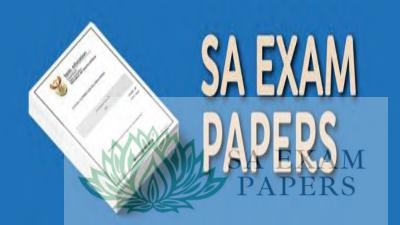


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# SENIOR CERTIFICATE EXAMINATIONS/ NATIONAL SENIOR CERTIFICATE EXAMINATIONS SENIORSERTIFIKAAT-EKSAMEN/ NASIONALE SENIORSERTIFIKAAT-EKSAMEN

# **TECHNICAL MATHEMATICS P1/TEGNIESE WISKUNDE V1**

# MAY/JUNE/MEI/JUNIE 2024

FINAL/FINALE MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150

MARKING GI

PRIVATE BAG XI

	Marking Codes/Nasienkodes
Α	Accuracy/Akkurgatheid
CA	Consistent Accuracy/Volgehoue Akkuraatheid
Μ	Method/Metode
R	Rounding/Afronding
NPR	No Penalty for Rounding/Geen Penalisering vir Afronding nie
NPU	No Penalty for Units omitted/Geen Penalisering vir Afronding nie Simplification/Verserver list
S	Simplification/Vereenvoudiging
SF	Substitution in Correct Formula/Vervanging in Korrekte Formule

# These marking guidelines consist of 19 pages. *Hierdie nasienriglyne bestaan uit 19 bladsye*.

DATE APPROVED/DATUM GOEDGEKEUR EXTERNAL/EKSTERNE MODERATOR	11 MAY 2024 INTERNAL /INTERNE MODERATORS
M.A. HENDRICKS	N. TOM
MA HENDRICKS	Att W. WHITE
External Moderator UMALUSI	White
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#### NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- Consistent accuracy applies in all aspects of the marking guidelines where indicated.
  # Shows questions where a Tolerance Range will be applied: Q 2.2; Q 5.2.1; Q 6.1 & 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 soos aangedui.
- # Toon vrae waar Toleransie wydte (Verdraagsaamheids omvang) toegepas word: V 2.2; V 5.2.; V 6.1 & V 9.2

#### **QUESTION/VRAAG1**

1.1.1	$x^2 - x - 12 = 0$		1
	$ (x-4)(x+3) = 0 \text{ OR/OF } x = \frac{-(-1) \pm \sqrt{(-1)^2 - 4(1)(-12)}}{2(1)} $ x = 4 or/of x = -3	✓ factors/formula faktore/formule	
	x = 4  or/of  x = -3	<ul> <li>✓ both values of x beide waardes van x</li> <li>AO: Full Marks/Volpunte</li> </ul>	C
1.1.2	$x^2 - x - 12 \le 0$	AO. Full Marks/ V Olpunte	(2
	$(x-4)(x+3) \le 0$		
	$-3 \le x \le 4$ OR/OF $x \in [-3; 4]$	✓ correct notation korrekte notasie	CA
		ADDENDUM	(1)
1.1.3	$x^2 - x - 12 = -5$		-
	$x^2 - x - 7 = 0$	1 -t - 1 - 1 C	
	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	✓ standard form /standaardvorm	A
	$=\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-7)}}{2}$		
	$=\frac{1}{2(1)}$		CA
	$x \approx -2,19$ or/of $x \approx 3,19$	✓ SF	
		✓ positive <i>x</i> -value	CA
. 1	10 miles 10 miles	Positiewe x-waarde	
	PRIVATE BAG X655, PRETORIA 000	✓ negative value of $x$	CA
	2024 -05- 1 8	negatiewe waarde v x	(4)
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	IPPROVED MARINATION	AO: Full Marks/Volpunte	



