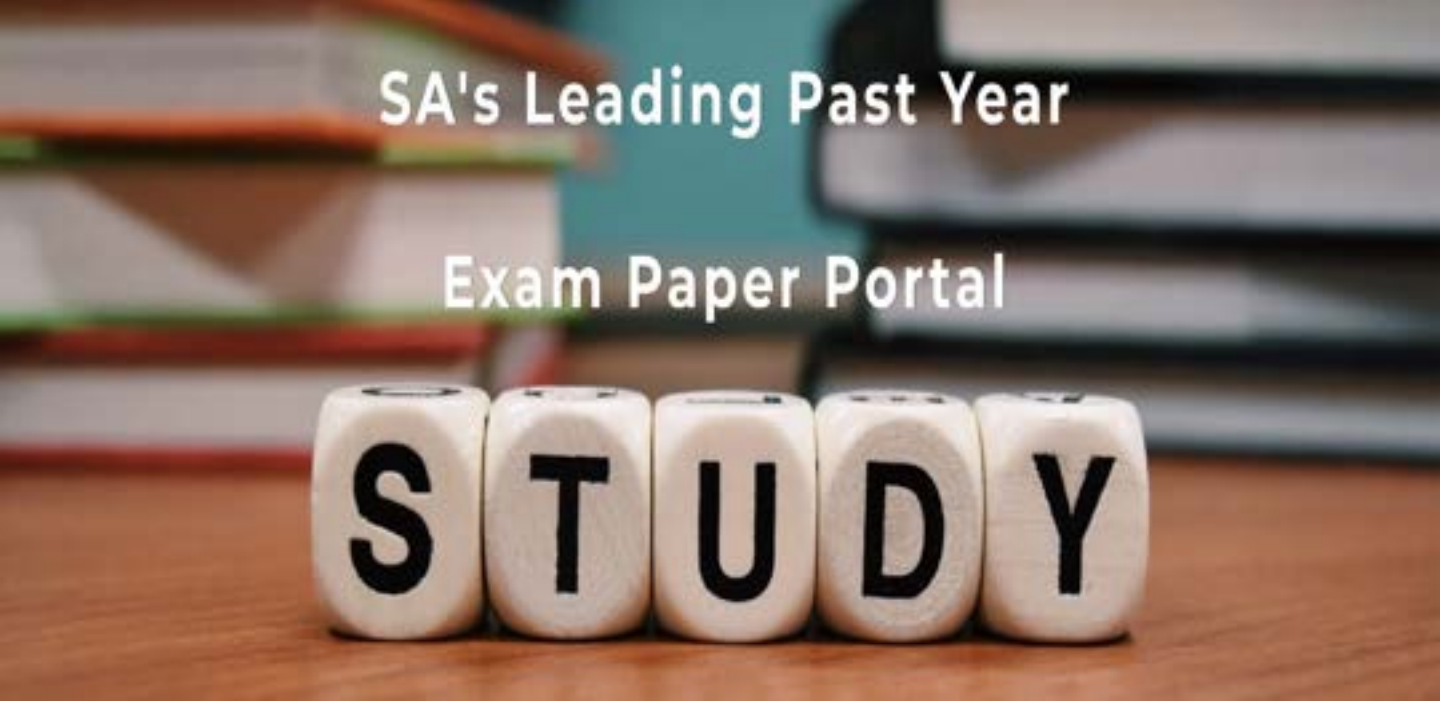


GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION/ *VOORBEREIDENDE EKSAMEN*

2022

MARKING GUIDELINES/*NASIENRIGLYNE*

TECHNICAL MATHEMATICS P1/*TEGNIESE WISKUNDE V1*
(11091)

23 pages/*bladsye*

Marking Codes/Nasien kodes	
A	Accuracy/*Akkuraatheid*
CA	Consistent Accuracy/*Volgehoue Akkuraatheid*
M	Method/*Metode*
R	Rounding/*Afronding*
NPR	No Penalty for Rounding/*Geen Penalisering vir Afronding*
NPU	No Penalty for Units omitted/*Geen Penalisering vir Eenhede weggelaat*
S	Simplification/*Vereenvoudiging*
F	Formula/*Formule*
SF	Substitution in correct Formula/*Substitusie in die regte Formule*
PR	Penalty for rounding/*Straf vir afronding*
P	Penalty/*Straf*

NOTES/*AANTEKENINGE*:

- If a candidate answers a question TWICE, mark only the FIRST attempt/*Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging*.
- If a candidate has crossed out an attempt to answer a question and did not redo it, mark the crossed-out version/*Indien 'n kandidaat 'n antwoord doodgetrek het, maar dit nie oorgedoen het nie, merk die doodgetrekte weergawe*.
- Consistent accuracy applies in all aspects of the marking guidelines/*Volgehoue akkuraatheid geld in alle aspekte van die nasienriglyne.*

QUESTION/*VRAAG* 1				
				CL
1.1	1.1.1	$3x(x-4)=0$		
		$x=0$ or/of $x=4$	✓ $x=0$	A
			✓ $x=4$	A
		OR/*OF*	**OR/*OF***	
		$3x^2-12x=0$		
		$x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$		
		$=\dfrac{-(-12)\pm\sqrt{(12)^2-(4)(3)(0)}}{2(3)}$		
		$=\dfrac{12\pm\sqrt{144}}{6}$		
		$x=4$ **OR/*OF*** $x=0$	✓ $x=0$	A
			✓ $x=4$	A
			(2)	

