAAG 5		
<p>5.1</p>	$i_{eff} = \left(1 + \frac{i_{nom}}{m}\right)^m - 1$ $0,0913 = \left(1 + \frac{i}{4}\right)^4 - 1$ $i_{nom} = \left(\sqrt[4]{1 + 0,0913} - 1\right) \times 4$ $i_{nom} = 0,088330$ $Rate_{nom} = 8,83\%$	<p>✓ Substitution/<i>vervanging</i> A</p> <p>✓ Simplification/<i>vereenvoudiging</i> CA</p> <p>✓ Rate/<i>Koers</i>_{nom} = 8,83% CA</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>AO: 1 MARK/PUNT</p> </div> <p style="text-align: right;">(3)</p>
<p>5.2.1</p>	$\text{Deposit/Deposito} = \frac{20}{100} \times R24\ 000$ $\text{Balance/Balans} = R24\ 000 - R4\ 800$ $= R19\ 200$ <p>Interest over 24 months/<i>Rente oor 24 maande</i></p> $A = R19\ 200 (1 + 0,12 \times 2)$ $A = R23\ 808$ $= \frac{23\ 808}{24}$ <p>Monthly installments/ Maandelikse paalement = R992</p>	<p>✓ R4 800 A</p> <p>✓ R19 200 CA</p> <p>✓ Correct formula/<i>korrekte formule</i> A</p> <p>✓ R23 808 CA</p> <p>✓ R992 CA</p> <p style="text-align: right;">(5)</p>
<p>5.2.2</p>	$\text{Total amount owed/} = R23\ 808 + R992$ $\text{Totale bedrag verskuldig} = R24\ 800$	<p>✓ R24 800 CA</p> <p style="text-align: right;">(1)</p>

5.3	$A = P(1+i)^n$ $6000 = 3000(1+i)^6$ $2 = (1+i)^6$ $1+i = \sqrt[6]{2}$ $i = \sqrt[6]{2} - 1$ $\text{Rate/Koers} = 12,25\%$	<p>✓ Substitution/<i>vervanging</i> A</p> <p>✓ $1 + i$ subject/<i>onderwerp</i> CA</p> <p>✓ 12,25% A</p>
5.4	$A = P(1+i)^n$ $R155\ 000 = Rx \left(1 + \frac{0,12}{2}\right)^{2 \times 5} \left(1 + \frac{0,132}{12}\right)^{12 \times 5}$ $+ R15\ 000 \left(1 + \frac{0,12}{2}\right)^{1 \times 2} \left(1 + \frac{0,132}{12}\right)^{5 \times 12}$ $155\ 000 - R15\ 000 \left(1 + \frac{0,12}{2}\right)^2 \left(1 + \frac{0,132}{12}\right)^{60} = Rx \left(1 + \frac{0,12}{2}\right)^{10} \left(1 + \frac{0,132}{12}\right)^{60}$ $Rx = \frac{155\ 000 - R15\ 000 \left(1 + \frac{0,12}{2}\right)^2 \left(1 + \frac{0,132}{12}\right)^{60}}{\left(1 + \frac{0,12}{2}\right)^{10} \left(1 + \frac{0,132}{12}\right)^{60}}$ $Rx = R35\ 484,41$	<p>✓ $\left(1 + \frac{0,12}{2}\right)^{2 \times 5} \left(1 + \frac{0,132}{12}\right)^{12 \times 5}$ A</p> <p>✓ +R15 000 A</p> <p>✓ $\left(1 + \frac{0,12}{2}\right)^{1 \times 2}$ A</p> <p>✓ Simplification/ <i>Vereenvoudiging</i> CA</p> <p>✓ $Rx = R35\ 484,41$ CA (5)</p>
		[17]

QUESTION / <i>VRAAG 6</i>		
6.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-\frac{1}{3}(x+h) - 4 - \left(-\frac{1}{3}x - 4\right)}{h}$ $= \lim_{h \rightarrow 0} \frac{-\frac{1}{3}x - \frac{1}{3}h - 4 + \frac{1}{3}x + 4}{h}$ $= \lim_{h \rightarrow 0} \frac{-\frac{1}{3}h}{h}$ $= \lim_{h \rightarrow 0} -\frac{1}{3}$ $f'(x) = -\frac{1}{3}$	<p>✓ Definition/<i>Definisie</i> A</p> <p>✓ Substitution/<i>Vervanging</i> A</p> <p>✓ Simplification/<i>vereenvoudiging</i> CA</p> <p>✓ Further simplification/<i>verdere vereenvoudiging</i> CA</p> <p>✓ $f'(x) = -\frac{1}{3}$ CA</p> <p>(5)</p>
6.2.1	$D_x \left[x^5 + \frac{1}{2}x^{-6} - x^{-1} \right]$ $= 5x^4 - 3x^{-7} + x^{-2}$	<p>✓ $\frac{1}{2}x^{-6}$ A</p> <p>✓ $-x^{-1}$ A</p> <p>✓ $5x^4$ CA</p> <p>✓ $-3x^7$ CA</p> <p>✓ x^{-2} CA</p> <p>(5)</p>
6.2.2	$f(x) = ax^4 + 2x^{\frac{1}{3}}$ $f'(x) = 4ax^3 + \frac{2}{3}x^{-\frac{2}{3}}$	<p>✓ $2x^{\frac{1}{3}}$ A</p> <p>✓ $4ax^3$ A</p> <p>✓ $\frac{2}{3}x^{-\frac{2}{3}}$ CA</p> <p>(3)</p>
6.3	$f(x) = kx^2 - 4x + 5$ $f'(x) = 2kx - 4$ $16 = 2k(-2) - 4$ $16 + 4 = -4k$ $k = -5$	<p>✓ Derivative/<i>afgeleide</i> A</p> <p>✓ Substitution/<i>vervanging</i> CA</p> <p>✓ $k = -5$ CA</p> <p>(3)</p>
		[16]