	2y - x = 7 $x = 2y - 7$	✓ x subject of formula x onderwerp van formule	(
1.2.2	x = 2y - 7 $x^{2} + xy = 21 - y^{2}$ $(2y - 7)^{2} + (2y - 7)y = 21 - y^{2}$ $4y^{2} - 28y + 49 + 2y^{2} - 7y = 21 - y^{2}$ $7y^{2} - 35y + 28 = 0  OR/OF  y^{2} - 5y + 4 = 0$ $(y - 4)(y - 1) = 0  OR/OF  y = \frac{-(-5) \pm \sqrt{(-5)^{2} - 4(1)(4)}}{2(1)}$ y = 4  or / of  y = 1 x = 2(4) - 7 = 1  or / of  x = 2(1) - 7 = -5	<ul> <li>✓ both y-values beide y-waardes</li> <li>✓ both x-values</li> </ul>	С. С. С. С. А
	$OR/OF$ $2y - x = 7$ $y = \frac{x}{2} + \frac{7}{2}$ $x^{2} + xy = 21 - y^{2}$	beide x-waardes OR/OF	CA
	$x^{2} + x\left(\frac{x}{2} + \frac{7}{2}\right) = 21 - \left(\frac{x}{2} + \frac{7}{2}\right)^{2}$ $x^{2} + \frac{x^{2}}{2} + \frac{7x}{2} = 21 - \left(\frac{x^{2}}{4} + \frac{7x}{2} + \frac{49}{4}\right)$ $x^{2} + \frac{x^{2}}{2} + \frac{7x}{2} = 21 - \frac{x^{2}}{4} - \frac{7x}{2} - \frac{49}{4}$ $4x^{2} + 2x^{2} + 14x = 84 - x^{2} - 14x - 49$	✓ subst./verv.	А
7	$7x^{2} + 28x - 35 = 0  \text{OR/OF}  x^{2} + 4x - 5 = 0$ (x+5)(x-1) = 0 \ \ OR/OF  x = $\frac{-(4) \pm \sqrt{(4)^{2} - 4(1)(-5)}}{2(1)}$	✓ standard form /standaardvorm	CA
	x = -5 or/of $x = 1$ $2(1)$	✓ factors/formula faktore/formule	CA
	$y = \frac{-5}{2} + \frac{7}{2} = 1$ or $/of$ $y = \frac{1}{2} + \frac{7}{2} = 4$	✓ both <i>x</i> -values /beide <i>x</i> -waardes	CA
y y		✓ both <i>y</i> -values	

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PROVED MARKING GUIDELINE

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	$T = \frac{12,5 D}{D + 4d}$ $T(D + 4d) = 12,5 D$ $(D + 4d) = \frac{12,5 D}{T}$	✓ multiplication/	
		vermenigvuldiging ✓ division/ deling	
	$d = \frac{T}{4} \text{ OR}/$	$OF \ d = \frac{12,5D}{4T} - \frac{D}{4}  \checkmark \text{ subtraction and division/} \\ aftrekking \ en \ deling$	C
	OR/OF	$F d = \frac{12,5D - DT}{4T}$	(
1.3.2	$d = \frac{\frac{12,5 D}{T} - D}{4}$		
	$=\frac{\frac{12,5(32)}{(10)}-(32)}{(32)}$	✓ SF	C.
	d = 2	✓ value of /waarde van d	C
	$d = \frac{12,5D}{4T} - \frac{D}{4}$	OR/OF	
	$=\frac{12,5(32)}{4(10)}-\frac{32}{4}$	✓ SF	C
	d = 2	$\checkmark$ value of /waarde van d	CA
RIVATE	OR/OF	OR/OF	
TMEN	$\frac{1}{4T}$		
ATION	$=\frac{12,5(32)-(32)(10)}{4(10)}$ d = 2	✓ SF	CA
BA TH	u = 2 OR/ <i>0F</i>	✓ value of /waarde van d	CA
	$T = \frac{12,5 D}{D + 4d}$	OR/OF	
	$10 = \frac{12,5 \times 32}{32 + 4d}$	✓ SF	А
	d = 2	$\checkmark$ value of /waarde van d	CA
			(2)

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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ŀ	1111102							
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		25	2 <sup>4</sup>	2 <sup>3</sup>	2 <sup>2</sup>	21	2°	1	
$32 + 16 + 8 + 4 + 2 = 62$ $\therefore 2 (111110_2 + 38)$ $= 2 (62 + 38)$ $= 200$		1	1	1	1	1		11	
$32 + 16 + 8 + 4 + 2 = 62$ $\therefore 2 (111110_2 + 38)$ $= 2 (62 + 38)$ $= 200$		32	16	8	4	2	-		
AO: Full Marks/Volpunte									A

