GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JUNE/*JUNIE* EXAMINATION/*EKSAMEN* GRADE/*GRAAD* 12

2026

MARKING GUIDELINES/NASIENRIGLYNE

MATHEMATICS/*WISKUNDE*

(PAPER/*VRAESTEL* 1)

22 pages/*bladsye*

GENERAL NOTES/*ALGEMENE NOTAS*

1. Consistent accuracy applies in this marking guideline.
2. If a learner answers the same question TWICE, but does not cancel one of the answers, ONLY consider the FIRST attempt.
3. If a learner cancels the answer but does not make a second attempt, consider the cancelled attempt.
4. If a learner provided an answer not mentioned in this memorandum, first check/prove it before disqualifying their attempt. Please check through all OPTIONS provided in this marking guideline.

1. *Konsekwente akkuraatheid geld in hierdie nasienriglyne.*
2. *Indien 'n leerder dieselfde vraag TWEE KEER beantwoord, maar nie een van die antwoorde kanselleer nie, oorweeg SLEGS die EERSTE poging.*
3. *Indien 'n leerder die antwoord kanselleer, maar nie 'n tweede poging aanwend nie, oorweeg die gekanselleerde poging.*
4. *Indien 'n leerder 'n antwoord verskaf het wat nie in hierdie memorandum genoem word nie, moet dit eers nagegaan/bewys word voordat hul poging gediskwalifiseer word. Gaan asseblief al die OPSIES wat in hierdie nasienriglyne verskaf word deur.*

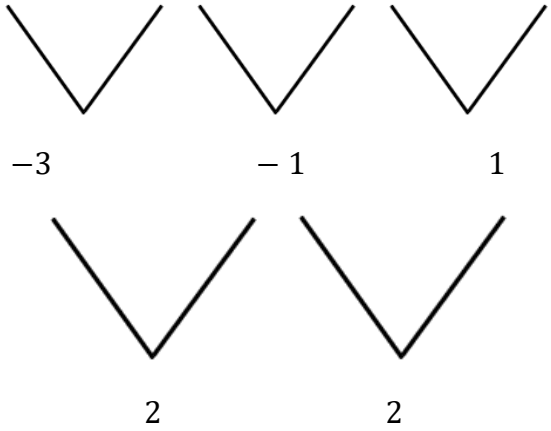
QUESTION/*VRAAG* 1			
1.1.1	$3x^2 - x = 0$ $x(3x - 1) = 0$ $x = 0$ or/*of* $3x - 1 = 0$ $x = \frac{1}{3}$	✓ factors/*faktore* ✓ both x values/*beide x-waardes*	(2)
1.1.2	$2x^2 + 6x = 6$ $2x^2 + 6x - 6 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(6) \pm \sqrt{(6)^2 - 4(2)(-6)}}{2 \times 2}$ $x = \frac{-6 \pm \sqrt{84}}{4}$ $x = 0{,}79$ or/*of* $x = -3{,}79$ **Penalize ONE mark for incorrect rounding**	✓ standard form/*standaardvorm* ✓ correct substitution in the equation *korrekte substutisie in vergelyking* ✓ $x = 0{,}79$ ✓ $x = -3{,}79$	(4)

1.1.3	$-x^2-2x\leq -8$ $x^2+2x-8\geq 0$ $(x+4)(x-2)\geq 0$ Critical values/*Kritieke waardes* $x+4=0$ or/*of* $x-2=0$ $x=-4$ and/*en* $x=2$ $x\leq -4$ or/*of* $x\geq 2$	✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ critical values/*kritiese waardes* $x=-4$ and $x=2$ ✓ $x\leq -4$ or/*of* $x\geq 2$ Note: If $x<-4$ *or* $x>2$ award 3 *out* 4	(4)
1.1.4	$2^{2x}-2^x=12$ Let/*Laat* $k=2^x$ $k^2-k=12$ $k^2-k-12=0$ $(k-4)(k+3)=0$ $k=4$ or $k=-3$ $2^x\neq -3$ No Solution/*Geen oplossing nie* $2^x=4$ $2^x=2^2$ $x=2$ **OR/*OF*** Alternative method/*Alternatiewe metode* $2^{2x}-2^x-12=0$ $(2^x-4)(2^x+3)=0$ $2^x=4$ $2^x=-3$ $2^x\neq -3$ No Solution/*Geen oplossing nie* $2^x=2^2$ $x=2$	✓ K-method/*K-metode* ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ $x=2$ or $2^x\neq -3$ **OR/*OF*** ✓Std form ✓ $(2^x-4)(2^x+3)=0$ ✓ $2^x=4$ or $2^x\neq -3$ No Solution/*Geen oplossing* $2^x=2^2$ ✓$x=2$	(4)