	1.1.2	-2x - 10= $3x^2$ $3x^2 + 2x + 10 = 0$ $x = \frac{-(2) \pm \sqrt{(2)^2 - 4(3)(10)}}{2(3)}$ $x = \frac{-2 \pm \sqrt{-116}}{6}$ $x = \frac{-2 \pm \sqrt{116}i}{6}$ $x = -\frac{1}{3} + \frac{\sqrt{29}}{3}i$ **OR/*OF*** $x = -\frac{1}{3} - \frac{\sqrt{29}}{3}i$ $x = -0{,}3 + 1{,}8i$ **OR/*OF*** $x = -0{,}3 - 1{,}8i$	✓ SF ✓ S ✓ Both x-values/ *Beide x-waardes*. (3) PR - MAX $\frac{2}{3}$ / MAKS $\frac{2}{3}$	A CA CA
	1.1.3	$-2x^2 + 3x \geq -2$ $-2x^2 + 3x + 2 \geq 0$ **OR/*OF*** $2x^2 - 3x - 2 \leq 0$ $(2x + 1)(x - 2) \leq 0$ $-\frac{1}{2} \leq x \leq 2$ **OR/*OF*** $x \in [-\frac{1}{2}; 2]$ **OR/*OF*** $2x^2 - 3x - 2 \leq 0$ Critical Values/*Kritiese Waardes*: $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-2)}}{2(2)}$ $x = \frac{3 \pm \sqrt{25}}{4}$ $x = 2$ **OR/*OF*** $x = -\frac{1}{2}$ $-\frac{1}{2} \leq x \leq 2$ **OR/*OF*** $x \in [-\frac{1}{2}; 2]$	✓ $(2x + 1)(x - 2)$ ✓ Notation/*Notasie* ✓ End points/*Eindpunte* **OR/*OF*** ✓ SF ✓ $x = 2$ & $x = -\frac{1}{2}$ ✓ Notation/*Notasie* AO: Full marks/*Volpunte* (3)	A CA CA A CA CA

1.2	$2x + y = 3$ **AND/*EN*** $2y + 2x^2 - 5 = -x$		
	$\therefore y = 3 - 2x$	✓ $y = 3 - 2x$	A
	$2(3 - 2x) + 2x^2 - 5 + x = 0$	✓ Substitution/*Substitusie*	CA
	$6 - 4x + 2x^2 - 5 + x = 0$		
	$2x^2 - 3x + 1 = 0$	✓ $2x^2 - 3x + 1 = 0$	CA
	$(2x - 1)(x - 1) = 0$	✓ $(2x - 1)(x - 1)$	CA
	$x = \frac{1}{2}$ **OR/*OF*** $x = 1$	✓ $x = \frac{1}{2}$ & $x = 1$	CA
	$\therefore y = 3 - 2(\frac{1}{2})$ or/of y= $3 - 2(1)$		
	$y = 2$ or/of $y = 1$	✓ $y = 2$ & $y = 1$	CA
	OR/*OF*	**OR/*OF***	
	$\therefore x = \frac{3}{2} - \frac{y}{2}$	✓ $x = \frac{3}{2} - \frac{y}{2}$	A
	$2y + 2\left(\frac{3}{2} - \frac{y}{2}\right)^2 - 5 = -\left(\frac{3}{2} - \frac{y}{2}\right)$	✓ Substitution/*Substitusie*	A
	$y^2 - 3y + 2 = 0$	✓ $y^2 - 3y + 2 = 0$	CA
	$(y - 2)(y - 1) = 0$	✓ $(y - 2)(y - 1)$	CA
	$y = 2$ **OR/*OF*** y= 1	✓ $y = 2$ & $y = 1$	CA
	$\therefore 2x + (2) = 3$ **OR/*OF*** $2x + (1) = 3$		
	$x = \frac{1}{2}$ **OR/*OF*** $x = 1$	✓ $x = \frac{1}{2}$ & $x = 1$	CA
		(6)	
1.3	1.3.1 $f = \frac{pq}{p + q}$		
	$f(p + q) = pq$	✓ M Multiplying/*Maal* $(p + q)$	A
	$fp + fq = pq$		
	$fq - pq = -fp$		
	$q(f - p) = -fp$		
	$\therefore q = \frac{-fp}{f - p}$ **OR/*OF*** $q = \frac{fp}{p - f}$	✓ Answer/*Antwoord*	A
		(2)	

	1.3.2	$q = \frac{fp}{p - f}$ $q = \frac{0,2 \times 5}{5 - 0,2}$ $q = \frac{1}{4,8}$ $q = 0,21$ **OR/OF** $f = \frac{pq}{p + q}$ $0,2 = \frac{(5)q}{5 + q}$ $1 + 0,2q = 5q$ $1 = 4,8q$ $q = \frac{1}{4,8}$ $q = 0,21$	✓ Substitution/*Substitusie* ✓ $q = 0,21$ **OR/OF** ✓ Substitution/*Substitusie* ✓ $q = 0,21$ (2) AO: Full marks/*Volpunte*	CA CA
1.4	1.4.1	$\text{A} \times \text{B}$ $= 21 \times 5$ $= 105$	✓ 105 AO: Full marks/*Volpunte* (1)	A
	1.4.2	105 - 64 41 - 32 9 - 8 1 - 1 0 6 5 4 3 2 1 0 **1 1 0 1 0 0 1** $\therefore 105 = 1101001_2$	✓ 1101001 ✓ Base/*Basis* 2 AO: Full marks/*Volpunte* (2)	A A
				[21]