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#### **QUESTION/VRAAG 2**

2.1.1	b = 0	✓ Value of/ waarde van b	A
2.1.2	$b = \frac{2}{5}  OR / OF  0,4$	✓ Value of/ waarde van b	$\begin{array}{c c} (1) \\ \hline \mathbf{A} \\ (1) \end{array}$
2.2	$kx^2 = 35 - 2x$		(-)
#	$kx^2 + 2x - 35 = 0$ $\Delta = b^2 - 4ac$	✓ standard form /standaardvorm	A
	$=(2)^2-4(k)(-35)$	✓ SF	CA
	= 4 + 140k For real roots / Vir reële wortels:	✓ S	CA
	$\Delta \ge 0$ $4 + 140k \ge 0$	$\checkmark \Delta \ge 0$	A
	$k \ge -\frac{1}{35}$ <b>OR</b> / <i>OF</i> - 0,03	✓ Values of /waardes van $k$	CA
		ADDENDUM	(5)
			[7]

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3.1.1	$\sqrt[3]{8x^{27}} = 2x^9$	$\checkmark 2 x^9$	4
3.1.2	$9^{n+1} \times 4^n \times 6^{1-2n}$		(1
	$= (3^{2})^{n+1} \times (2^{2})^{n} \times (2 \times 3)^{1-2n}$ = $3^{2n+2} \times 2^{2n} \times 2^{1-2n} \times 3^{1-2n}$ = $3^{2n+2+1-2n} \times 2^{2n+1-2n}$	<ul> <li>✓ prime bases</li> <li>/priem grondtalle</li> <li>✓ expansion/uitbreiding</li> </ul>	A CA
	$= 3^3 \times 2^1$ $= 54$	✓ S	CA (3
3.1.3	$\sqrt{k} (2 - \sqrt{k}) - \sqrt{4k}$ $= 2\sqrt{k} - k - 2\sqrt{k}$ $= -k$ $OR/OF$ $\sqrt{k} (2 - \sqrt{k}) - \sqrt{4k}$	$\checkmark 2\sqrt{k} - k$ $\checkmark -2\sqrt{k}$ $\checkmark S$ OR/OF	A A CA
	$=k^{\frac{1}{2}}\left(2-k^{\frac{1}{2}}\right)-2k^{\frac{1}{2}}$ $=2k^{\frac{1}{2}}-k-2k^{\frac{1}{2}}$ $=-k$	$\checkmark 2k^{\frac{1}{2}} - k$ $\checkmark - 2k^{\frac{1}{2}}$ $\checkmark S$	A A CA (3)
	$\log 72 - \log 2  OR/OF$ $\log 36 + \log 2 - \log 2 = \log 36$ $= \log \frac{72}{2}  OR/OF  \log 36  OR/OF  2 \log 6$	✓ log prop./eienskap	A (1)
3.2.2	$\frac{\log 72 - \log 2}{\log 6} = \frac{\log 36}{\log 6}$ $= \frac{\log 6^2}{\log 6} \qquad OR/OF = \log_6 36$ $= \frac{2\log 6}{\log 6} \qquad = 2\log_6 6$	AO: Full Marks if Q 3.2.1 is correct otherwise only 1mark /Volpunte indien V3.2.1 korrek is anders Slegs 1 punt ✓ log prop./eienskap ✓ S	CA CA (2)

