



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**SENIOR CERTIFICATE EXAMINATIONS/
NATIONAL SENIOR CERTIFICATE EXAMINATIONS
SENIORSERTIFIKAAT-EKSAMEN/
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

TECHNICAL MATHEMATICS P1/TEGNIESE WISKUNDE VI

2023

FINAL MARKING GUIDELINES/FINALE NASIENRIGLYNE

MARKS/PUNTE: 150

Marking Codes/Nasienkodes	
A	Accuracy/Akkuraatheid
AD	Additional Notes on ADDENDUM/ Bykomende notas op ADDENDUM
CA	Consistent Accuracy/Volgehoue Akkuraatheid
M	Method/Metode
R	Rounding/Afronding
NPR	No Penalty for Rounding/Geen Penalisering vir Afronding nie
NPU	No Penalty for Units omitted/Geen Penaliseering vir Eenhede Weggelaat nie
S	Simplification/Vereenvoudiging
SF	Substitution in Correct Formula/Vervanging in Korrekte Formule

**These marking guidelines consist of 18 pages.
Hierdie nasienriglyne bestaan uit 18 bladsye.**

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in all aspects of the marking guidelines where indicated.
- # Shows questions where Tolerance Range will be applied:
Q 1.2.2 ; Q 3.3.2 ; Q 5.3 ; Q 9.2

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, sien slegs die EERSTE poging na.
- Volgehoue akkuraatheid is deurgaans op alle aspekte van die nasienriglyne waar aangedui.
- # Toon vare waar Toleransie Wydte (Verdraagsaamheids omvang) toegepas word:
V 1.2.2 ; V 3.3.2 ; V 5.3 ; V 9.2

QUESTION/VRAAG 1

1.1.1	$\frac{1}{2}x(2x - 1) = 0$ $x = 0 \quad \text{or/of} \quad x = \frac{1}{2}$	$\checkmark x = 0$ $\checkmark x = \frac{1}{2}$	A A (2)
1.1.2	$-x(6 - x) = 4$ $x^2 - 6x - 4 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-4)}}{2(1)}$ $x \approx -0,61 \quad \text{or/of} \quad x \approx 6,61$	AD \checkmark standard form / standaardvorm \checkmark SF $\checkmark x \approx -0,61$ $\checkmark x \approx 6,61$	A CA CA CA (4)
1.1.3	$(2 - x)(x + 5) > 0 \quad \text{OR/OF} \quad (x - 2)(x + 5) < 0$ $-5 < x < 2 \quad \text{OR/OF} \quad x \in (-5; 2)$ OR/OF $x > -5$ and/en $x < 2$	\checkmark critical values/ kritiese waarde \checkmark correct notation/ korrekte notasie	A A (2)
1.2.1	$y + x - 10 = 0$ $y = -x + 10$	$\checkmark y = -x + 10$	A (1)
1.2.2 #	$y = -x + 10$ $x^2 - xy + y^2 = 28$ $x^2 - x(-x + 10) + (-x + 10)^2 = 28$ $x^2 + x^2 - 10x + x^2 - 20x + 100 = 28$ $\therefore 3x^2 - 30x + 72 = 0 \quad \text{or/of} \quad x^2 - 10x + 24 = 0$ $(x - 6)(x - 4) = 0 \quad \text{OR/OF}$ $x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(24)}}{2(1)}$ $\therefore x = 6 \quad \text{or/of} \quad x = 4$ $\therefore y = -6 + 10 = 4 \quad \text{or/of} \quad y = -4 + 10 = 6$	\checkmark subst./ verv. \checkmark expanding/ uitbrei \checkmark standard form / standaardvorm \checkmark factors/formula /faktore/formule \checkmark both x-values/albei x-waardes \checkmark both y-values/albei	CA CA CA CA CA

OR/OF	y-waardes OR/OF	CA
$x = -y + 10$		
$x^2 - xy + y^2 = 28$		
$(-y + 10)^2 - y(-y + 10) + y^2 = 28$		
$y^2 - 20y + 100 + y^2 - 10y + y^2 = 28$	✓ subst/verv	
$3y^2 - 30y + 72 = 0$ or / of $y^2 - 10y + 24 = 0$	✓ expanding	CA
	✓ standard form / standaardvorm	CA
$(y - 4)(y - 6) = 0$ OR / OF $y = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(24)}}{2(1)}$	✓ factors/formula /faktore/formule	CA
$\therefore y = 4$ or / of $y = 6$	✓ both y-values/ beide y--waardes	CA
$\therefore x = -4 + 10 = 6$ or / of $x = -6 + 10 = 4$	✓ both x-values/ beide x-waardes	CA
		(6)