QUESTION/*VRAAG* 2				
2.1	2.1.1	$t - 3 \geq 0$ $t \geq 3$ **OR/OF** $t\epsilon[3; \infty)$	✓ $t \geq 3$ **OR/OF** ✓ $t\epsilon[3; \infty)$ (1) AO: Full marks/*Volpunte*	A A
	2.1.2	$t - 3 < 0$ $t < 3$ **OR/OF** $t\epsilon(-\infty; 3)$	✓ $t < 3$ **OR/OF** ✓ $t\epsilon(-\infty; 3)$ (1) AO: Full marks/*Volpunte*	A A
2.2	$x^2 - 4x + (k - 1) = 0$ $\Delta = b^2 - 4ac$ $\Delta = (-4)^2 - 4(1)(k - 1)$ $= 16 - 4k + 4$ $= 20 - 4k$ For equal roots/*Vir gelyke wortels*: $\Delta = 0$ $20 - 4k = 0$ $k = 5$	✓ Formula/*Formule* ✓ SF ✓ $20 - 4k$ ✓$k = 5$ (4)	A A CA CA
				[6]

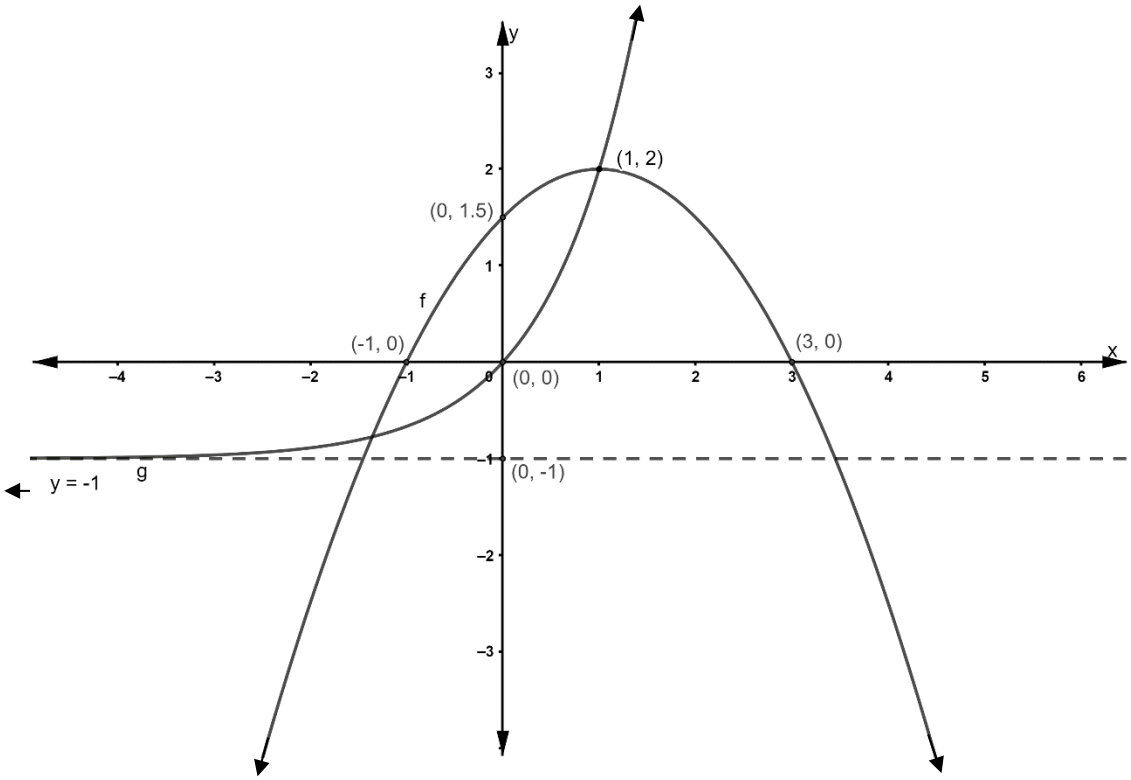
QUESTION/*VRAAG* 3				
3.1	3.1.1	$\left(\frac{\sqrt{b^3}}{b^{-\frac{1}{2}}}\right)^{-1}$ $= \frac{b^{-\frac{1}{2}}}{b^{\frac{3}{2}}}$ $= b^{-2}$ $= \frac{1}{b^2}$	✓ $\frac{b^{-\frac{1}{2}}}{b^{\frac{3}{2}}}$ ✓ b^{-2} ✓ $\frac{1}{b^2}$ (3)	A A CA
	3.1.2	$log_2 0{,}125 - 2log_5\sqrt{5} + log_4 1$ $= log_2\left(\frac{125}{1000}\right) - 2log_5 5^{\frac{1}{2}} + log_4 4^0$ $= log_2\left(\frac{1}{8}\right) - \frac{1}{2} \times 2log_5 5 + 0log_4 4$ $= log_2(2^{-3}) - 1 + 0$ $= -3 - 1 + 0$ $= -4$	✓ $\log_2 \frac{1}{8}$ ✓ $\frac{1}{2} \times 2\log_5 5$ or/of $\log_5 5$ ✓ $log_4 1 = 0$ ✓ -4 (4) AO: 1 mark/1 *punt*	A A A CA
	3.1.3	$\left(\sqrt{3} - \sqrt{2}\right)^2$ $= 3 - 2\sqrt{6} + 2$ $= 5 - 2\sqrt{6}$	✓ $3 - 2\sqrt{6} + 2$ ✓ $5 - 2\sqrt{6}$ (2) AO: 1 mark/1 *punt* P if/as 0,101 0 marks /0 punte	A A

