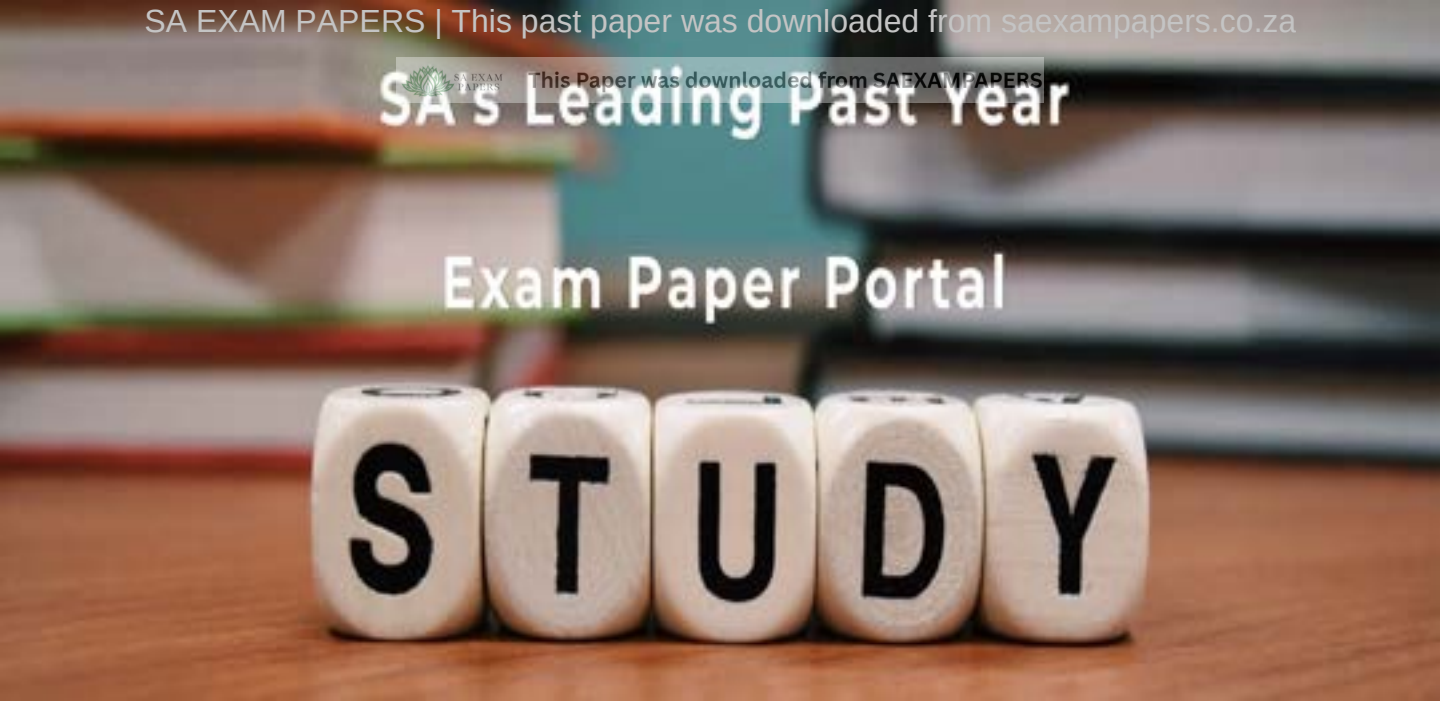


LIMPOPO

PROVINCIAL GOVERNMENT

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF

EDUCATION

NATIONAL SENIOR CERTIFICATE / *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRADE* 12

MATHEMATICS P1/*WISKUNDE V1*

MARKING GUIDELINES/*NASIENRIGLYNE*

JUNE/*JUNIE* 2026

MARKS/*PUNTE*: 150

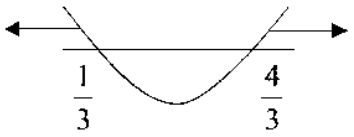
This marking guidelines consists of 17 pages/ *Hierdie nasienriglyne bestaan uit 17 bladsye*

NOTE/*NOTA*:

- If a candidate answers a question TWICE, only mark the FIRST attempt/ *As 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging*
- Consistent accuracy applies in ALL aspects of the marking guidelines/ *Konsekwente akkuraatheid is van toepassing in ALLE aspekte van die nasienriglyne*

QUESTION 1/*VRAAG 1*

1.1	1.1.1	$x^2 - x = 12$ $x^2 - x - 12 = 0$ $(x-4)(x+3) = 0$ $x = 4$ or / *of* $x = -3$	✓ standard form/*standaardvorm* ✓ $x = 4$ ✓ $x = -3$ (3)
	1.1.2	$4x^2 - 12x - 6 = 0$ $x = \frac{-(-12) \pm \sqrt{(-12)^2 - 4(4)(-6)}}{2(4)}$ $x = \frac{12 \pm \sqrt{240}}{8}$ $x = -0,44$ or / *of* $x = 3,44$	✓ substitution/*vervanging* ✓ answer/*antwoord* ✓ answer/*antwoord* (3)
	1.1.3	$2x - \sqrt{x+4} = 7$ $2x - 7 = \sqrt{x+4}$ $(2x-7)^2 = \left(\sqrt{x+4}\right)^2$ $4x^2 - 28x + 49 = x + 4$ $4x^2 - 29x + 45 = 0$ $(4x-9)(x-5) = 0$ $x \neq \frac{9}{4}$ or / *of* $x = 5$	✓ isolating the surd/*isoleer wortel* ✓ squaring both sides/*kwadreer albei kante* ✓ standard form/*standaardvorm* ✓ answer with selection/*antwoord met seleksie* (4)

	1.1.4	$(3x-2)^2 > 3x$ $9x^2 - 12x + 4 > 3x$ $9x^2 - 15x + 4 > 0$ $(3x-4)(3x-1) > 0$ CV $x = \frac{4}{3}$ or / *of* $x = \frac{1}{3}$  $\therefore \quad x < \frac{1}{3}$ or / *of* $x > \frac{4}{3}$	✓ standard form/*standaardvorm* ✓ critical values/*kritieke waardes* ✓✓ answer/*antwoord* (4)
	1.1.5	$2^{\frac{2x}{3}} + 2^{\frac{x}{3}} - 6 = 0$ $\left(2^{\frac{x}{3}}\right)^2 + 2^{\frac{x}{3}} - 6 = 0$ let / *stel* $2^{\frac{x}{3}} = k$ $k^2 + k - 6 = 0$ $(k-2)(k+3) = 0$ $k = 2$ or / *of* $k = -3$ $2^{\frac{x}{3}} = 2$ or / *of* $2^{\frac{x}{3}} = -3$ $\frac{x}{3} = 1$ N / A $x = 3$	✓ substitution/*vervanging* ✓ both equations/*beide vergelykings* ✓ answer/*antwoord* (3)

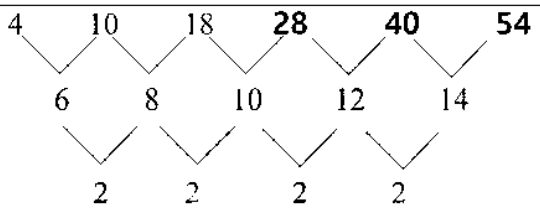
1.2	$6y = x^2 - 2x - 6$ ..... (1) $\sum_{n=3}^{4} x(n-2)^2 = 10y$ ..... (2) from (2): $x(3-2)^2 + x(4-2)^2 = 10y$ $x + 4x = 10y$ $5x = 10y$ $x = 2y$ $6y = (2y)^2 - 2(2y) - 6$ $4y^2 - 10y - 6 = 0$ $2y^2 - 5y - 3 = 0$ $(2y+1)(y-3) = 0$ $y = -\frac{1}{2}$ or / *of* $y = 3$ $x = -1$ or / of $x = 6$ **OR/*OF*** $6y = x^2 - 2x - 6$ ..... (1) $\sum_{n=3}^{4} x(n-2)^2 = 10y$ ..... (2) from (2): $x(3-2)^2 + x(4-2)^2 = 10y$ $x + 4x = 10y$ $5x = 10y$ $y = \frac{x}{2}$ $6\left(\frac{x}{2}\right) = x^2 - 2x - 6$ $x^2 - 2x - 6 = 3x$ $x^2 - 5x - 6 = 0$ $(x+1)(x-6) = 0$ $x = -1$ or / *of* $x = 6$ $y = -\frac{1}{2}$ or / *of* $y = 3$	✓ expansion/*uitbreiding* ✓ simplification/*vereenvoudig* ✓ substitution/*vervanging* ✓ standard form/*standaardvorm* ✓ both *y* values/ *beide y waardes* ✓ both *x* values/ *beide x waardes* (6) **OR/*OF*** ✓ expansion/*uitbreiding* ✓ simplification/*vereenvoudig* ✓ substitution/*vervanging* ✓ standard form/*standaardvorm* ✓ both *x* values/ *beide x waardes* ✓ both *y* values/*beide y waardes* (6)