1.3.1	$P = \frac{F}{A}$ $PA = F$ $A = \frac{F}{P}$	✓ subject/ onderwerp A (1)
1.3.2	$A = \frac{F}{P}$ $A = \frac{25 \times 10^3}{25\,984\,480,5} \text{ m}^2$ $\approx 0,000962 \text{ m}^2$ $\approx 9,62 \times 10^{-4} \text{ m}^2$ <p style="text-align: center;">OR/OF</p> $P = \frac{F}{A}$ $25\,984\,480,5 = \frac{25 \times 10^3}{A}$ $A \approx 0,000962 \text{ m}^2$ $A \approx 9,62 \times 10^{-4} \text{ m}^2$	AD ✓ SF CA ✓ S CA ✓ Scientific notation/ Wetenskaplike notasie CA <p style="text-align: center;">OR/OF</p> ✓ SF A ✓ S CA ✓ Scientific notation/ Wetenskaplikenotasie CA NPU NPR (3)

1.4.1	$= 1000111_2 - 10011_2$ $= 110100_2$ <p style="text-align: center;">OR/OF</p> <p>1000111₂ and/en 10011₂</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>2⁶</td> <td>2⁵</td> <td>2⁴</td> <td>2³</td> <td>2²</td> <td>2¹</td> <td>2⁰</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td></td> <td></td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> </tr> </table> $64 + 4 + 2 + 1 = 71$ $16 + 2 + 1 = 19$ $\therefore 71 - 19 = 52$ $52 = 32 + 16 + 4 = 110100_2$	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	1	0	0	0	1	1	1			1	0	0	1	1	<p>AD</p> <p>✓ M Substitution/ vervanging A</p> <p>✓ 110100₂ CA</p> <p style="text-align: center;">OR/OF</p> <p>✓ M A</p> <p>✓ 110100₂ CA (2)</p> <p>AO: Full Marks/volpunte</p>
2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰																	
1	0	0	0	1	1	1																	
		1	0	0	1	1																	
1.4.2	$110100_2 = 2^5 + 2^4 + 2^2$ $= 52$	<p>✓ decimal form/ desimale vorm CA (1)</p>																					
		[22]																					

QUESTION/VRAAG 2

2.1.1	$1 - 3k = 0$ $k = \frac{1}{3}$	<p>✓ value of / waarde van k A (1)</p>
2.1.2	$k = 4$	<p>✓ value of / waarde van k A (1)</p>
2.2.1	<p>< 0 OR / OF is negative / negatief OR / OF less than zero/minder as nul</p>	<p>✓ < 0 or/of is neg or/of less than zero/minder as nul A (1)</p>
2.2.2	$4x^2 + 3x + p = 0$ $\Delta = b^2 - 4ac$ $= (3)^2 - 4(4)(p)$ $= 9 - 16p$ $9 - 16p < 0$ $p > \frac{9}{16}$	<p>AD</p> <p>✓ SF A ✓ S CA</p> <p>✓ $\Delta < 0$ A</p> <p>✓ value of /waarde van p CA (4)</p>
		[7]