1.1.5	$\sqrt{4x-3}=x$ $\left(\sqrt{4x-3}\right)^2=(x)^2$ $4x-3=x^2$ $x^2-4x+3=0$ $(x-3)(x-1)=0$ $x=3$ or/*of* $x=1$	✓ squaring both sides/*kwadreer beide kante* ✓ standard form/*standaardvorm* ✓ factors/*faktore* ✓ x-values/*waardes*	(4)
1.2	$4^{2x+1}=16^{\frac{y}{2}}$ and $x^2-2xy=-1$ ……② $4^{2x+1}=4^{2\left(\frac{y}{2}\right)}$ $2x+1=2\left(\frac{y}{2}\right)$ $y=2x+1$ ……③ Substitution equation 3 into 2/*Substitusie gelykstelling 3 in 2* $x^2-2xy=-1$ $x^2-2x(2x+1)+1=0$ $x^2-4x^2-2x+1=0$ $-3x^2-2x+1=0$ $3x^2+2x-1=0$ $(x+1)(3x-1)=0$ $x=-1$ or/*of* $x=\frac{1}{3}$ When/*Wanneer* $x=-1$ When/*Wanneer* $x=\frac{1}{3}$ $y=2x+1$ $y=2\left(\frac{1}{3}\right)+1$ $y=2(-1)+1$ $y=\frac{2}{3}+1$ $y=-2+1$ $y=-1$ $y=\frac{5}{3}$	✓ $4^{2x+1}=4^{2\left(\frac{y}{2}\right)}$ ✓ $y=2x+1$ ✓ substitution/*substitusie* ✓ factors/*faktore* ✓ x-values/*waardes* ✓ y-values/*waardes* Note CA only if solving a quadratic function.	(6)

1.3	$\sqrt[4]{\frac{4^{1013}-2^{2025}}{2^{2017}}}$ $\left(\frac{2^{2(1013)}-2^{2025}}{2^{2017}}\right)^{\frac{1}{4}}$ $\left(\frac{2^{2026}-2^{2025}}{2^{2017}}\right)^{\frac{1}{4}}$ $\left[\frac{2^{2025}(2^1-1)}{2^{2017}}\right]^{\frac{1}{4}}$ $(2^8)^{\frac{1}{4}}$ 4	✓ 2^{2026} ✓ common factor/*vereenvouding* ✓ Simplify ✓ answer/*antwoord*	(4)
1.4	$x^2-px+1=0$ $\Delta \geq 0$ $(-p)^2-4(1)(1)\geq 0$ $p^2-4\geq 0$ Critical values/*Kritieke waardes*: $p=\pm\sqrt{4}$ $p=-2$ and/*en* $p=2$ $p\leq -2$ or/*of* $p\geq 2$	✓*S*tandard form/*standaardvorm* ✓ p^2-4 ✓ $\Delta \geq 0$ ✓ critical values/*kritieke waardes* ✓ $p\leq -2$ ✓ $p\geq 2$	(6)
			[34]