1.3	$(x+x^{-1})^2-(x-x^{-1})^2=4$ LHS: $(x+x^{-1})^2-(x-x^{-1})^2$ $=\left(x+\frac{1}{x}\right)^2-\left(x-\frac{1}{x}\right)^2$ $=\left(\frac{x^2+1}{x}\right)^2-\left(\frac{x^2-1}{x}\right)^2$ $=\frac{\left(x^4+2x^2+1\right)-\left(x^4-2x^2+1\right)}{x^2}$ $=\frac{4x^2}{x^2}$ $=4$ $\therefore$ LHS = RHS	✓changing to fractions/*verander na breuk* ✓ simplification/*vereenvoudig* ✓ simplification/*vereenvoudig* ✓ simplification/*vereenvoudig* (4)
		[27]

QUESTION/*VRAAG* 2

2.1	$2x-(x+4)=x+8-2x$ $2x-x-4=8-x$ $2x=12$ $x=6$	✓common difference/*konstante verskil* ✓ answer/*antwoord*	(2)
2.2	10 ; 12 ; 14;.....	✓ answer/*antwoord*	(1)
2.3	$T_{100}=10+99(2)$ $=208$	✓ substitution/*vervanging* ✓ answer/*antwoord*	(2)
2.4	$a+(n-1)d=48$ $10+2(n-1)=48$ $2n+8=48$ $2n=40$ $n=20$	✓ $T_n=48$ ✓ substitution/*vervanging* ✓ answer/*antwoord*	(3)
2.5	$S_{21}=\frac{21}{2}[2(10)-(21-1)(2)]$ $=630$	✓ substitution/*vervanging* ✓ answer/*antwoord*	(2)
			[10]

QUESTION/*VRAAG* 3

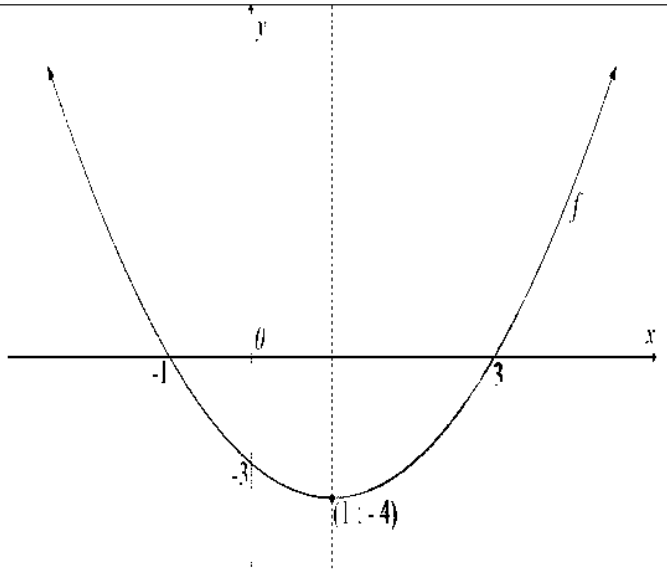
3.1	3.1.1		✓ 28 ✓ 40 ✓ 54 (3)
	3.1.2	$2m = 2$ $m = 1$ $3m + n = 6$ $3(1) + n = 6$ $n = 3$	✓ answer/*antwoord* ✓ answer/*antwoord* (2)
	3.1.3	$d = t^2 + 3t$ $d(10) = (10)^2 + 3(10)$ $= 130$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
3.2	3.2.1	$T_1 = 30(1 - 20\%) = 24$ $T_2 = 24(1 - 20\%) = 19,2$ **OR/*OF*** $30 \times (100\% - 20\%) \times 80\%$ $= 19,2$ **OR/*OF*** $(30 - 20\% \times 30) \times 80\%$ $= 19,2$	✓ 24 ✓ 19,2 (2) **OR/*OF*** ✓ $30 \times (100\% - 20\%) \times 80\%$ ✓ answer/*antwoord* (2) **OR/*OF*** ✓ $(30 - 20\% \times 30) \times 80\%$ ✓ answer/*antwoord* (2)
	3.2.2	$-1 < \frac{4}{5} < 1$	✓ $r = \frac{4}{5}$ ✓ answer/*antwoord* (2)
	3.2.3	$S_\infty = \frac{24}{1 - \frac{4}{5}}$ $= 120$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)