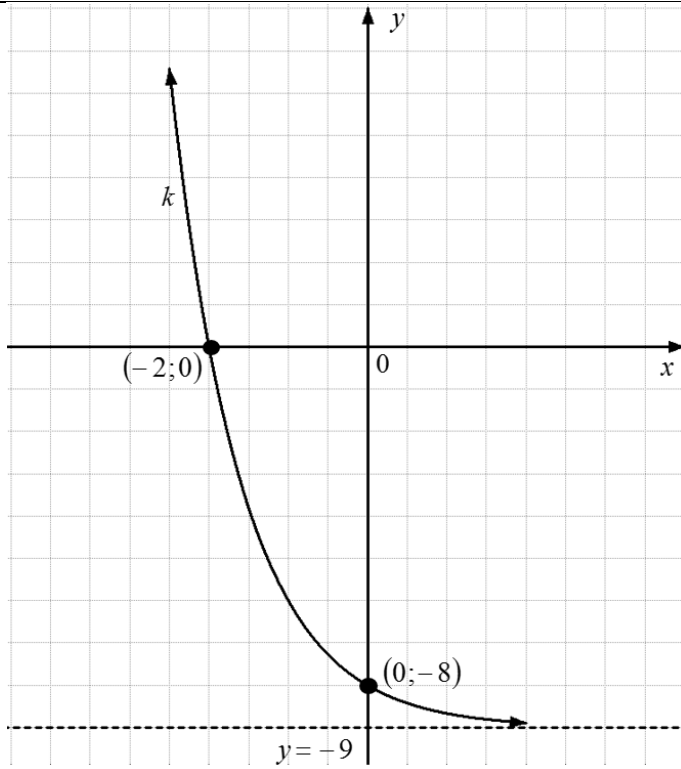
QUESTION/VRAAG 3

3.1.1	$7(3x)^0 = 7(1) = 7$	✓ 7(1) or /of 7 A (1)
3.1.2	$\sqrt{8}(\sqrt{242} - \sqrt{72})$ $= \sqrt{2 \times 4}(\sqrt{2 \times 121} - \sqrt{2 \times 36})$ $= 2\sqrt{2}(11\sqrt{2} - 6\sqrt{2})$ <p>OR/OF $= 2\sqrt{2}(5\sqrt{2})$</p> <p>OR/OF $= 2\sqrt{2}(11\sqrt{2}) - 2\sqrt{2}(6\sqrt{2})$</p> <p>OR/OF $= 22 \times 2 - 12 \times 2$</p> $= 20$	✓ $\sqrt{2 \times 121}$ or/of $11\sqrt{2}$ A ✓ $\sqrt{2 \times 36}$ or/of $6\sqrt{2}$ A ✓ S CA AO: Zero Marks/ Nul punte (3)
3.1.3	$\frac{9^{n-1} \times 27^{3-2n}}{81^{2-n}}$ $= \frac{3^{2(n-1)} \times 3^{3(3-2n)}}{3^{4(2-n)}}$ $= \frac{3^{2n-2} \times 3^{9-6n}}{3^{8-4n}}$ $= 3^{2n-2+9-6n-8+4n}$ $= \frac{1}{3} \quad \text{OR/OF} \quad 3^{-1}$	✓ prime base/ <i>priem-basis</i> A ✓ expanding/ <i>uitbrei</i> CA ✓ exponent properties CA <i>/eksponent eienskappe</i> ✓ $\frac{1}{3}$ OR/OF 3^{-1} CA (4)

<p>3.2</p>	$\log(x+2) - \log x = 1$ $\log \frac{x+2}{x} = 1 \quad \text{OR/OF} \quad \log \frac{x+2}{x} = \log 10$ $\frac{x+2}{x} = 10^1$ $10x = x + 2$ $\therefore x = \frac{2}{9}$ <p style="text-align: center;">OR/OF</p> $\log(x+2) - \log x = 1$ $\log(x+2) = \log 10 + \log x$ $\log(x+2) = \log 10x$ $x+2 = 10x$ $\therefore x = \frac{2}{9}$	<p>✓ log properties/ <i>eienskappe</i> A</p> <p>✓ exponent form/ <i>eksponent vorm</i> A</p> <p>✓ S CA</p> <p>✓ $x = \frac{2}{9}$ CA</p> <p style="text-align: center;">OR/OF</p> <p>✓ log 10 + log x A</p> <p>✓ log property/ <i>eienskappe</i> A</p> <p>✓ S CA</p> <p>✓ $x = \frac{2}{9}$ CA</p> <p style="text-align: right;">(4)</p>
<p>3.3.1</p>	<p>z lies in the 4th Quadrant / lê in 4de kwadrant</p>	<p>AD</p> <p>✓ correct quadrant/ <i>korrekte kwadrant</i> A</p> <p style="text-align: right;">(1)</p>
<p>3.3.2 #</p>	$z = 5 - 5i$ $r = \sqrt{5^2 + (-5)^2}$ $= 5\sqrt{2}$ $\tan \theta = -\frac{5}{5} = -1$ <p>ref / verw. $\angle = 45^\circ$</p> $\theta = 315^\circ$ $z = 5\sqrt{2} \text{ cis } 315^\circ \quad \text{OR/OF} \quad 2\sqrt{5} \angle 315^\circ$ <p style="text-align: center;">OR/OF</p> $z = 5\sqrt{2} (\cos 315^\circ + i \sin 315^\circ)$	<p>AD</p> <p>✓ modulus(r) A</p> <p>✓ reference \angle / verw \angle CA</p> <p>✓ argument CA</p> <p>✓ polar form / <i>polêre vorm</i> CA</p> <p>[Accept radians/ Aanvaar radiale]</p> <p>AO: Full Marks/volpunte (4)</p>
<p>3.4</p>	$m = 3i(2i - 5) + 7 - ni$ $m + ni = 6i^2 - 15i + 7$ $m + ni = 6(-1) - 15i + 7$ $m = 1$ $n = -15$	<p>✓ expanding A</p> <p>✓ $i^2 = -1$ A</p> <p>✓ value of / waarde van m CA</p> <p>✓ value of /waarde van n CA</p> <p style="text-align: right;">(4)</p>
[21]		