3.2	3.2.1	$log_x 125 + log_4 64 - log_3 \frac{1}{3} = log_2 128$ $log_x 125 + log_4 4^3 - log_3 3^{-1} = log_2 2^7$ $log_x 125 + 3 + 1 = 7$ $log_x 125 = 3$ $x^3 = 125$ $x^3 = 5^3$ $x = 5$	✓ $\ldots + 3 + 1 = 7$ ✓ $log_x 125 = 3$ ✓ $x^3 = 125$ ✓ $x = 5$ (4)	A CA CA CA
	3.2.2	$27^{1-2x} - 243 = 0$ $27^{1-2x} = 243$ $(3^3)^{1-2x} = 3^5$ $3^{3-6x} = 3^5$ $3 - 6x = 5$ $-6x = 2$ $x = -\frac{1}{3}$ **OR/OF** $27^{1-2x} - 243 = 0$ $1 - 2x = \log_{27} 243$ $1 - 2x = \frac{5}{3}$ $-2x = \frac{2}{3}$ $x = -\frac{1}{3}$	✓ $(3^3)^{1-2x} = 3^5$ ✓ $3^{3-6x} = 3^5$ ✓ $x = -\frac{1}{3}$ **OR/OF** ✓ $1 - 2x = \log_{27} 243$ ✓ $\frac{5}{3}$ ✓ $x = -\frac{1}{3}$ (3)	A CA CA A CA CA

3.3	$4{,}5\angle 30°$ $\mathrm{I} = 4{,}5cos30° + 4{,}5isin30°$ $\mathrm{I} = \frac{9}{2}\left(\frac{\sqrt{3}}{2}\right) + \frac{9}{2}\left(\frac{1}{2}\right)i$ $\mathrm{I} = \frac{9\sqrt{3}}{4} + \frac{9}{4}i$	✓ $4{,}5cos30°$ ✓ $+4{,}5isin30°$ ✓ Simplification/*Vereenvoudiging* ✓ $\frac{9\sqrt{3}}{4}$ ✓ $+\frac{9}{4}i$ (5) **P -** If $I = \frac{9\sqrt{3}+9i}{4}$ then MAX 4 marks. If $3{,}90 + 2{,}25i$ then MAX 4 marks. *As* $I = \frac{9\sqrt{3}+9i}{4}$ *dan MAKS 4 punte.* *As* $3{,}90 + 2{,}25i$ *dan MAKS 4 punte.*	A A CA CA CA
3.4	$x + iy = \frac{7+i}{2-i}$ $x + iy = \frac{7+i}{2-i} \times \frac{2+i}{2+i}$ $x + iy = \frac{14+9i+i^2}{4+2i-2i-i^2}$ $x + iy = \frac{13+9i}{5}$ $x + iy = \frac{13}{5} + \frac{9}{5}i$ $x = \frac{13}{5}$ **AND/*EN*** $y = \frac{9}{5}$	✓ $\times \frac{2+i}{2+i}$ ✓ $\frac{14+9i+i^2}{4+2i-2i-i^2}$ ✓ $\frac{13}{5} + \frac{9}{5}i$ ✓ $x = \frac{13}{5}$ ✓ $y = \frac{9}{5}$ (5)	A CA CA CA CA
			[26]

QUESTION/*VRAAG* 4				
4.1	4.1.1 (a)	$f(x) = -\frac{1}{2}x^2 + x + \frac{3}{2}$ y-intercept/*y-afsnit*: $x = 0$ $\therefore y = \frac{3}{2}$	✓$y = \frac{3}{2}$ or/of $\left(0; \frac{3}{2}\right)$ (1) ACCEPT/AANVAAR $y = 1{,}5$	A
	4.1.1 (b)	x-intercept/x-*afsnit*: $f(x) = 0$ $\therefore -\frac{1}{2}x^2 + x + \frac{3}{2} = 0$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x = 3$ **OR/*OF*** $x = -1$	✓$f(x) = 0$ ✓ Factors/Formula *Faktore/Formule* ✓ $x = 3$ ✓ $x = -1$ (4)	A A CA CA
	4.1.1 (c)	$f(x) = -\frac{1}{2}x^2 + x + \frac{3}{2}$ $f'(x) = -x + 1$ TP/DP: $f'(x) = 0$ $\therefore -x + 1 = 0$ $\therefore x = 1$ $f(1) = -\frac{1}{2}(1)^2 + (1) + \frac{3}{2}$ $= 2$ ∴TP/DP: (1;2) **OR/*OF***	✓ Derivative/*Afgeleide* ✓ $f'(x) = 0$ ✓$x = 1$ ✓ $y = 2$ **OR/*OF***	A A CA CA