	3.2.4	$24 \; ; \; 19,2 \; ;.....$ $r = \frac{19,2}{24}$ $r = \frac{4}{5}$ $T_n = 24\left(\frac{4}{5}\right)^{n-1}$ $T_n > 4$ $24\left(\frac{4}{5}\right)^{n-1} > 4$ $\left(\frac{4}{5}\right)^{n-1} > \frac{1}{6}$ $(n-1)\log\left(\frac{4}{5}\right) > \log\left(\frac{1}{6}\right)$ $n-1 < 8,0296.....$ $n < 9,0296.....$ 9 times / *keer*	✓ 24 ✓ value of *r/waarde van r* ✓ $T_n > 4$ ✓ $\left(\frac{4}{5}\right)^{n-1} > \frac{1}{6}$ ✓ use of logs/*gebruik van logs* ✓ answer/*antwoord* (6)
	3.2.5	Total distance / *Totale afstand* $= 30 + (120 \times 2)$ $= 270$ m **OR/*OF*** Total Distance / *Totale afstand* $\frac{24 \times 2}{1-\frac{4}{5}} + 30$ $= 270$ m	✓ $30 + (120 \times 2)$ ✓ (120×2) ✓ answer/*antwoord* (3) **OR/*OF*** ✓ 24×2 ✓ $\frac{24 \times 2}{1-\frac{4}{5}} + 30$ ✓ answer/*antwoord* (3)
			[22]