		from/vanaf Q/V 4.1.2	(2)
4.1.4	$g(x) = \frac{k}{x} + 9$ $0 = \frac{k}{-2} + 9$ $k = 18$	✓ subst.asymptote/verv. <i>asimptoot</i> ✓ subst/verv A ✓ value of/waarde van <i>k</i>	CA CA CA (3)
4.1.5	$-2 \leq x < 0$ OR/OF $x \in [-2 ; 0)$	✓ endpoints/eindpunte ✓ correct notation/notasie	A A (2)
4.2.1	$h(x) = 2x + c$ $0 = 2(-3) + c$ $6 = c$	✓ subst/verv S ✓ value of/waarde van <i>c</i>	A CA (2)
4.2.2	(a) M(- 6; 0)	✓ coordinates/coordinate	CA from/ vanaf Q/V 4.2.1 (1)
	(b) $p(x) = \sqrt{36 - x^2}$	36 or/of 6^2	CA from/ vanaf Q/V 4.2.1 or 4.2.2 (a) (1)
	(c) $-6 \leq x \leq 6$ OR/OF $x \in [-6 ; 6]$	✓ endpoints/eindpunte ✓ correct notation/notasie	CA A (2)
4.3.1	$y = -9$	✓ asymptote / <i>asimptoot</i>	A (1)
4.3.2	$k(x) = \left(\frac{1}{3}\right)^x - 9$ $0 = \left(\frac{1}{3}\right)^x - 9$ $3^{-x} = 3^2$ $x = -2$ $k(x) = \left(\frac{1}{3}\right)^0 - 9$ $y = -8$	✓ $3^{-x} = 3^2$ ✓ $x = -2$ ✓ $y = -8$	 A CA A (3)

4.3.3



AD

✓ asymptote/asimptote

CA

✓ both intercepts/
beide afsnitte

CA

✓ exponent shape/
eksponent vorm

CA

(3)

[26]

QUESTION/VRAAG 5

5.1	$A = P(1+i)^n$ $= 75 (1 + 26\%)^3$ $\approx 150,03^\circ \text{C}$	AD ✓ F A ✓ SF A ✓ temp CA NPU NPR (3)
5.2.1	R 27 000	✓ 27 000 A (1)
5.2.2	$A = P(1-i)^n$ $27\ 000 = 81\ 000(1-0,2)^n$ $\frac{27\ 000}{81\ 000} = (0,8)^n$ $n = \log_{0,8} \frac{27\ 000}{81\ 000} \quad \text{OR / OF} \quad n = \log_{(1-0,2)} \frac{1}{3}$ $n \approx 4,92 \text{ years/jare}$	✓ SF CA ✓ S CA ✓ log form / vorm CA ✓ 4,92 CA (4)
5.3 #	<p><u>Amount on / bedrag op 1 Feb 2025:</u></p> $A_1 = R30\ 000 \left(1 + \frac{10\%}{12}\right)^{12 \times 2} + R20\ 000$ $\approx R56\ 611,72884$ <p><u>Amount on / bedrag op 1 Feb 2026:</u></p> $A_2 = [56\ 611,72884] \times \left(1 + \frac{12\%}{2}\right)^2 + R10\ 000$ $\approx R73\ 608,93853$ <p><u>Amount on / bedrag op 1 Feb 2028:</u></p> $A_3 = 73\ 608,93853 \times \left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ $\approx R92\ 929,59$ <p>The municipality will NOT will be able to save enough money for the upgrade / Die munisipaliteit sal NIE genoeg geld gespaar het vir die opgradering nie.</p> <p style="text-align: center;">OR/OF</p>	✓ $R30\ 000 \left(1 + \frac{10\%}{12}\right)^{12 \times 2}$ A A ✓ + R20000 ✓ $A_1 \times \left(1 + \frac{12\%}{2}\right)^2$ CA A ✓ + R10000 ✓ $A_2 \times \left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ CA CA ✓ conclusion/ gevolgtrekking