		$x = -\frac{b}{2a}$ $x = -\frac{1}{2\left(-\frac{1}{2}\right)}$ $x = 1$ $y = \frac{4ac - b^2}{4a}$ $y = \frac{4\left(-\frac{1}{2}\right)\left(\frac{3}{2}\right) - (1)^2}{4\left(-\frac{1}{2}\right)}$ $y = \frac{-3 - 1}{-2}$ $= 2$ ∴TP/DP: (1;2)	✓ F ✓ SF ✓$x = 1$ ✓ $y = 2$ (4)	A A CA CA
	4.1.1 (d)	$y = -1$	✓$y = -1$ (1)	A
	4.1.1 (e)	$g(x) = 3^x - 1$ x-intercept/x-*afsnit*: $g(x) = 0$ $3^x - 1 = 0$ $3^x = 1$ $3^x = 3^0$ $x = 0$ **OR/OF** $3^x - 1 = 0$ $3^x = 1$ $x = \log_3 1$ $x = 0$	✓ 3^0 ✓ $x = 0$ **OR/OF** ✓ $x = \log_3 1$ ✓ $x = 0$ (2)	A CA A CA

	4.1.2			
			For/Vir f: ✓ x-intercepts/*afsnitte* ✓ y-intercept/*afsnit* ✓ TP/DP **For/Vir g**: ✓Asymptote/*Asimptoot* ✓ $(0;0)$ ✓ Shape/*Vorm* (6)	 CA CA CA CA CA CA
	4.1.3	$0 < x < 1$ **OR/OF** $x \in (0;1)$	✓ Endpoints/*Eindpunte* **AND/*EN*** Notation/*Notasie* (1)	CA

4.2	4.2.1	$k = 2$ $g(x) = \frac{a}{x} + 2$ $3 = \frac{a}{-3} + 2$ $-9 = a - 6$ $a = -9 + 6$ $a = -3$	✓ $k = 2$ ✓ SF $(-3; 3)$ ✓ $a = -3$ (3)	A A CA
	4.2.2	$r = \sqrt{10}$	✓ Radius (1) **P** if/as $r = 3{,}16$ 0 $marks/punte$	A
	4.2.3	$x\epsilon[-\sqrt{10}; \sqrt{10}]$ **OR/*OF*** $-\sqrt{10} \leq x \leq \sqrt{10}$	✓ Endpoints/*Eindpunte* from/van 4.2.2 ✓ Notation/*Notasie* **OR/*OF*** ✓ Endpoints/*Eindpunte* from/van 4.2.2 ✓ Notation/*Notasie* (2)	CA A CA A
	4.2.4	$y \in R; y \neq 2$ **OR/*OF*** $y\epsilon(-\infty; 2)\ or/of\ y\epsilon(2; \infty)$	✓ $y \in R$ ✓ $y \neq 2$ **OR/*OF*** ✓ $(-\infty; 2)$ ✓ $(2; \infty)$ (2)	A A A A
				[27]

QUESTION/*VRAAG* 5			
5.1	$i_{eff} = \left(1 + \frac{i}{m}\right)^{m} - 1$	✓ F	A
	$\frac{6,7}{100} = \left(1 + \frac{i}{12}\right)^{12} - 1$	✓ m=12	A
	$\frac{6,7}{100} + 1 = \left(1 + \frac{i}{12}\right)^{12}$		
	$\sqrt[12]{1,067} = 1 + \frac{i}{12}$		
	$12\left(\sqrt[12]{1,067} - 1\right) = i$		
	$i = 6,50\%$	✓ Rate as %/*Koers as %*	CA
	OR/*OF*	**OR/*OF***	
	$A = P\left(1 + \frac{i}{m}\right)^{n \times m}$	✓F	A
	$106,7 = 100\left(1 + \frac{i}{12}\right)^{1 \times 12}$	✓m=12	A
	$\sqrt[12]{1,067} = 1 + \frac{i}{12}$		
	$12\left(\sqrt[12]{1,067} - 1\right) = i$		
	$i = 6,50\%$	✓Rate as %/*Koers as %*	CA
		(3)	

5.2	5.2.1	$\frac{1}{2} \times 6\,500 = \text{R}3\,250$	✓ R3 250 (1)	A
	5.2.2	$A = P(1-i)^n$ $3\,250 = 6\,500\left(1 - \frac{8}{100}\right)^n$ $\frac{3\,250}{6\,500} = \left(1 - \frac{8}{100}\right)^n$ $log\frac{1}{2} = \log(0{,}92)^n$ $log\frac{1}{2} = n\log(0{,}92)$ $n = \frac{log\frac{1}{2}}{\log(0{,}92)}$ $n = 8{,}31295$ $n = 8$ years/*jaar* ACCEPT/AANVAAR 9	✓F ✓SF ✓Answer/*Antwoord* WRONG FORMULA/VERKEERDE FORMULE 0 marks/0 punte (3)	A CA CA
5.3		$A = P(1+I)^n$ $= 150\,000\left(1 + \frac{0{,}105}{4}\right)^{\left(\frac{33}{12}\right)\times 4}$ $= \text{R}199\,469{,}3307$ $\text{R}199\,469{,}3307 - \text{R}30\,000$ $= \text{R}169\,469{,}3307$ $A = P(1+i)^n$ $= 169\,469{,}3307\left(1 + \frac{0{,}105}{4}\right)^{\left(\frac{27}{12}\right)\times 4}$ $= \text{R}213\,978{,}26$	✓ F ✓SF $\frac{33}{12} \times 4 = 11$ ✓Answer/*Antwoord* ✓ $-$ R30 000 ✓SF $\frac{27}{12} \times 4 = 9$ ✓A (6)	A A CA A CA CA
				[13]