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3.3	$\frac{SC/NSC - FINAL/FINALE Marking Guideline}{5^{x+2} - 5^x} = 600$		T
	$5^x \cdot 5^2 - 5^x = 600$	✓ separating exp./skei eksp.	
	$5^{x}(25-1)=600$	✓ factors / <i>faktore</i>	CA
	$5^{x} = 25$	✓ S	CA
	$5^{x} = 5^{2} \text{ OR/OF } x = \log_{5} 25 \text{ OR/OF } \log 5^{x} = \log 5^{2}$	✓ exp or log. prop./eksp. of log eienskap	CA
	$x \log 5 = 2 \log 5$		
	$\therefore x = 2$	$\checkmark$ value of /waarde van x	CA
3.4.1	-i <b>OR</b> / <b>OF</b> $0-i$	AO: Full Marks/Volpunte	(5
5.7.1	-i <b>OR</b> /OF $0-i$	✓ conjugate /gekojugeerde	A
3.4.2	2 + 3i		(1
	$\frac{2+3i}{i}$		
	0 + 2;		
	$= \frac{2+3i}{i} \times \frac{-i}{-i}$	✓ M	A
	$= \frac{-2i-3i^2}{-i^2}$ <b>OR / OF</b> $-\frac{2i}{-i^2} + 3$	✓ S	CA
	$= \frac{-2i - 3(-1)}{-(-1)}  \mathbf{OR} / \mathbf{OF}  -\frac{2i}{-(-1)} + 3$	✓ -1	A
	= -2i + 3	✓ S	CA
			(4)
.5	a + bi = -i - 14	ADDENDUM ✓ a-value/waarde	
			Α
	$\therefore a = -14$ and $/ en  b = -1$	✓ <i>b</i> -value/ <i>waarde</i>	A (2)
			[22]



Technical Mathematics/P1/Tegniese Wiskunde/V1 9 DBE/May/June/Mei/Junie 2024 SC/NSC – FINAL/FINALE Marking Guidelines/Nasienriglyne

# QUESTION/VRAAG 4

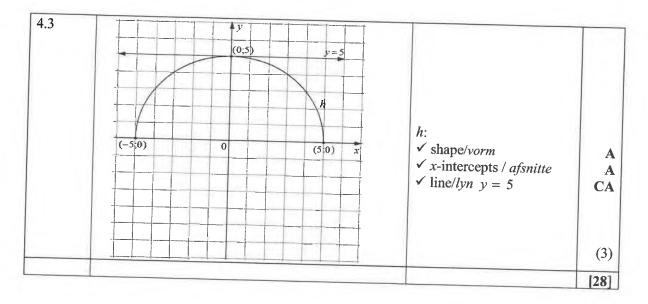
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	(3;18)	✓ 3 ✓ 18	A
4.1.2	$-2(x-3)^2 + 18 = 0$		(2
	$-2(x^2-6x+9)+18=0$	<b>√</b> =0	
	$-2(x^{2}-6x+9)+18=0$		
	$-2x^2 + 12x = 0$	✓ Standard form	C
	$-2x(x-6) = 0  \mathbf{OR}/\mathbf{OF}  x = \frac{-(12)\pm\sqrt{(12)^2 - 4(-2)(0)}}{2(-2)}$	standaard vorm ✓ factors/formula faktore/formule	C
	x = 0  or  / of x = 6 <b>OR</b> /OF	<ul> <li>✓ both values of x albei waardes van x</li> <li>OR/OF</li> </ul>	C
	$-2(x-3)^2 + 18 = 0$	<b>√</b> =0	
	$2(x-3)^2 = 18$ <b>OR</b> / <b>OF</b> $(x-3)^2 = 9$	✓ S	CA
	$x-3=\pm 3$	✓ S	CA
	x = 0 or / of $x = 6$	✓ both x-values of /albei	
4.1.3		x-waardes	(4
4.1.5		<ul> <li>4.1.3 f:</li> <li>✓ Turning point Draaipunt</li> <li>✓ both x- int beide x-afsn.</li> <li>✓ shape/vorm</li> <li>ADDENDUM</li> <li>4.1.5 h:</li> <li>✓ x- int./afsn. &amp; (5;10)</li> <li>✓ increasing line/ toenemende lyn</li> <li>ADDENDUM</li> </ul>	CA CA (3) CA CA CA (2)