QUESTION/*VRAAG* 2

2.1	$-15\ ;-12$	✓ -15 ✓ -12	(2)
2.2	$-12 \quad -15 \quad -16 \quad -15$  $-3 \quad -1 \quad 1$ $2 \quad 2$ $2a = 2$ $\quad 3(1) + b = -3$ $\therefore a = 1$ $\quad \therefore b = -3 - 3 = -6$ $1 + (-6) + c = -12$ $\therefore c = -12 + 5 = -7$ $T_n = n^2 - 6n - 7$	✓ $a = 1$ ✓ $b = -6$ ✓ $c = -7$ ✓ $n^2 - 6n - 7$	(4)

2.3	$n^2 - 6n - 7 > 0$ $(n-7)(n+1) > 0$ Critical values/*Kritieke waardes*: $n = 7$ and/*en* $n \neq -1$ **AWARD A MARK FOR CRITICAL VALUES EVEN IF A CANDIDATE WRITES $n = -1$** ***KEN 'N PUNT TOE VIR KRITIEKE WAARDES SELFS AL SKRYF 'N KANDIDAAT $n = -1$*** **Do not penalize if** $n \in \mathbb{N}$ is omitted. $n \in \mathbb{N},\ n > 7$ (accept $n \geq 8$) **OR/*OF*** $n^2 - 6n - 7 > 0$ $n = \frac{-(-6) \pm \sqrt{(-6)^2 - 4(1)(-7)}}{2(1)}$ $n = \frac{6 \pm \sqrt{64}}{2}$ **Critical values/*Kritieke waardes*:** $n = 7$ or/*of* $n \neq -1$ $n \in \mathbb{N},\ n > 7$ (Accept $n \geq 8$) **OR/*OF*** $n^2 - 6n - 7 > 0$ $(n-3)^2 = 7 + 9$ $(n-3)^2 = 16$ $n = 3 \pm 4$ **Critical values/*Kritieke waaardes*:** $n = 7$ or/*of* $n \neq -1$ $n \in \mathbb{N},\ n > 7$ (accept $n \geq 8$) **OR** Accept when expanded (and Shown) the terms and made a conclusion (FULL marks)	✓ inequality/ *ongelykheid* ✓ factorization/ *faktorisering* ✓ critical values./ *kritieke waardes* ✓ $n \in \mathbb{N},\ n > 7$ **OR/*OF*** ✓ inequality/ *ongelykheid* ✓ quadratic formula/ *kwadratiese formule* ✓ critical values/ *kritieke waardes* ✓ $n \in \mathbb{N},\ n > 7$ **OR/*OF*** ✓ Inequality/ *Ongelykheid* ✓ Completion of a Square./ *Vierkantvoltooiing* ✓ Critical values/ *Kritieke waardes* ✓ $n \in \mathbb{N},\ n > 7$	(4)

2.4	$T_n = a + (n-1)d$ $T_n = -3 + (n-1)(2)$ $T_n = 2n - 5$ $2n - 5 = 113$ $2n = 118$ $n = 59$ $\therefore$ T_{59} *and* T_{60} are the two consecutive terms with a first difference of 113./*is die twee opeenvolgende terme met 'n eerste verskil van 113.* **OR/*OF*** $T_n = n^2 - 6n - 7$ $T_{n-1} = (n-1)^2 - 6(n-1) - 7$ $T_{n-1} = n^2 - 2n + 1 - 6n + 6 - 7 = n^2 - 8n$ $T_n - T_{n-1} = n^2 - 6n - 7 - (n^2 - 8n)$ $2n - 7 = 113$ $n = 60$ $\therefore n - 1 = 60 - 1 = 59$ T_{59} *and* T_{60} are the two consecutive terms with a first difference of 113/*is die twee opeenvolgende terme met 'n eerste verskil van 113*. **OR/*OF*** $T_n = n^2 - 6n - 7$ $T_{n+1} = (n+1)^2 - 6(n+1) - 7$ $T_{n+1} = n^2 + 2n + 1 - 6n - 6 - 7 = n^2 - 4n - 12$ $T_{n+1} - T_n = n^2 - 4n - 12 - (n^2 - 6n - 7)$ $2n - 5 = 113$ $n = 59$ $\therefore n + 1 = 59 + 1 = 60$ T_{59} *and* T_{60} are the two consecutive terms with a first difference of 113/*is die twee opeenvolgende terme met 'n eerste verskil van 113*.	✓ $T_n = 2n - 5$ ✓ equating to 113/ *stel gelyk aan 113* ✓ 59 ✓ 60 **OR/*OF*** ✓ $T_n = 2n - 7$ ✓ equating to 113 *stel gelyk aan 113* ✓ 60 ✓ 59 **OR/*OF*** ✓ $T_n = 2n - 5$ ✓ equating to 113/ *stel gelyk aan 113* ✓ 59 ✓ 60	(4)

