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

2026

MARKING GUIDELINES/*NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE*

(PAPER/*VRAESTEL* 1)

22 pages/*bladsye*



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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 <i>korrekte substitusie in vergelyking</i> ✓ $x = 0,79$ ✓ $x = -3,79$	(4)



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



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



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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/<i>vereenvouding</i> ✓ Simplify ✓ answer/<i>antwoord</i>	(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/<i>Kritieke waardes</i>: $p = \pm\sqrt{4}$ $p = -2 \text{ and/en } p = 2$ $p \leq -2 \quad \text{or/of} \quad p \geq 2$	✓ Standard form/<i>standaardvorm</i> ✓ $p^2 - 4$ ✓ $\Delta \geq 0$ ✓ critical values/<i>kritieke waardes</i> ✓ $p \leq -2$ ✓ $p \geq 2$	(6)

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QUESTION/VRAAG 2

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



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2.3	$n^2 - 6n - 7 > 0$ $(n - 7)(n + 1) > 0$ Critical values/<i>Kritieke waardes</i>: $n = 7$ 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 SELS 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/<i>Kritieke waardes</i>: $n = 7$ 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/<i>Kritieke waaardes</i>: $n = 7$ 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)
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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.	$\checkmark T_n = 2n - 5$ $\checkmark$ equating to 113/ <i>stel gelyk aan 113</i> $\checkmark 59$ $\checkmark 60$ OR/OF $\checkmark T_n = 2n - 7$ $\checkmark$ equating to 113 <i>stel gelyk aan 113</i> $\checkmark 60$ $\checkmark 59$ OR/OF $\checkmark T_n = 2n - 5$ $\checkmark$ equating to 113/ <i>stel gelyk aan 113</i> $\checkmark 59$ $\checkmark 60$	(4)
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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 <i>stel gelyk aan 1001</i> ✓ 250	(3)
3.2	$S_n = a + (a + d) + (a + 2d) + (a + 3d) + \dots + l$ $+ [S_n = l + (l - d) + (l - 2d) + (l - 3d) + \dots + a]$ $2S_n = (a + l) + (a + l) + (a + l) + \dots + (a + l)$ <i>n times/keer</i> $2S_n = n(a + l)$ $S_n = \frac{n}{2}(a + l)$ But $l = a + (n - 1)d$ $\therefore S_n = \frac{n}{2}[a + a + (n - 1)d]$ $\therefore S_n = \frac{n}{2}[2a + (n - 1)d]$	✓ $S_n = a + (a + d) + \dots + l$ ✓ $+ [S_n = l + (l - d) + \dots + a]$ ✓ $S_n = \frac{n}{2}(a + l)$ ✓ substitution of l using/ <i>substitusie van l deur gebruik van</i> $l = a + (n - 1)d$	(4)
3.3	$\sum_{p=-1}^{19} (3p - 2) = (-5) + (-2) + 1 + \dots + 55$ $n = 19 - (-1) + 1 = 21$ $S_{21} = \frac{21}{2}(-5 + 55)$ $S_{21} = \frac{21}{2}(50)$ $= 525$	✓ expansion/uitbreiding ✓ $n = 21$ ✓ substitution into correct formula/ <i>substitusie in korrekte formule</i> ✓ 55 ✓ 525	



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

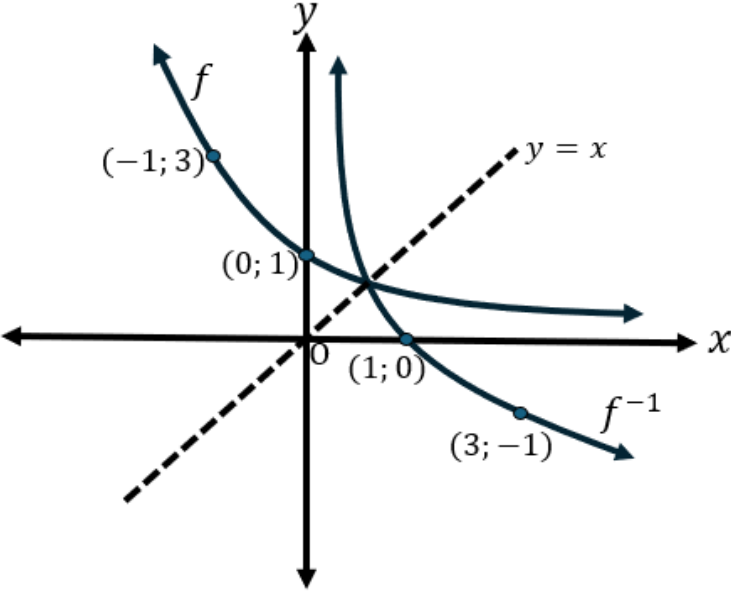
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QUESTION/VRAAG 4

4.1	$y = \left(\frac{1}{3}\right)^x$ For inverse/ <i>Vir inversie</i> : $x = \left(\frac{1}{3}\right)^y$ $y = \log_{\frac{1}{3}} x$ 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/ <i>Vorm</i> FOR f^{-1} ✓ x-intercept/ x -afsnit ✓ any other point/ $enige$ ander $punt$ ✓ shape/ <i>vorm</i>	(6)