	$A = R30\,000 \left(1 + \frac{10\%}{12}\right)^{2 \times 12} \left(1 + \frac{12\%}{2}\right)^{3 \times 2}$ $+ R20\,000 \left(1 + \frac{12\%}{2}\right)^{2 \times 3}$ $+ R10\,000 \left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ <p>$A \approx R92\,929,59$</p> <p>The municipality will NOT be able to save enough money for the upgrade / <i>Die munisipaliteit sal NIE genoeg geld gespaar het vir die opgradering nie.</i></p> <p style="text-align: center;">OR/OF</p> $A = \left[\left\{ R30\,000 \left(1 + \frac{10\%}{12}\right)^{12 \times 2} + R20\,000 \right\} \times \left(1 + \frac{12\%}{2}\right)^2 + R10\,000 \right]$ $\times \left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ <p>$A \approx R92\,929,59$</p> <p>The municipality will NOT be able to save enough money for the upgrade / <i>Die munisipaliteit sal NIE genoeg geld gespaar het vir die opgradering nie.</i></p>	<p>✓</p> <p>$R30\,000 \left(1 + \frac{10\%}{12}\right)^{12 \times 2}$ A</p> <p>A</p> <p>✓ + R20 000 A</p> <p>✓ × $\left(1 + \frac{12\%}{2}\right)^2$ A</p> <p>✓ + R10 000 A</p> <p>✓ × $\left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ CA</p> <p>✓ conclusion/ gevolgtrekking CA</p> <p style="text-align: center;">OR/OF</p> <p>✓</p> <p>$R30\,000 \left(1 + \frac{10\%}{12}\right)^{12 \times 2}$ A</p> <p>A</p> <p>✓ + R20 000 A</p> <p>✓ × $\left(1 + \frac{12\%}{2}\right)^2$ A</p> <p>✓ + R10 000 CA</p> <p>✓ × $\left(1 + \frac{12\%}{2}\right)^{2 \times 2}$ CA</p> <p>✓ conclusion/ gevolgtrekking</p> <p style="text-align: right;">(6)</p> <p>NPR</p>
		[14]

QUESTION/VRAAG 6

<p>6.1</p>	$f(x) = \frac{7}{2}x + 5$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{7}{2}(x+h) + 5 - \left(\frac{7}{2}x + 5\right)}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{7}{2}x + \frac{7}{2}h + 5 - \frac{7}{2}x - 5}{h}$ $= \lim_{h \rightarrow 0} \frac{\frac{7}{2}h}{h}$ $= \lim_{h \rightarrow 0} \frac{7}{2}$ <p>$\therefore f'(x) = \frac{7}{2}$ OR/OF 3,5</p>	<p>AD</p> <p>✓ definition/definisie A</p> <p>✓ SF CA</p> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>Penalty of one mark for incorrect notation</p> <p><i>Penaliseer een punt indien notasie foutief is.</i></p> </div> <p>✓ S CA</p> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>AO one mark/slegs een punt</p> </div> <p>✓ S CA</p> <p>✓ $\frac{7}{2}$ OR/OF 3,5 CA (5)</p>
<p>6.2.1</p>	$f(x) = -8\pi$ $f'(x) = 0$	<p>AD</p> <p>✓ 0 A (1)</p>
<p>6.2.2</p>	$y = \frac{x^4 + 9x}{x^2}$ $= x^2 + 9x^{-1}$ $\frac{dy}{dx} = 2x - 9x^{-2} \quad \mathbf{OR / OF} \quad \frac{dy}{dx} = 2x - \frac{9}{x^2}$	<p>AD</p> <p>✓ S A</p> <p>✓ $2x$ CA</p> <p>✓ $-9x^{-2}$ or / of $-\frac{9}{x^2}$ CA (3)</p>
<p>6.2.3</p>	$D_x \left[(\sqrt{x} + 8x)^2 \right]$ $= D_x \left[\left(x^{\frac{1}{2}} + 8x \right)^2 \right]$ $= D_x \left[x + 16x^{\frac{3}{2}} + 64x^2 \right]$ $= 1 + 24x^{\frac{1}{2}} + 128x \quad \mathbf{OR / OF} \quad = 1 + 24\sqrt{x} + 128x$	<p>AD</p> <p>✓ $x^{\frac{1}{2}}$ A</p> <p>✓ expanding/ uitbrei CA</p> <p>✓ 1 CA</p> <p>✓ $24x^{\frac{1}{2}}$ OR/OF $24\sqrt{x}$ CA</p> <p>✓ $128x$ CA (5)</p>