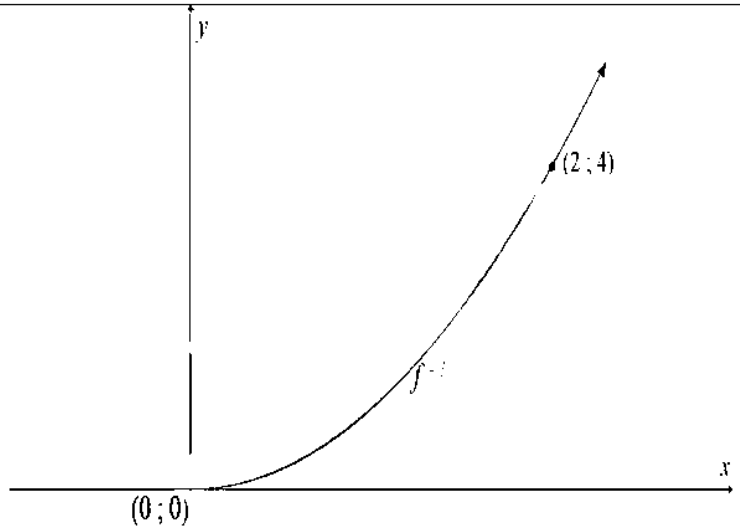
QUESTION/*VRAAG* 4

4.1	4.1.1	$x=-3$ and / *en* $y=-1$	✓ answer/*antwoord* ✓ answer/*antwoord* (2)
	4.1.2	$x \in R,\ x \neq -3$	✓answer/*antwoord* (1)
	4.1.3	$m=\frac{3-(-1)}{0-(-3)}$ $m=\frac{4}{3}$ $h(x)=\frac{4}{3}x+3$	✓ substitution/*vervanging* (0 ; 3) and/*en* (−3 ; −1) ✓ gradient/*gradiënt* ✓ equation/*vergelyking* (3)
	4.1.4	$y=-(x+3)-1$ $y=-x-4$ **OR/*OF*** $y=-x+c$ $-1=-(-3)+c$ $c=-4$ $y=-x-4$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2) **OR/*OF*** ✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
	4.1.5	**By translation/*Deur translasie*** 2 units to the right and 4 units up/*2 eenhede regs en 4 eenhede op* $x=-1$ and / *en* $y=3$ **OR/*OF*** $g(x-2)+4=\frac{1}{x+1}+3$ $x=-1$ and / *en* $y=3$	✓ $x=-1$ ✓ $y=3$ (2) **OR/*OF*** ✓ $x=-1$ ✓ $y=3$ (2)

	4.1.6	$AC = 6\frac{7}{15} = \frac{97}{15}$ $AC = f(x) - g(x)$ $\frac{97}{15} = \frac{4}{3}x + 3 - \left(\frac{1}{x+3} - 1\right)$ $\frac{97}{15} = \frac{4x+9}{3} - \left(\frac{-x-2}{x+3}\right)$ $\frac{97}{15} = \frac{4x+9}{3} + \frac{x+2}{x+3}$ $60x^2 + 69x - 378 = 0$ $20x^2 + 23x - 126 = 0$ $(20x + 63)(x - 2) = 0$ $x \neq \frac{63}{20}$ or / *of* $x = 2$	✓ equation/*vergelyking* ✓ simplification/*vereenvoudig* ✓standard form /*standaardvorm* ✓answer with selection/ *antwoord met seleksie* (4)
	4.1.7	$y = \frac{4}{3}x + 3$ $y = \frac{4}{3}(2) + 3$ $y = \frac{17}{3}$ $AB = \frac{17}{3}$ Area of ABOG / *Opv* ABOG $= \frac{1}{2}(OG)(AB)(OB)$ $= \frac{1}{2}(3)\left(\frac{17}{3}\right)(2)$ $= 17$	✓ substitution/*vervanging* ✓ answer/*antwoord* ✓ substitution/*vervanging* ✓ answer/*antwoord* (4)
4.2	4.2.1	$x^2 - 2x - 3 = 0$ $(x+1)(x-3) = 0$ $x = -1$ or / *of* $x = 3$	✓ $y = 0$ ✓ both values of *x/albei waardes van x* (2)

	4.2.2	$f'(x)=0$ OR / *OF* $x=\frac{-b}{2a}$ $2x-2=0$ $x=\frac{-(-2)}{2(1)}$ $2x=2$ $x=\frac{2}{2}$ $x=1$ $x=1$ $y=(1)^2-2(1)-3$ $y=-4$ TP / *DP* $(1\ ;-4)$	✓ answer/*antwoord* ✓ answer/*antwoord* (2)
	4.2.3		✓ shape/*vorm* ✓ turning point/*draaipunt* ✓ y – intercept/*afsnit* ✓ x- intercepts/*afsnit* (4)
	4.2.4	$y=-4$	✓ answer/*antwoord* (1)
	4.2.5	$-1<x<3$	✓✓ answer/*antwoord* (2)
			[29]