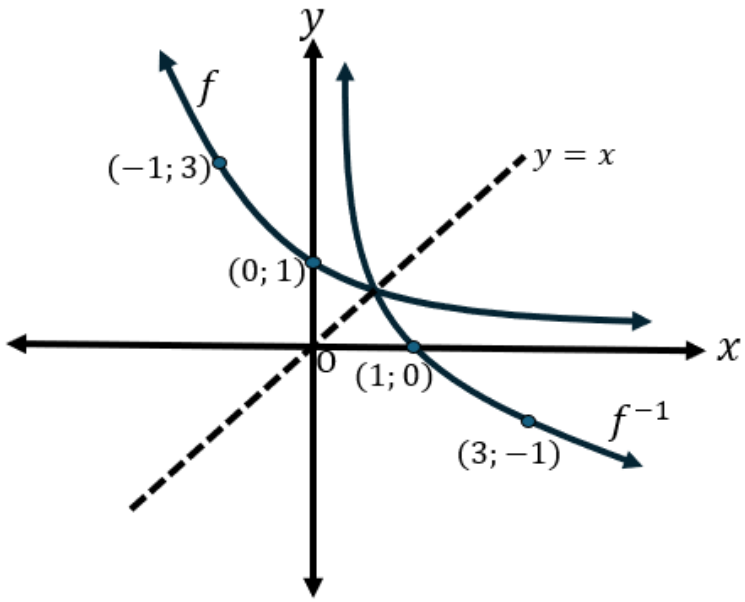
[14]

QUESTION/*VRAAG* 3

3.1	$T_n = a + (n-1)d$ $T_n = 5 + (n-1)(4)$ $T_n = 4n + 1$ $4n + 1 = 1001$ $4n = 1000$ $n = 250$	✓ $T_n = 4n + 1$ ✓ equating to 1001 *stel gelyk aan 1001* ✓ 250	(3)
3.2	$S_n = a + (a+d) + (a+2d) + (a+3d) + \cdots + l$ $+[S_n = l + (l-d) + (l-2d) + (l-3d) + \cdots + a]$ $2S_n = (a+l) + (a+l) + (a+l) + \cdots + (a+l)$ n *times/keer* $2S_n = n(a+l)$ $S_n = \frac{n}{2}(a+l)$ But $l = a + (n-1)d$ $\therefore S_n = \frac{n}{2}[a + a + (n-1)d]$ $\therefore S_n = \frac{n}{2}[2a + (n-1)d]$	✓ $S_n = a + (a+d) + \cdots + l$ ✓ $+[S_n = l + (l-d) + \cdots + a$ ✓ $S_n = \frac{n}{2}(a+l)$ ✓ substitution of l using/ *substitusie van l deur gebruik van* $l = a + (n-1)d$	(4)
3.3	$\sum_{p=-1}^{19}(3p-2) = (-5) + (-2) + 1 + \cdots + 55$ $n = 19 - (-1) + 1 = 21$ $S_{21} = \frac{21}{2}(-5 + 55)$ $S_{21} = \frac{21}{2}(50)$ $= 525$	✓ expansion/*uitbreiding* ✓ $n = 21$ ✓ substitution into correct formula/ *substitusie in korrekte formule* ✓ 55 ✓ 525	