6.3.1	$g(x) = 3x^2 + 9x$ $g'(x) = 6x + 9$	✓ derivative of /afgeleide v A (1)
6.3.2	$g'(x) = 6x + 9$ $\therefore m_T = 6(-3) + 9$ $= -9$	✓ subst.into derivative / CA <i>vervang in afgeleide</i> ✓ -9 CA (2)
6.3.3	$y = 3(-3)^2 + 9(-3)$ $\therefore y = 0$ $y = mx + c \quad \text{OR/OF} \quad y - y_1 = m(x - x_1)$ $0 = -9(-3) + c \quad y - 0 = -9(x + 3)$ $c = -27 \quad y - 0 = -9x - 27$ $\therefore y = -9x - 27$	✓ y- coordinate / koördinaat A ✓ SF CA ✓ eqn. of tangent / CA <i>vergelyking v raaklyn</i> (3)
		[20]

QUESTION/VRAAG 7

7.1	$(0; -10)$	AD ✓ 0 ✓ -10	A A (2)
7.2	$f(-1) = -(-1)^3 + 6(-1)^2 - 3(-1) - 10$ $= 0$ $\therefore (x + 1)$ is a factor of/is a factore van f	✓ substitution/ <i>vervanging</i> ✓ 0	A A (2)
7.3	x -intercepts; $y = 0$ $-(x - 2)(x^2 - 4x - 5) = 0$ $-(x - 2)(x + 1)(x - 5) = 0$ $\therefore x = 2$ or/of $x = -1$ or/of $x = 5$	AD ✓ $x = 2$ ✓ $x = -1$ and/en $x = 5$ AO: full marks/volpunte	A A (2)
7.4	$f'(x) = -3x^2 + 12x - 3$ $f'(x) = -3x^2 + 12x - 3 = 0$ $= x^2 - 4x + 1 = 0$ $x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$ $\therefore x \approx 0,27$ or/of $x \approx 3,73$ $y = f(0,27) = -(0,27)^3 + 6(0,27)^2 - 3(0,27) - 10$ $\approx -10,39$ $y = f(3,73) = -(3,73)^3 + 6(3,73)^2 - 3(3,73) - 10$ $\approx 10,39$ $\therefore (0,27; -10,39)$ and/en $(3,73; 10,39)$	✓ derivative/afgeleide ✓ equating derivative to 0/ <i>stel afgeleide gelyk aan 0</i> ✓ SF ✓ both values of / <i>beide waardes van x</i> ✓ both values of / <i>beide waardes van y</i>	A A CA CA CA (5)

7.5		<p>AD</p> <ul style="list-style-type: none"> ✓ y-intercept/ afsnit CA ✓ all x-intercepts/ al die x- afsnitte CA ✓ both turning points/ beide draaipunte CA ✓ cubic shape/ kubiek vorm CA <p style="text-align: right;">(4)</p>
7.6	<p>$0,27 < x < 3,73$</p> <p style="text-align: center;">OR/OF</p> <p>$x \in (0,27 ; 3,73)$</p> <p style="text-align: center;">OR/OF</p> <p>$x > 0,27$ and/en $x < 3,73$</p>	<ul style="list-style-type: none"> ✓ critical values / kritiesewaardes CA ✓ correct notation / korrekte notasie CA <p style="text-align: right;">(2)</p>
		[17]