4.1.4 (a)	$\int (x) = 2(x-3) + 10$ subst./verv. (5;t)		1
	$t = -2(5-3)^2 + 18$	✓ subst./verv	
	= 10	✓ value of /waarde van t	C
	OR/OF	OR/OF	
	$\begin{cases} f(x) = -2x^2 + 12x \\ t = -2(5)^2 + 12(5) \end{cases}$	✓ subst./verv	
	l = -2(3) + 12(3) = 10		CA
		✓ value of /waarde van t AO: Full Marks/Volpunte	CA (2
4.1.4 (b)	$h(x) = 2x + c  \text{subst./verv} \ (5;10)$		
	10 = 2(5) + c	✓ subst./verv	CA
	c = 0	✓ <i>c</i> -value of / <i>c</i> -waarde	CA
4.1.5	REFER TO DIAGRAM IN Q 4.1.3	-	(2)
4.2.1 (a)	$x \in \Box$ ; $x \neq 0$ <b>OR</b> / <i>OF</i> $x \in (-\infty; 0) \cup (0; \infty)$	$\checkmark x \neq 0$ <b>OR</b> / <i>OF</i>	A
		$x \in (-\infty; 0) \cup (0; \infty)$	A
4.2.1 (b)	$y > -4$ <b>OR/OF</b> $y \in (-4; \infty)$		(1)
		✓ Range/waarde versameling	A
.2.1 (c)	<i>q</i> = -4	$\checkmark q = -4$	(1) A
.2.1 (d)	D(0; -3)	$\checkmark x = 0$	(1)
	2(0, 3)	$\bigvee x = 0$ $\bigvee y = -3$	A CA
		y = -5	(2)
.2.2	$0 = -\frac{8}{x} - 4$		
	$4 = -\frac{8}{3}$	$\checkmark y = 0$	A
	x		
	4x = -8	✓ S	
	x = -2	$\checkmark$ x-value /x-waarde	CA CA
	$\frac{C(-2;0)}{C(-2;0)}$	AO: Full Marks/Volpunte	(3)
	$g(x) = a^{x} + q$		
	$g(x) = a^{x} - 4$		
	$0 = a^{-2} - 4$ subst./verv. (-2; 0)	✓ subst./verv	CA
	$4 = a^{-2}$		
	$a = \frac{1}{2}$	✓ <i>a</i> -value / <i>a</i> -waarde	CA
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#### **QUESTION/VRAAG5**

5.1.1	250	✓ 250	A
5.1.2			(1)
5.1.2	$\mathbf{A} = \mathbf{P} \left( 1 + i \right)^n$	✓F	A
	$= 250 \ (1+50 \ \%)^{12}$	✓SF	
	≈ 32 437	✓ S	CA
- 1 - 0		ADDENDUM	(3)
5.1.3	$\mathbf{A} = \mathbf{P} \left( 1 + i \right)^n$	√F	A
	$100\ 000 = 250\ (1+50\ \%)^n$	✓ SF	CA
	$\frac{100\ 000}{250} = (1,5)^n$		
	$n = \frac{\log\left(\frac{100000}{250}\right)}{\log(1,5)} \text{ OR/OF } n = \log_{1,5} \frac{100000}{250}$	✓ log form/-vorm	CA
	$\therefore n \approx 15 \text{ months/ maande}$	✓ value of/waarde van n	
		ADDENDUM	CA (4)
.2.1 <b>‡</b>	Value of investment end of 3 years/ Waarde van belegging einde van 3 jaar:		(4)
	$\mathbf{A} \coloneqq \mathbf{P}(1+i)^n$		
	$= R15000 \left(1 + \frac{8,5\%}{4}\right)^{3 \times 4}$	✓ values of <i>i</i> and <i>n</i> /waarde van <i>i</i> en n	A
	≈ R19305,28		
	Value of investment end of 5 years/ Waarde van belegging einde van 5 jaar:	✓ S	CA
	$\mathbf{A} = \mathbf{P}(1 + i)^n$		
	$= R19305, 28 \left(1 + \frac{6\%}{2}\right)^{2 \times 2}$		
	ŕ	✓ values of <i>i</i> and <i>n</i> /waarde	A
	≈ R 21 728,26	van ienn	
	$\therefore$ R 21728, 26 < R 23000	✓ R 21 728,26	CA
1	He will <b>NOT</b> have enough money/Hy sal NIE		CA
8	genoeg geld hê NIE.	✓ conclusion/gevolgtrekking	CA
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	$OR/OF$ $A = P(1+i)^n$	OR/OF	
	$= R15000 \left(1 + \frac{8,5\%}{4}\right)^{3\times4} \times \left(1 + \frac{6\%}{2}\right)^{2\times2}$	✓ <b>M</b> ✓ values of <i>i</i> and <i>n</i> /waarde van <i>i</i> en n	
		✓ values of <i>i</i> and <i>n</i> /waarde van <i>i</i> en n	A
	$\approx$ R 21 728,26 ∴ R 21 728, 26 < R 23 000	✓ R 21 728,26	CA
	He will <b>NOT</b> have enough money/ <i>Hy sal NIE</i> genoeg geld hê NIE	✓ conclusion/gevolgtrekking	CA
5.0.0		ADDENDUM	(5)
5.2.2	R 21 728,26 - R15000 = R 6 728,26	<ul> <li>✓ M subtracting / aftrek</li> <li>✓ interest earned</li> </ul>	A
		rente verdien	CA (2)
			[15]