QUESTION/*VRAAG* 5

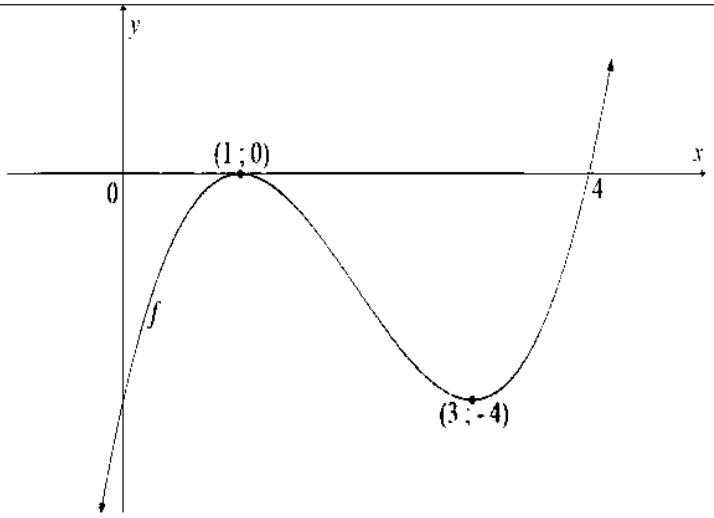
5.1	$y = a\sqrt{x}$ $2 = a\sqrt{4}$ $a = 1$ $y = \sqrt{x}$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
5.2	$y = \sqrt{x}$ $x = \sqrt{y}$ $f^{-1}(x) = x^2 \quad ; \quad x \geq 0$	✓ interchange x and y/*ruil* x *en* y ✓ inverse (2)
5.3	$y \geq 0$	✓ answer/*antwoord* (1)
5.4		✓shape/*vorm* f^{-1} ✓(0 ; 0) ✓the coordinates of f^{-1}/ die *koördinate van* f^{-1} (3)
5.5	Reflecting f across the line $y = x$ is the inverse of f, i.e f^{-1}/ *Reflekteer* f *oor die lyn* $y = x$ *is die inverse van* f, *d.i* f^{-1} $f(x) = \sqrt{x}$ $f^{-1}(x) = x^2$ $y = -x^2; \quad x \geq 0$	✓ $f^{-1}(x) = x^2$ ✓ $y = -x^2$ ✓ restriction/*beperking* (3)
		[11]

QUESTION/*VRAAG* 6

6.1	6.1.1	$f(x) = x - x^2$ $f'(x) = \lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $= \lim_{h\to 0}\frac{(x+h)-(x+h)^2-(x-x^2)}{h}$ $= \lim_{h\to 0}\frac{x+h-x^2-2xh-h^2-x+x^2}{h}$ $= \lim_{h\to 0}\frac{h-2xh-h^2}{h}$ $= \lim_{h\to 0}\frac{h(1-2x-h)}{h}$ $= \lim_{h\to 0}(1-2x-h)$ $= 1-2x$	✓expansion/*uitbreiding* ✓simplification/*vereenvoudig* ✓common factor/*gemeenskaplike faktor* ✓ answer/*antwoord* (4)
	6.1.2	$f'(2) = 1-2(2)$ $= -3$	✓ answer/*antwoord* (1)
6.2	6.2.1	$y = \frac{2x^2-11x+15}{3-x}$ $= \frac{(2x-5)(x-3)}{-(x-3)}$ $= -2x+5$ $\frac{dy}{dx} = -2$	✓ factorization/*faktorisering* ✓ simplification/*vereenvoudig* ✓ answer/*antwoord* (3)
	6.2.2	$y = \left(x^2-\sqrt{x}\right)^2$ $y = \left(x^2-\sqrt{x}\right)\left(x^2-\sqrt{x}\right)$ $y = \left(x^2-x^{\frac{1}{2}}\right)\left(x^2-x^{\frac{1}{2}}\right)$ $y = x^4-2x^{\frac{5}{2}}+x$ $\frac{dy}{dx} = 4x^3-5x^{\frac{3}{2}}+1$	✓ product/*produk* ✓ derivative/*afgeleide* ✓ derivative/*afgeleide* ✓ derivative/*afgeleide* (4)

6.3	$3 = a(-1)^3 + b(-1)$ $3 = -a - b$ $a = -b - 3$ $f^{-1}(x) = 3ax^2 + b$ $1 = 3a(-1)^2 + b$ $b = 1 - 3a$ $a = -(1 - 3a) - 3$ $a = -1 + 3a - 3$ $-2a = -4$ $a = 2$ $b = 1 - 3(2)$ $b = -5$ $f(x) = 2x^3 - 5x$	✓substitution/*vervanging* ✓ simplification/*vereenvoudig* ✓ inverse ✓ simplification/*vereenvoudig* ✓ answer/*antwoord* ✓ answer/*antwoord* (6)
		[18]