	OR/*OF* $\sum_{p=-1}^{19}(3p-2) = (-5)+(-2)+1+\cdots+55$ $n = 19-(-1)+1 = 21$ $d = 3$ $S_n = \frac{n}{2}[2a+(n-1)d]$ $S_{21} = \frac{21}{2}[2(-5)+(21-1)3]$ $S_{21} = \frac{21}{2}[-10+60]$ $= 525$	**OR/*OF*** ✓ expand ✓ $n = 21$ ✓ $d = 3$ ✓ substitution into correct formula *substitusie in korrekte formule* ✓ 525	(5)
3.4.1	$128x$	✓ $128x$	(1)
3.4.2	$T_n = ar^{n-1}$ $T_8 = ar^7$ $x = (128x)r^7$ $r^7 = \frac{1}{128}$ $r = \left(\frac{1}{128}\right)^{\frac{1}{7}} = \frac{1}{2}$	✓ substitution into correct formula *substitusie in formule* ✓ simplification *vereenvoudiging* ✓ $r = \frac{1}{2}$	(3)
3.4.3	$S_n = \frac{a[1-r^n]}{1-r}$ $15{,}9375 = \frac{128x[1-\left(\frac{1}{2}\right)^8]}{1-\frac{1}{2}}$ $x = \frac{\frac{1}{2}[15.9375]}{128[1-\left(\frac{1}{2}\right)^8]} = 0{,}0625$ metres The longest piece is/Die langste stuk is $= 128 \times 0{,}0625$ m $= 8$ metres/*meter*	✓ substitution into correct formula *substitusie in korrekte formule* ✓ simplification/ *vereenvoudiging* ✓ 0,0625 ✓ 8	(4)
			[20]

QUESTION/*VRAAG* 4

4.1	$y = \left(\frac{1}{3}\right)^x$ For inverse/*Vir inversie*: $x = \left(\frac{1}{3}\right)^y$ $y = \log_{\frac{1}{3}} x$ or/*of* $y = -\log_3 x$ **ANSWER ONLY- FULL MARKS/** ***SLEGS ANTWOORD – VOLPUNTE***	✓ interchanging/ *vervanging van* x and/*en* y. *ruil* x *en* y ✓ answer/ *antwoord*	(2)
4.2		FOR f ✓ y-intercept *y-afsnit* ✓ any other point/ *enige and punt* ✓ Shape/*Vorm* *FOR* f^{-1} ✓ x-intercept/ *x-afsnit* ✓ any other point/ *enige ander punt* ✓ shape/*vorm*	(6)

4.3	$f^{-1}(x) > -3$ Critical values/*Kritieke waardes*: $\log_{\frac{1}{3}} x = -3$ or/*of* $-\log_3 x = -3$ $x = 27$ $0 < x < 27$ **OR/*OF*** $\log_{\frac{1}{3}} x > -3$ $x < \left(\frac{1}{3}\right)^{-3}$ $x < 2$; but/*maar* $x > 0$ $\therefore 0 < x < 27$ **ANSWER ONLY – FULL MARKS/** ***SLEGS ANTWOORD – VOLPUNTE***	✓ $x = 27$ ✓ $0 < x < 27$	(2)
			[10]

QUESTION/*VRAAG* 5

5.1	$m_1 \times m_2 = \frac{1}{2} \times (-2) = -1$	✓ $\frac{1}{2} \times (-2)$ ✓ -1	(2)
5.2	At/*By* R: $h(x) = g(x)$ $\frac{1}{2}x - 4 = -2x - 14$ $\frac{1}{2}x = -2x - 10$ $x = -4x - 20$ $5x = -20$ $\therefore x = -4$ $h(-4) = -2x - 14$ $\therefore y = -2(-4) - 14 = -6$ $R(-4; -6)$ **DO NOT PENALISE IF NOT IN COORDINATES FORM/** **MOENIE *PENALISEER INDIEN NIE IN KOÖRDINATE FORMAAT NIE.***	✓ equating the two functions/ *stel twee funksie gelyk* ✓ $x = -4$ ✓ $R(-4; -6)$	(3)
5.3	At Q and/*en* T; $y = 0$ $-x^2 - 6x + 7 = 0$ $x^2 + 6x - 7 = 0$ $(x + 7)(x - 1) = 0$ $x = -7$ or/*of* $x = 1$ $\therefore$ QT $= 1 - (-7) = 8$ units/*eenhede*	✓ factorisation/method *faktorisering/metode* ✓ x-values/*waardes* ✓ 8	(3)