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# QUESTION/VRAAG 6

6.1	f(x) = 11 + 7x		
#	$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$	✓ definition/definisie	A
	$= \lim_{h \to 0} \frac{11 + 7(x+h) - (11 + 7x)}{h}$	✓ SF	A
	$= \lim_{h \to 0} \frac{11 + 7x + 7h - 11 - 7x}{h}$	✓ S (only if the given expression is used)/	CA
	$=\lim_{h\to 0}\frac{7h}{h}$	(slegs as die gegewe uitdrukking gebruik is.)	CA
	$ = \lim_{h \to 0} h $	√S	CA
	$\therefore f'(x) = 7$	√ 7	
		Penalty: 1 mark for incorrect notation/ Penaliseer : 1 punt vir foutiwe notasie	
2.1		AO : 1 mark/ <i>punt</i> ADDENDUM	(5)
5.2.1	$y = x^{8}$ $\therefore \frac{dy}{dx} = 8x^{7}$	$\checkmark 8x^7$	A
.2.2	$\frac{dx}{f(x) = \sqrt[3]{x^4}}$		(1)
.2.2	$\int (x) - \sqrt{x}$ $= x^{\frac{4}{3}}$	4	
	: $f'(x) = \frac{4}{3}x^{\frac{1}{3}}$ OR / OF $f'(x) = \frac{4}{3}\sqrt[3]{x}$	$\begin{array}{ c c c c } \checkmark & x^{\frac{4}{3}} \\ \checkmark & \frac{4}{3}x^{\frac{1}{3}} & \text{OR/OF} \end{array}$	A CA
		$\frac{4}{3}\sqrt[3]{x}$	
2.3	$D_x \left[ \frac{x^2 - 16}{4 - x} \right]$		(2)
	$= D_{x}\left[\frac{(x+4)(x-4)}{-(x-4)}\right] \text{ OR/ OF } = D_{x}\left[\frac{-(x+4)(4-x)}{(4-x)}\right]$	✓✓ factors /faktore	A A
	$= D_x \left[ -x - 4 \right]$	✓ S	CA
	= - 1	<ul><li>✓ -1</li></ul>	CA

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6.3	$g(x) = -\frac{9}{x}$ $g(-3) = -\frac{9}{(-3)} = 3$		
	$g(-1) = -\frac{9}{(-1)} = 9$ Av./Gemid. Gradient = $\frac{g(x_2) - g(x_1)}{x_2 - x_1}$	<ul> <li>✓ both g(x)-values beide g(x)-waardes</li> <li>✓ F</li> </ul>	A
6.4.1	$= \frac{3-9}{-3-(-1)}  OR/OF = \frac{9-3}{-1-(-3)}$ = 3	, ✓ 3	CA (3)
	$f(x) = mx^{3} + mx - 4$ $\therefore f'(x) = 3mx^{2} + m + 0$	$\checkmark 3m x^2$ $\checkmark m + 0  \mathbf{OR}/\mathbf{OF}  m - 0$	A A (2)
5.4.2	$f'(2) = 3m(2)^2 + m = 13m$	✓ 13 m	<b>CA</b> (1)
.4.3	f'(2) = 39 13 m = 39 m = 3	<ul> <li>✓ Equating derivative to 39/ Stel afgeleide gelyk aan 39</li> <li>✓ Value of / waarde van m</li> </ul>	CA CA (2)
			[20]