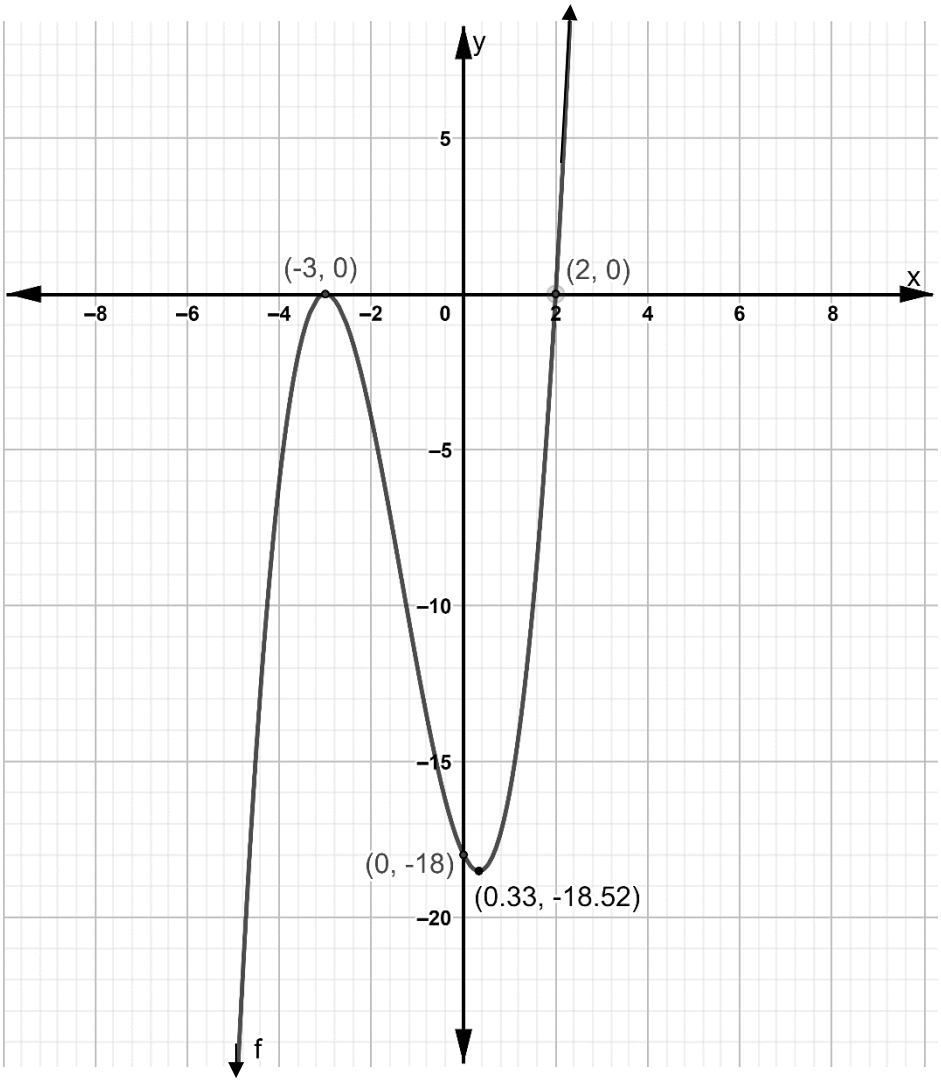
QUESTION/*VRAAG* 6				
6.1		$f(x) = 2x - 1$ $f(x+h) = 2(x+h) - 1$ $= 2x + 2h - 1$ $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ $f'(x) = \lim_{h \to 0} \frac{2x + 2h - 1 - (2x - 1)}{h}$ $f'(x) = \lim_{h \to 0} \frac{2x + 2h - 1 - 2x + 1}{h}$ $f'(x) = \lim_{h \to 0} \frac{2h}{h}$ $f'(x) = \lim_{h \to 0} 2$ $f'(x) = 2$	✓ Definition/*Definisie* ✓ SF ✓ $\lim_{h \to 0} \frac{2h}{h}$ ✓ $f'(x) = 2$ (4) AO: 0 marks/punte	A CA CA CA
6.2	6.2.1	$f(x) = \sqrt[3]{x^2} + 2x^5 - \frac{\pi}{x}$ $f(x) = x^{\frac{2}{3}} + 2x^5 - \pi x^{-1}$ $f'(x) = \frac{2}{3}x^{\frac{-1}{3}} + 10x^4 + \pi x^{-2}$ $= \frac{2}{3}\left(\frac{1}{\sqrt[3]{x}}\right) + 10x^4 + \frac{\pi}{x^2}$ $= \frac{2}{3\sqrt[3]{x}} + 10x^4 + \frac{\pi}{x^2}$	✓ $x^{\frac{2}{3}}$ and/en πx^{-1} ✓ $\frac{2}{3}x^{\frac{-1}{3}}$ or/of $\frac{2}{3\sqrt[3]{x}}$ ✓ $10x^4$ ✓ πx^{-2} or/of $\frac{\pi}{x^2}$ (4)	A CA CA CA