5.4.1	$Q(-7;0)$ $y=\frac{1}{2}x+c$ $0=\frac{1}{2}(-7)+c$ $c=\frac{7}{2}$ $(0;\frac{7}{2})$ $W(x)=\frac{1}{2}x+\frac{7}{2}$	✓ substitution/*substitusie* ✓ $\frac{7}{2}$	(2)
5.4.2	$f(x)=-x^2-6x+7$ $f'(x)=-2x-6$ At the turning point/*By die draaipunt*, $f'(x)=0$ $-2x-6=0$ $\therefore x=-3$ $f(-3)=-(-3)^2-6(-3)+7=16$ $W(-3)=\frac{1}{2}(-3)+\frac{7}{2}=2$ $\therefore$ PM $=16-2=14$ units/*eenhede* **OR/*OF*** $\boldsymbol{x}=\frac{1+(-7)}{2}=-3$ $f(-3)=-(-3)^2-6(-3)+7=16$ $W(-3)=\frac{1}{2}(-3)+\frac{7}{2}=2$ $\therefore$ PM $=16-2=14$ units/*eenhede*	✓ $x=-3$ ✓ 16 ✓ 2 ✓ 14	

	OR/*OF* $f(x) = -(x+3)^2 + 16$ $\mathrm{P}(-3;16)$ $W(-3) = \frac{1}{2}(-3) + \frac{7}{2} = 2$ $\mathrm{M}(-3;2)$ $\mathrm{PM} = 16 - 2 = 14$ units/*eenhede* **OR/*OF*** $\boldsymbol{x} = \frac{1+(-7)}{2} = -3$ $\mathrm{PM} = -x^2 - 6x + 7 - (\frac{1}{2}x + \frac{7}{2})$ $= -x^2 - \frac{13x}{2} + \frac{7}{2}$ $\therefore \mathrm{PM} = -(-3)^2 - \frac{13(-3)}{2} + \frac{7}{2} =$ 14 units/*eenhede*	**OR/*OF*** ✓ $x = -3$ ✓ $f - w$ ✓ substitution/*substitusie* ✓ 14	(4)
			[14]

QUESTION/*VRAAG* 6

6.1	E $(0\,;-15)$	✓ $(0\,;-15)$	(1)
6.2	$x^2-2x-15=0$ $(x+3)(x-5)=0$ $x=-3$ or $x=5$ B $(5\,;0)$	✓ equate to zero ✓factorisation/method *faktorisering/metode* ✓ $x=5$ \	(3)
6.3	$f(1)=(1)^2-2(1)-15=-16$ $y\geq -16$	✓ substitute ✓ $y\geq -16$	(2)

6.4.1	$p = -1$ $q = -2$	✓ -1 ✓ -2	(2)
6.4.2	$g(x) = \frac{a}{x-1} - 2$ Use/*Gebruik* B (5 ; 0) $0 = \frac{a}{5-1} - 2$ $2 = \frac{a}{4}$ $\therefore a = 8$	✓ substitution for p and q/ *vervang p en q* ✓ substitution / *substitusie* ✓ simplification/ *vereenvoudiging*	(3)
6.4.3	$y = -(x-1) - 2$ $y = -x - 1$ **OR/*OF*** $y = -x + c$ Use/*Gebruik* H $(1 ; -2)$ $-2 = -1 + c \quad \Rightarrow c = -1$ $\therefore y = -x - 1$	✓ $gradient = -1$ ✓ y intercept	(2)
6.5	$-2{,}41 < x < 0{,}41$ **OR/*OF*** $1 < x < 5$	✓ $-2{,}41$ and/*en* 0,41 ✓ 1 and/*en* 5 ✓ correct inequality symbols for both./*korrekte ongelykheid notasie*	(3)