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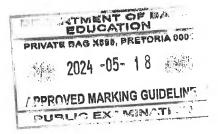
#### **QUESTION/VRAAG7**

7.1	F(0; -2)	<ul><li>✓ 0</li></ul>	
		✓ -2	
			(2
7.2	$2^{3} + p(2)^{2} + 9(2) - 2 = 0$	✓ Subst./verv. (2;0)	
	8 + 4p + 18 - 2 = 0 OR/OF $4p = -24$	✓ S	
	p = -6		(2
7.3	x-intercepts/afsnitte; $y = 0$	✓ = 0	
	$(x-2)(x^2-4x+1)=0$	✓ quadratic factor	
	$-(-4)+\sqrt{(-4)^2}$ , $A(1)(1)$	kwadratiese faktor	
	$\therefore x = 2 \text{ or/}of x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(1)}}{2(1)}$	✓ SF	CA
	$\therefore x_B = 2$ and $/en  x_A = 2 - \sqrt{3}$ and $/en  x_C = 2 + \sqrt{3}$	✓ values of/waardes van $x$	CA
	$\therefore$ BC = $\sqrt{3}$	✓ length of / lengte van BC	CA
		AO:Full Marks/Volpunte ADDENDUM	(5
.4	$h'(x) = 3x^2 - 12x + 9 = 0$	✓ derivative/afgeleide	A
		$\checkmark$ derivative = 0	A
		afgeleide = 0	
	$3(x-1)(x-3) = 0$ <b>OR</b> / <i>OF</i> $x = \frac{-(-12)\pm\sqrt{(-12)^2-4(3)(9)}}{2(3)}$	✓ factors/formula	
	2(3)	faktore/formule	CA
	$x = 1 \operatorname{cm}/cf$	juniore.jorniuie	
	$\therefore x = 1 \text{ or/of } x = 3$	$\checkmark$ both <i>x</i> -values	CA
	-(1) $(1)$ $(1)$ $(1)$ $(1)$	beide x-waardes	
	$h(1) = (1)^{3} - 6(1)^{2} + 9(1) - 2 = 2$		
	$h(3) = (3)^{3} - 6(3)^{2} + 9(3) - 2 = -2$	✓ both y-values	CA
		beide y-waardes	
	: $D(1; 2)$ and <i>len</i> $E(3; -2)$		
		AO: Full Marks/ <i>Volpunte</i> ADDENDUM	(5)



7.5 $2 < x < 3$ or / of $x > 2 + \sqrt{3}$	✓ critical values
	kritiese waardes ✓ correct notation korrekte notasie
OR/OF	$\checkmark x > 2 + \sqrt{3}$ OR/OF
$x \in (2; 3)$ or $/ of$ $x \in (2 + \sqrt{3}; \infty)$	<ul> <li>✓ critical values</li> <li><i>kritiese waardes</i></li> <li>✓ correct notation</li> <li><i>korrekte notasie</i></li> </ul>
	$\checkmark x \in \left(2 + \sqrt{3}; \infty\right) \qquad \mathbf{C}.$
OR/OF	OR/OF
$x > 2$ and /en $x < 3$ or / of $x > 2 + \sqrt{3}$	✓ critical values kritiese waardes
	✓ correct notation A korrekte notasie
	$\checkmark x > 2 + \sqrt{3}$ CA
	(3)
	[17]