QUESTION/VRAAG 8

8.1	$r^2 = 9 - h^2$ $r = \sqrt{9 - h^2}$	✓ Applying / <i>toepassing</i> Pythagoras Theorem/ <i>Stelling</i> A ✓ $r = \sqrt{9 - h^2}$ A (2)
8.2	$V = \frac{1}{3} \pi r^2 h$ $V(h) = \frac{1}{3} \pi (\sqrt{9 - h^2})^2 h$ $= \frac{1}{3} \pi (9 - h^2) h$ $= 3\pi h - \frac{1}{3} \pi h^3$	✓ SF CA ✓ S CA (2)
8.3	$V(h) = 3\pi h - \frac{1}{3} \pi h^3$ $V'(h) = 3\pi - \pi h^2$ <p>For maximum/<i>vir maksimum</i>: $V'(h) = 0$</p> $\therefore 3\pi - \pi h^2 = 0$ $-\pi h^2 = -3\pi$ $h^2 = 3$ $h = \sqrt{3} \text{ cm } \mathbf{OR/OF} \ h \approx 1,73 \text{ cm}$	✓ derivative/ <i>afgeleide</i> A ✓ equating derivative to 0 / <i>stel afgeleide aan 0</i> A ✓ S CA ✓ value of/ <i>waarde van h</i> CA NPU NPR (4)
		[8]

QUESTION/VRAAG 9

9.1.1	$\int \frac{3}{x} dx$ $= 3 \ln x + C$	$\checkmark 3 \ln x$ $\checkmark C$	A A (2)
9.1.2	$\int \left(-\frac{3x}{x^5} + \sqrt[5]{x^3} \right) dx$ $= \int \left(-3x^{-4} + x^{\frac{3}{5}} \right) dx$ $= \frac{-3x^{-3}}{-3} + \frac{x^{\frac{8}{5}}}{\frac{8}{5}} + C$ $= x^{-3} + \frac{5}{8}x^{\frac{8}{5}} + C \quad \text{OR/OR} \quad = \frac{1}{x^3} + \frac{5}{8}x^{\frac{8}{5}} + C$	AD $\checkmark -3x^{-4}$ $\checkmark x^{\frac{3}{5}}$ $\checkmark x^{-3} \quad \text{OR/OR} \quad \frac{1}{x^3}$ $\checkmark \frac{5}{8}x^{\frac{8}{5}} \quad \text{OR/OR} \quad \frac{x^{\frac{8}{5}}}{\frac{8}{5}}$	A A CA CA (4)

<p>9.2 #</p>	$A_1 = - \int_0^3 f(x) dx$ $= - \int_0^3 (x^2 - 5x) dx$ $= - \left[\frac{x^3}{3} - \frac{5}{2}x^2 \right]_0^3$ $= - \left[\left[\frac{(3)^3}{3} - \frac{5}{2}(3)^2 \right] - \left[\frac{(0)^3}{3} - \frac{5}{2}(0)^2 \right] \right]$ $= 13,5 \text{ OR/OF } \frac{27}{2} \text{ units}^2 / \text{eenhede}^2$ $A_2 = \int_5^7 (x^2 - 5x) dx$ $= \left[\frac{x^3}{3} - \frac{5}{2}x^2 \right]_5^7$ $= \left[\frac{(7)^3}{3} - \frac{5}{2}(7)^2 \right] - \left[\frac{(5)^3}{3} - \frac{5}{2}(5)^2 \right]$ $= \frac{38}{3} \text{ OR/OF } \approx 12,67 \text{ units}^2 / \text{eenhede}^2$ $\therefore A_1 - A_2 = 13,5 - 12,67 \text{ units}^2 / \text{eenhede}^2$ $\approx 0,83 \text{ units}^2 / \text{eenhede}^2$ $\text{OR / OF} = \frac{5}{6} \text{ units}^2 / \text{eenhede}^2$	<p>AD</p> <p>✓ M Area notation using integrals/ Oppervlakte- notasie met gebruik van integrale A</p> <p>✓ $\frac{x^3}{3} - \frac{5}{2}x^2$ A</p> <p>✓ Substitution/ Vervanging CA</p> <p>✓ 13,5 OR/OF $\frac{27}{2}$ CA</p> <p>✓ M Area notation using integrals/ Oppervlakte- notasie met gebruik van integrale A</p> <p>✓ Substitution/ vervanging CA</p> <p>✓ $\frac{38}{3}$ OR/OF 12,67 CA</p> <p>✓ Subtracting Areas/ Areas aftrek M A</p> <p>✓ 0,83 OR/OF $\frac{5}{6}$ CA</p> <p>NPR</p> <p>AO: 3 marks/punte (9)</p>
		[15]

TOTAL/TOTAAL: 150