QUESTION / <i>VRAAG 7</i>		
7.1	$f(x) = x^3 - 7x^2 + 6x - x^2 + 7x - 6$ $f(x) = x^3 - 8x^2 + 13x - 6$	$\checkmark f(x) = x^3 - 8x^2 + 13x - 6$ A (1)
7.2	$f(x) = (x - 1)(x - 1)(x - 6)$ $(x - 1)(x - 1)(x - 6) = 0$ $x = 1$ or/of $x = 6$ OR/OF $(x - 1)$ or/of $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(1)(6)}}{2(1)}$ $x = 1$ or/of $x = 6$	\checkmark Factors/ <i>faktore</i> A $\checkmark x = 1$ CA $\checkmark x = 6$ CA OR/ OF \checkmark Substitution/ <i>vervanging</i> A $\checkmark x = 1$ CA $\checkmark x = 6$ CA (3)
7.3	$f'(x) = 3x^2 - 16x + 13$ let/laat $f'(x) = 0$ $3x^2 - 16x + 13 = 0$ $x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(3)(13)}}{2(3)}$ $x = \frac{13}{3}$ or/of $x = 1$ $y = (1)^3 - 7(1)^2 + 6(x) - 6$ $y = 0$ $y = \left(\frac{13}{3}\right)^3 - 7\left(\frac{13}{3}\right)^2 + 6\left(\frac{13}{3}\right) - 6$ $y = -18,52$	\checkmark Derivative/ <i>afgeleide</i> A \checkmark Derivate/ <i>Afgeleide</i> = 0 A \checkmark Factors/ <i>Faktore</i> Substitution / <i>Vervanging</i> CA \checkmark Both x values/ <i>Beide</i> x -waardes CA \checkmark Both y values/ <i>Beide</i> y -waardes CA (5)

7.4		<p>✓ <i>x</i>-intercepts/<i>afsnitte</i> CA</p> <p>✓ <i>y</i>-intercept/<i>afsnit</i> CA</p> <p>✓ Turning points/<i>draaipunte</i> CA</p> <p>✓ Shape/<i>vorm</i> CA</p>
7.5	$x = 1$ or/of $x \geq 6$	<p>✓ $x = 1$ A</p> <p>✓ $x \geq 6$ A</p>
(4)		
[15]		
QUESTION / VRAAG 8		
8.1	$h(0) = -2(0)^2 + 9,2(0) + 2$ $= 2 \text{ } ^\circ\text{C}$	<p>✓ $2 \text{ } ^\circ\text{C}$ A</p>
(1)		
8.2	$\frac{d(T)}{dt} = -4t + 9,2$ $= -4(3) + 9,2$ $= -2,8 \text{ } ^\circ\text{C}$	<p>✓ Derivative/<i>Afgeleide</i> A</p> <p>✓ Substitution/<i>vervanging</i> CA</p> <p>✓ $-2,8 \text{ } ^\circ\text{C}$ CA</p>
(3)		
8.3	<p>Let/Laat $\frac{d(T)}{dt} = 0$</p> $-4t + 9,2 = 0$ $t = \frac{9,2}{4}$ $t = 2,3 \text{ seconds/sekondes}$	<p>✓ Derivative/<i>Afgeleide</i> = 0 A</p> <p>✓ $t = 2,3 \text{ sec/sek}$ CA</p>
(2)		
8.4	$T(2,3) = 12,58 \text{ } ^\circ\text{C}$	<p>✓ $T(2,3) = 12,58 \text{ } ^\circ\text{C}$ CA</p>
(1)		
[7]		

QUESTION / <i>VRAAG 9</i>		
9.1.1	$\int -4^{2t} dt = \frac{-4^{2t}}{2\ln 2} + c$	$\checkmark \frac{-4^{2t}}{2\ln 2}$ A $\checkmark c$ A (2)
9.1.2	$= \int 2 + \frac{3}{x} dx$ $= 2x + 3 \ln x + c$	$\checkmark 2$ A $\checkmark \frac{3}{x}$ A $\checkmark 2x$ CA $\checkmark 3 \ln x$ CA (4)
9.2	$A = \int x^2 - 6x + 5 dx$ $A_1 = \int_0^1 x^2 - 6x + 5 dx$ $= \left[\frac{1}{3}x^3 - 3x^2 + 5x \right]_0^1$ $= \left[\frac{1}{3}(1)^3 - 3(1)^2 + 5(1) \right] - \left[\frac{1}{3}(0)^3 - 3(0)^2 + 5(0) \right]$ $= \frac{7}{3}$ $A_2 = - \left[\frac{1}{3}x^3 - 3x^2 + 5x \right]_1^3$ $= - \left[\frac{1}{3}(3)^3 - 3(3)^2 + 5(3) \right] - \left[\frac{1}{3}(1)^3 - 3(1)^2 + 5(1) \right]$ $= - \left(-3 - \frac{7}{3} \right)$ $= \frac{16}{3}$ $A_{total} = A_1 + A_2$ $= \frac{7}{3} + \frac{16}{3}$ $= \frac{23}{3} \text{ unit}^2 / \text{eenhede}^2$	\checkmark Area notation/ <i>notasie</i> A \checkmark Integral/ <i>integraal</i> A \checkmark Substitution/ <i>vervanging</i> CA $\checkmark \frac{7}{3}$ CA \checkmark Substitution by 1&3/ <i>Vervanging deur 1 & 3</i> CA $\checkmark \frac{16}{3}$ CA $\checkmark \frac{23}{3}$ CA (7) [13]
		TOTAL/ <i>TOTAAL</i>: 150