	6.2.2	$\frac{d}{dx}\left(\frac{(x-2)^2}{x^2}\right)=\frac{d}{dx}\left(\frac{x^2-4x+4}{x^2}\right)$		
		$=\frac{d}{dx}\left(\frac{x^2}{x^2}-\frac{4x}{x^2}+\frac{4}{x^2}\right)$		
		$=\frac{d}{dx}(1-4x^{-1}+4x^{-2})$	✓ 1 ✓ $-4x^{-1}$ ✓ $4x^{-2}$	A A A
		$=4x^{-2}-8x^{-3}$	✓$4x^{-2}$ or/of $\frac{4}{x^2}$	CA
		$=\frac{4}{x^2}-\frac{8}{x^3}$	✓ $-8x^{-3}$ or/of $\frac{8}{x^3}$ (5)	CA
6.3	$f(x)=x^2-2x$			
	$f(1)=(1)^2-2(1)=1-2=-1$ $\quad(1;-1)$			
	$f(-2)=(-2)^2-2(-2)=4+4=8$ $\quad(-2;8)$			
	$m_{ave}=\frac{f(x_2)-f(x_1)}{x_2-x_1}$			
	$m_{ave}=\frac{-1-8}{1-(-2)}$ or/of $m_{ave}=\frac{8-(-1)}{-2-1}$		✓ SF $\frac{-1-8}{1-(-2)}$	A
	$m_{ave}=\frac{-9}{3}$ or/of $m_{ave}=\frac{9}{-3}$		✓ $\frac{-9}{3}$	CA
	$m_{ave}=-3$		✓ $m_{ave}=-3$	CA
	OR/*OF*		**OR/*OF***	
	$m_{ave}=\frac{f(x_2)-f(x_1)}{x_2-x_1}=\frac{[(1)^2-2(1)]-[(-2)^2-2(-2)]}{1-(-2)}$		✓ SF	A
	$m_{ave}=\frac{-1-8}{3}$			
	$m_{ave}=\frac{-9}{3}$		✓ $\frac{-9}{3}$	CA
	$m_{ave}=-3$		✓ $m_{ave}=-3$ (3)	CA

6.4	$g(x) = 4x - x^2$		
	$g'(x) = 4 - 2x$	✓ $g'(x) = 4 - 2x$	A
	$m = g'(3) = 4 - 2(3) = 4 - 6 = -2$	✓ $m = g'(3) = -2$	CA
	$g(3) = 4(3) - (3)^2 = 12 - 9 = 3$ $(3; 3)$	✓ $g(3) = 3$	A
	$y = mx + c$		
	$y = -2x + c$		
	$3 = -2(3) + c$	✓SF	CA
	$3 = -6 + c$		
	$9 = c$		
	$y = -2x + 9$	✓ $y = -2x + 9$	CA
	OR/OF	**OR/OF**	
	$g(x) = 4x - x^2$		
	$g'(x) = 4 - 2x$	✓ $g'(x) = 4 - 2x$	
	$m = g'(3) = 4 - 2(3) = 4 - 6 = -2$	✓ $m = g'(3) = -2$	
	$g(3) = 4(3) - (3)^2 = 12 - 9 = 3$ $(3; 3)$	✓ $g(3) = 3$	
	$y - 3 = -2(x - 3)$	✓SF	CA
	$y - 3 = -2x + 6$		
	$y = -2x + 9$	✓ $y = -2x + 9$	CA
		(5)	
			[21]

QUESTION/*VRAAG* 7			
7.1	$f(x) = x^3 + 4x^2 - 3x - 18$ $f(2) = (2)^3 + 4(2)^2 - 3(2) - 18$ $f(2) = 8 + 16 - 6 - 18$ $f(2) = 0$ $\therefore (x - 2)$ is a factor of $f / is\ 'n\ faktor\ van\ f$ **OR/OF** +1 | +4 -3 -18 2 | +2 +12 +18 +1 +6 +9 0 $\therefore (x - 2)$ is a factor of $f / is\ 'n\ faktor\ van\ f$	✓ SF ✓ 0 **OR/OF** ✓ **M** ✓ Remainder/Res = 0 (2)	A A A A
7.2	$0 = x^3 + 4x^2 - 3x - 18$ $x^2(x - 2) + 6x(x - 2) + 9(x - 2) = 0$ $(x - 2)(x^2 + 6x + 9) = 0$ $(x - 2)(x + 3)(x + 3) = 0$ $x = 2$ **OR/*OF*** $x = -3$ **OR/*OF*** $x = -3$	✓ $(x - 2)$ ✓ $(x^2 + 6x + 9)$ ✓ $(x + 3)(x + 3)$ ✓ x-intercepts/*x-afsnitte*	A A CA A