6.6	$\frac{8}{x-1}-2=-2x+k$ $8-2(x-1)=-2x(x-1)+k(x-1)$ $8-2x+2=-2x^2+2x+kx-k$ $2x^2-(4+k)x+10+k=0$ $b^2-4ac<0$ $[-(4+k)]^2-4(2)(10+k)<0$ $k^2+8k+16-80-8k<0$ $k^2-64<0$ $(k+8)(k-8)<0$ Critical values/*Kritieke waardes* $k=-8$ or $k=8$ $-8<k<8$	✓ equating/*gelykstelling* ✓ simplification/*vereenvoudiging* to k^2-64 ✓ factorisation/*faktorisering* ✓ critical values/*kritiese waardes* ✓ $-8<k<8$	(5)
			[21]

QUESTION/*VRAAG* 7 [ONLY Penalize for notation in 7.1]

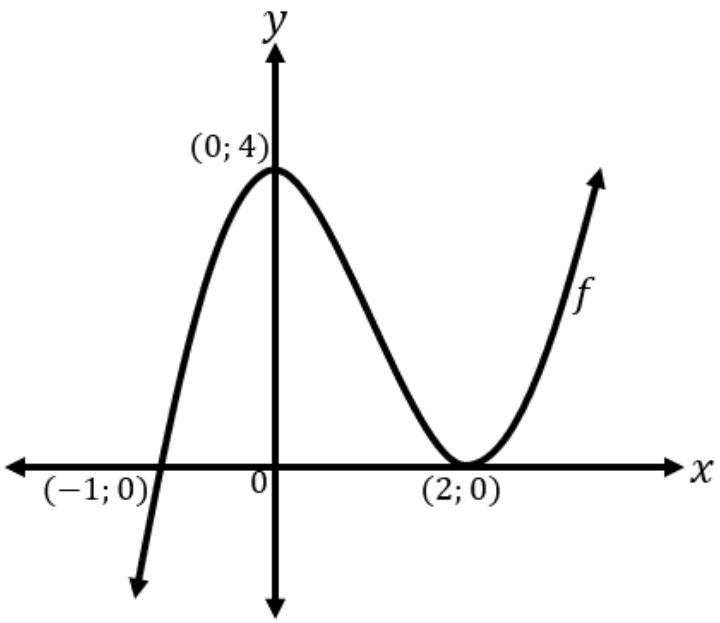
7.1	Given/*Gegee*: $f(x)=4x^2-3x$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x+h)}{h}$ $f'(x)$ $=\lim_{h\to 0}\frac{4(x+h)^2-3(x+h)-(4x^2-3x)}{h}$ $=\lim_{h\to 0}\frac{4x^2+8xh+4h^2-3x-3h-4x^2+3x}{h}$ $=\lim_{h\to 0}\frac{8xh+4h^2-3h}{h}$ $=\lim_{h\to 0}\frac{h(8x+4h-3)}{h}$ $=\lim_{h\to 0}(8x+4h-3)$ $\therefore f'(x)=8x-3$	✓$f(x+h)$ $=4x^2+8xh+4h^2-3x-3h$ ✓substitution into correct formula/ *subtitusie in korrekte formule* ✓$8xh+4h^2-3h$ ✓$8x+4h-3$ ✓$f'(x)=8x-3$	(5)

7.2	$D_x\left[\frac{x^2-9}{3-x}\right]$ $D_x\left[\frac{(x-3)(x+3)}{-(x-3)}\right]$ $D_x[-(x+3)]$ $D_x[-x-3)]$ -1	✓ $\frac{(x-3)(x+3)}{-(x-3)}$ ✓ $-(x+3)$ ✓ -1 answer/*antwoord*	(3)