QUESTION/*VRAAG* 7

7.1	7.1.1	$f(x)=x^3-6x^2+9x-4$ $f(x)=(1)^3-6(1)^2+9(1)-4$ $=0$ $(x-1)$ is a factor of/*is 'n faktor van* $f(x)$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
	7.1.2	$1\overline{)1 \quad -6 \quad 9 \quad -4}$ $\quad\quad 1 \quad -5 \quad 4$ $1 \quad -5 \quad 4 \quad 0$ $f(x)=(x-1)(x^2-5x+4)$ $(x-1)(x-1)(x-4)=0$ $x=1$ or / *of* $x=1$ or / *of* $x=4$ $(1;0)$ $(1;0)$ $(4;0)$	✓ $f(x)=(x-1)(x^2-5x+4)$ ✓ answer/*antwoord* ✓ answer/*antwoord* ✓ answer/*antwoord* (4)
	7.1.3	$(1;0)$ TP/*DP* $f'(x)=3x^2-12x+9$ $3x^2-12x+9=0$ $x^2-4x+3=0$ $(x-1)(x-3)=0$ $x=1$ or / *of* $x=3$ $y=0$ or / of $y=-4$ $(1;0)$ $(3;-4)$	✓ derivative/*afgeleide* ✓ $f'(x)=0$ ✓ both x values/*beide* x *waardes* ✓ both y values/*beide* y *waardes* (4)
	7.1.4		✓ shape/*vorm* ✓ y – intercept/y – *afsnit* ✓ x – intercepts/x – *afsnit* ✓ turning points/*draaipunte* (4)

	7.1.5	$(x-2)^3-6(x-2)^2+9(x-2)=4$ $x-2=1$ $x=3$ $x-2=4$ $x=6$	✓ answer/*antwoord* ✓ answer/*antwoord* (2)
	7.1.6	$6x-12=0$ $6x=12$ $x=2$ $f(2)=(2)^3-6(2)^2+9(2)-4$ $=-2$ $(2;-2)$	✓ 2nd derivative/2 *de afgeleide* = 0 ✓ value of *x/waarde van x* ✓ value of *y/waarde van y* (3)
7.2	7.2.1	$V(x)=(60-2x)(2x)\left(\frac{x}{2}\right)$ $=60x^2-2x^3$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
	7.2.2	Max / *Maks* : $V'(x)=0$ $120x-6x^2=0$ $20x-x^2=0$ $x(20-x)=0$ $x\neq 0$ or / *of* $x=20$	✓equating to 0/*gelykstel 0* ✓ derivative/*afgeleide* ✓ answer with selection/ *antwoord met seleksie* (3)
	7.2.3	Max / *Maks* : $V(x)=60(20)^2-2(20)^3$ $=8000$	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
			[26]

QUESTION/*VRAAG* 8

8.1	$m(t) = 0,02t^3 - 0,2t^2 + 3200$ $m(0) = 0,02(0)^3 - 0,2(0)^2 + 3200$ $= 3200\text{g}$ (or $3.2kg$)	✓ answer/*antwoord* (1)
8.2	$m'(t) = 0,06t^2 - 0,2t$ For maximum weight / *Vir maks gewig* : $m'(t) = 0$ $0,06t^2 - 0,2t = 0$ $t(0,06t - 0,2) = 0$ $t \neq 0$ or / *of* $0,06t = 0,4$ $t = 6,6666.....$ $t = 6,67$ On the 7th day / *Op die 7de dag*	✓ derivative/*afgeleide* ✓ $m'(t) = 0$ ✓ both values of *t/albei waardes van t* ✓ answer/*antwoord* (4)
8.3	Weight / *gewig* $= m(30)$ $m(30) = 0,02(30)^3 - 0,2(30)^2 + 3200$ $= 3250\text{g}$ (or $3,56kg$)	✓ substitution/*vervanging* ✓ answer/*antwoord* (2)
		[7]