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#### **QUESTION/VRAAG 8**

	$h(0) = -(0)^2 + 6(0) + 1,62$ = 1,62 m	✓ 1,62 m	A
		- 300 444	NPU
8.2	h'(t) = -2t + 6		(1)
	n(i) = -2i + 0	$\checkmark -2t + 6$	A
8.3	$h'(t) = 0$ <b>OR</b> /OF $t = -\frac{b}{b}$		(1)
	$\therefore -2t + 6 = 0$ $t = -\frac{2a}{2(-1)}$	$\checkmark \text{ derivative/ afgeleide} = 0$ OR/OF using/ gebruik $-\frac{b}{2a}$	A
	t = 3s	✓ <i>t</i> -value / <i>waarde</i>	C.
	$h(3) = -(3)^2 + 6(3) + 1,62$	✓ Subst. <i>t</i> -value/waarde	CA CA
	= 10,62  m	✓ Maximum height/ maks hoogte	CA
			NPU
	OR/OF	OR/OF	
	$h = \frac{4ac - b^2}{4a}$	✓ F	A
	$h = \frac{4(-1)(1,62) - (6)^2}{4(-1)}$	$\checkmark \checkmark$ subst/verv. <i>a</i> , <i>b</i> and/en <i>c</i>	
	4(-1)	value/ waarde	A
	=10,62  m		A
	10,02 m	✓ Maximum height/ maks hoogte	CA
			NPU
4	-2t + 6 = 3	$\checkmark$ derivative / afgeleide = 3	(4)
	t = 1,5 s		CA
		✓ <i>t</i> -value / <i>waarde</i>	CA
	:. $h(1,5) = -(1,5)^2 + 6(1,5) + 1,62$		
	$\approx 8,37 m$	✓ height / hoogte	CA
			NPU
	OR/OF	OR/OF	
	-2t + 6 = -3	✓ derivative / <i>afgeleide</i> = $-3$	CA
	t = 4,5s	✓ t-value / waarde	
	$\therefore h(4,5) = -(4,5)^2 + 6(4,5) + 1,62$	· i-value / waarde	CA
	≈ 8,37 m	✓ height / hoogte	<u></u>
			CA NPU
_			(3)
1/1	- NOM		[9]
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9.1.1	$\int x^4 dx$		
	$=\frac{x^5}{5}+C$	$\checkmark \frac{x^5}{5}$ $\checkmark C$	
		5	
			(2
9.1.2	$\int \left(2\pi + \frac{4}{x}\right) dx$		
	$= 2\pi x + 4\ln x + C$	$\checkmark 2\pi x$	
		$\checkmark 4 \ln x + C$	
		No Penalty if C omitted/	-
		Geen penalisering indien C	
9.1.3	$\int (2 -3)^3 dx$	weggelaat	(2
	$\int \left(2x^{-3}\right)^3 dx$		
	$\int 8x^{-9} dx$	$\checkmark 8x^{-9}$	A
	$= -x^{-8} + C$ <b>OR</b> / <b>OF</b> $= -\frac{1}{x^8} + C$	$\sqrt{-x^{-8}} + C$	
		No Penalty if C omitted/	CA
		Geen penalisering indien C	
0.2	$A = \int_{-1}^{3} g(x)  dx$	weggelaat	(2)
4		$\checkmark$ Area notation using	M
	$=\int_{-1}^{3}\left(2^{x}+2\right)dx$	integrals/ Oppervlak-notasie met gebruik van integrale	
	$\begin{bmatrix} 2^x \end{bmatrix}^3$		
	$= \left  \frac{2^x}{\ln 2} + 2x \right ^3$	$\sqrt{\frac{2^x}{\ln 2}}$	A
		$\int \frac{\ln 2}{\sqrt{2x}}$	
	$= \left\lfloor \frac{(2)^3}{\ln 2} + 2(3) \right\rceil - \left\lceil \frac{(2)^{-1}}{\ln 2} + 2(-1) \right\rceil$		A
		✓✓ SF	CA
	$\approx 18,82$ units <sup>2</sup> / eenhede <sup>2</sup>	✓ area /oppervl	
	OR/ <i>OF</i>		CA
	$=8 + \frac{15}{2 \ln 2}$ units <sup>2</sup> / eenhede <sup>2</sup>	AO: 1 mark/ 1 punt NPU	
		No substitution or	
		simplification marks to be	
	EDUCATION	allocated if there is no integration/ <i>Geen</i>	
	PRIVATE BAG X895, PRETORIA 000	vervangings- of	
	2024 -05- 18	vereenvoudigingspunte moet	
	/ PPROVED MARKING GUIDELING	toegeken word as daar geen integrasie is nie.	
	PURLIC EXAMINATION	ADDENDUM	(6)
			[12]

MA HENDRICKS External Moderator UMALUSI

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