7.3	$y=(2x-3)^2$ $y=(2x-3)^2$ $y=4x^2-12x+9$ $\frac{dy}{dx}=8x-12$ $=4(2x-3)$ But/*Maar* $2x-3=\sqrt{y}$ $\therefore \frac{dy}{dx}=4(\sqrt{y})$	✓expand/*brei uit* $y=4x^2-12x+9$ ✓ $\frac{dy}{dx}=8x-12$ ✓ factorisation/*faktorisering* $4(2x-3)$ ✓ $\sqrt{y}=2x-3$	(4)
			[12]

QUESTION 8

8.1	$f(x) = x^3 - 3x^2 + 4$ x- intercept/*afsnit*, $y = 0$ $x^3 - 3x^2 + 4 = 0$ $x = -1$ $(x-2)(x-2)(x+1) = 0$ $\therefore x = 2$ or $x = -1$ $(2; 0)$ and/*en* $(-1; 0)$ y- intercept/*afsnit*, , $x = 0$ $f(0) = (0)^3 - 3(0)^2 + 4$ $y = 4$ $(0; 4)$ **NO PENALTY IF INTERCEPTS ARE NOT IN COORDINATES FORM/** ***GEEN PENALISERING INDIEN AFSNITTE NIE IN KOÖRDINAATVORM IS NIE***	✓ equating to 0/ *stel gelyk aan 0* ✓ factorisation/*faktoriseer* ✓$x = 2$ ✓$x = -1$ ✓$y = 4$	(5)
8.2	$f(x) = x^3 - 3x^2 + 4$ $f'(x) = 0$ $f'(x) = 3x^2 - 6x$ $3x^2 - 6x = 0$ $3x(x-2) = 0$ $x = 0$ or $x = 2$ When/*Wanneer* $x = 0$ $f(0) = (0)^3 - 3(0)^2 + 4$ $y = 4$ $(0; 4)$ When/*Wanneer* $x = 2$ $f(2) = (2)^3 - 3(2)^2 + 4$ $y = 0$ $(2; 0)$	✓$f'(x) = 3x^2 - 6x$ ✓$f'(x) = 0$ ✓ x values ✓ y values	(4)

8.3		✓ x-intercepts/*afsnitte* ✓ y-intercepts/*afsnitte* ✓ turning points/ *draaipunt* ✓ shape/*vorm*	(4)
8.4	$f(x) = x^3 - 3x^2 + 4$ $f'(x) = 3x^2 - 6x$ $f'(x) = 0$ $f''(x) = 6x - 6$ $f''(x) = 0$ $6x - 6 = 0$ $6x = 6$ $x = 1$ $\therefore x > 1$ **OR/*OF*** $x = \frac{0+2}{2}$ $x = 1$ $\therefore x > 1$	✓$f''(x) = 6x - 6$ ✓ $x > 1$ **OR/*OF*** ✓ $\frac{0+2}{2}$ ✓ $x > 1$	(2)
8.5	$p < -4$ or $p > 0$ NB due to the incorrect naming of the new function allow for answer : $p = 0$ (award FULL MARKS)	✓ $p < -4$ ✓$p > 0$	(2)

[17]

QUESTION/*VRAAG* 9

9.1	$P(x) = -2x^2 + 160x + 19\,600$ $P(5) = -2(5)^2 + 160(5) + 19\,600$ $= \text{R}20\,350$	✓ $-2(5)^2 + 160(5) + 19\,600$ ✓ R20 350	(2)
9.2	$P(x) = -2x^2 + 160x + 19\,600$ $p'(x) = -4x + 160$ $p'(x) = 0$ $-4x + 160 = 0$ $4x = 160$ $x = 40$ ∴ 40 teachers/*onderwysers*	✓ $p'(x) = -4x + 160$ ✓ $-4x + 160 = 0$ ✓ simplify ✓ 40 teachers/*onderwysers*	(4)
9.3	$P(x) = -2x^2 + 160x + 19\,600$ $P(40) = -2(40)^2 + 160(40) + 19\,600$ Maximum profit/*Maksimum profit* = R22 800	✓$P(40) = -2(40)^2 + 160(40) + 19\,600$ ✓ R22 800	(2)
			[8]

TOTAL/*TOTAAL*: 150