	OR/*OF*	**OR/*OF***	
	$\begin{array}{c\|cccc} & +1 & +4 & -3 & -18 \\ 2 & & +2 & +12 & +18 \\ \hline & +1 & +6 & +9 & 0 \end{array}$ $(x-2)(x^2+6x+9)=0$ $(x-2)(x+3)(x+3)=0$ $x=2$ **OR/*OF*** $x=-3$ **OR/*OF*** $x=-3$	✓ $(x-2)$ ✓ (x^2+6x+9) ✓ $(x+3)(x+3)$ ✓ x-intercepts/*x-afsnitte* (4) AO: Full marks/Volpunte	A CA CA A
7.3	$f(x)=x^3+4x^2-3x-18$ $f'(x)=3x^2+8x-3$ $3x^2+8x-3=0$ $(3x-1)(x+3)=0$ $3x-1=0$ **OR/*OF*** $x+3=0$ $x=\frac{1}{3}$ $x=-3$ $f\left(\frac{1}{3}\right)=\left(\frac{1}{3}\right)^3+4\left(\frac{1}{3}\right)^2-3\left(\frac{1}{3}\right)-18$ $f\left(\frac{1}{3}\right)=-18{,}5$ $f(-3)=(-3)^3+4(-3)^2-3(-3)-18$ $f(-3)=0$	✓ Derivative/*Afgeleide* ✓ $f'(x)=0$ ✓ Factorization/ *Faktorisering* ***OR/OF*** Formula/*Formule* ✓x-values/ *x-waardes* ✓ y-values/ *y-waardes* (5)	A A CA CA CA

7.4			
		✓ x-intercepts/*x-afsnitte* ✓ y-intercept/*y-afsnit* ✓ TP/*DP* ✓ Shape/*Vorm* (4)	CA CA CA CA
			[15]

QUESTION/*VRAAG* 8			
8.1	$2\pi r + h = 21$ $h = 21 - 2\pi r$	✓ M (1)	A
8.2	$V = \pi r^2 h$ $V = \pi r^2(21 - 2\pi r)$ $V = 21\pi r^2 - 2\pi^2 r^3$	✓ F ✓ SF (2)	A A
8.3	$V' = 42\pi r - 6\pi^2 r^2$ $0 = 42\pi r - 6\pi^2 r^2$ $0 = r(42\pi - 6\pi^2 r)$ $r = 0$ **OR/*OF*** $0 = 42\pi - 6\pi^2 r$ N/A $6\pi^2 r = 42\pi$ N.v.T. $r = \frac{7}{\pi}$	✓ $V'(r) = 0$ ✓ $r(42\pi - 6\pi^2 r)$ ✓ $r = \frac{7}{\pi}$ (3) P - If $r = 0$ are not shown as N/A, MAX $\frac{2}{3}$ *As $r = 0$ nie getoon word as N.v.T. dan MAKS* $\frac{2}{3}$ P - If not i.t.o.π/ *As nie i.t.v. π*	CA CA CA
8.4	$V = 21\pi r^2 - 2\pi^2 r^3$ $V = 21\pi\left(\frac{7}{\pi}\right)^2 - 2\pi^2\left(\frac{7}{\pi}\right)^3$ $V = \frac{343}{\pi}$ unit²/*eenheid*² V =109,18 unit²/*eenheid*²	✓ SF ✓ Answer/*Antwoord* (2)	CA CA
			[8]

QUESTION/*VRAAG* 9				
9.1	9.1.1	$\int (\frac{2}{5x} - 2^{3x} + 4)dx$ $= \frac{2}{5}lnx - \frac{2^{3x}}{3ln2} + 4x + c$	✓ $\frac{2}{5}lnx$ ✓ $\frac{-2^{3x}}{3lnx}$ ✓$4x + c$	A A A (3)
	9.1.2	$\int \left(\frac{2a^3 - 54}{a - 3}\right) da$ $= \int \frac{2(a^3 - 27)}{a - 3} da$ $= \int \frac{2(a-3)(a^2 + 3a + 9)}{(a-3)} da$ $= \int 2(a^2 + 3a + 9)da$ $= \frac{2}{3}a^3 + 3a^2 + 18a + c$	✓$2(a^3 - 27)$ ✓$(a-3)(a^2 + 3a + 9)$ ✓ $\frac{2a^3}{3}$ ✓ $3a^2$ ✓$18a + c$ (5)	A A CA CA CA
9.2	$A_{\text{Rectangle}/Reghoek} = lb = 3 \times 5 = 15 \text{ m}^2$ $A_{\text{Lawn}/Gras} = \int_0^3 (-x^2 + 2x + 3)dx$ $A_{\text{Lawn}/Gras} = \left[-\frac{x^3}{3} + x^2 + 3x\right]_0^3$ $A_{\text{Lawn}/Gras} = \left[-\frac{3^3}{3} + 3^2 + 3(3)\right] - \left[-\frac{0^3}{3} + 0^2 + 3(0)\right]$ $A_{\text{Lawn}/Gras} = 9 \text{ m}^2$ $\therefore A_{\text{Flower bed}/Blombedding} = 15 - 9 = 6 \text{ m}^2$		✓Area of Rectangle/ *Oppervlak van Reghoek* ✓ $\int_0^3 (-x^2 + 2x + 3)dx$ ✓ $\left[-\frac{3^3}{3} + 3^2 + 3(3)\right] - \left[-\frac{0^3}{3} + 0^2 + 3(0)\right]$ ✓ 9 ✓ 6 (5) NPU	A A A CA CA
				[13]
			TOTAL/*TOTAAL*:	**150**