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4.3	$f^{-1}(x) > -3$ Critical values/ <i>Kritieke waardes</i> : $\log_{\frac{1}{3}} x = -3$ or/of $-\log_3 x = -3$ $x = 27$ $0 < x < 27$ OR/OF $\log_{\frac{1}{3}} x > -3$ $x < \left(\frac{1}{3}\right)^{-3}$ $x < 27$; but/ <i>maar</i> $x > 0$ $\therefore 0 < x < 27$ ANSWER ONLY – FULL MARKS/ SLEGS ANTWOORD – VOLPUNTE	$\checkmark x = 27$ $\checkmark 0 < x < 27$	(2)
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QUESTION/VRAAG 5

5.1	$m_1 \times m_2 = \frac{1}{2} \times (-2) = -1$	$\checkmark \frac{1}{2} \times (-2)$ $\checkmark -1$	(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.	$\checkmark$ equating the two functions/ <i>stel twee funksie gelyk</i> $\checkmark x = -4$ $\checkmark R(-4; -6)$	(3)
5.3	At Q and/en T; $y = 0$ $-x^2 - 6x + 7 = 0$ $x^2 + 6x - 7 = 0$ $(x + 7)(x - 1) = 0$ $x = -7 \text{ or/of } x = 1$ $\therefore QT = 1 - (-7) = 8 \text{ units/eenhede}$	$\checkmark$ factorisation/method <i>faktorisering/metode</i> $\checkmark$ x-values/waardes $\checkmark 8$	(3)



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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/ <i>substitusie</i> ✓ $\frac{7}{2}$	(2)
5.4.2	$f(x) = -x^2 - 6x + 7$ $f'(x) = -2x - 6$ At the turning point/ <i>By die draaipunt</i> , $f'(x) = 0$ $-2x - 6 = 0$ $\therefore x = -3$ $f(-3) = -(-3)^2 - 6(-3) + 7 = 16$ $W(-3) = \frac{1}{2}(-3) + \frac{7}{2} = 2$ $\therefore PM = 16 - 2 = 14$ units/ <i>eenhede</i> OR/OF $x = \frac{1 + (-7)}{2} = -3$ $f(-3) = -(-3)^2 - 6(-3) + 7 = 16$ $W(-3) = \frac{1}{2}(-3) + \frac{7}{2} = 2$ $\therefore PM = 16 - 2 = 14$ units/ <i>eenhede</i>	✓ $x = -3$ ✓ 16 ✓ 2 ✓ 14	



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	OR/OF $f(x) = -(x + 3)^2 + 16$ P(-3; 16) $W(-3) = \frac{1}{2}(-3) + \frac{7}{2} = 2$ M(-3; 2) PM = 16 - 2 = 14 units/eenhede OR/OF $x = \frac{1 + (-7)}{2} = -3$ $PM = -x^2 - 6x + 7 - \left(\frac{1}{2}x + \frac{7}{2}\right)$ $= -x^2 - \frac{13x}{2} + \frac{7}{2}$ $\therefore PM = -(-3)^2 - \frac{13(-3)}{2} + \frac{7}{2} =$ 14 units/eenhede	OR/OF ✓ $x = -3$ ✓ $f - w$ ✓ substitution/substitusie ✓ 14	(4)
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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 <i>faktorisering/metode</i> ✓ $x = 5$ \	(3)
6.3	$f(1) = (1)^2 - 2(1) - 15 = -16$ $y \geq -16$	✓ substitute ✓ $y \geq -16$	(2)



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


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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 $k = -8 \text{ or } k = 8$ $-8 < k < 8$	✓ 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: $f(x) = 4x^2 - 3x$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $f'(x)$ $= \lim_{h \rightarrow 0} \frac{4(x+h)^2 - 3(x+h) - (4x^2 - 3x)}{h}$ $= \lim_{h \rightarrow 0} \frac{4x^2 + 8xh + 4h^2 - 3x - 3h - 4x^2 + 3x}{h}$ $= \lim_{h \rightarrow 0} \frac{8xh + 4h^2 - 3h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(8x + 4h - 3)}{h}$ $= \lim_{h \rightarrow 0} (8x + 4h - 3)$ $\therefore f'(x) = 8x - 3$	✓ $f(x+h)$ $= 4x^2 + 8xh + 4h^2 - 3x - 3h$ ✓ substitution into correct formula/ <i>subtitusie in korrekte formule</i> ✓ $8xh + 4h^2 - 3h$ ✓ $8x + 4h - 3$ ✓ $f'(x) = 8x - 3$	(5)
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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	$\checkmark \frac{(x - 3)(x + 3)}{-(x - 3)}$ $\checkmark -(x + 3)$ $\checkmark -1$ 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 $2x - 3 = \sqrt{y}$ $\therefore \frac{dy}{dx} = 4(\sqrt{y})$	$\checkmark$ expand/brei uit $y = 4x^2 - 12x + 9$ $\checkmark \frac{dy}{dx} = 8x - 12$ $\checkmark$ factorisation/faktorisering $4(2x - 3)$ $\checkmark \sqrt{y} = 2x - 3$	(4)
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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	$\checkmark$ equating to 0/ <i>stel gelyk aan 0</i> $\checkmark$ factorisation/faktoriseer $\checkmark x = 2$ $\checkmark x = -1$ $\checkmark y = 4$	(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 $x = 2$ $f(2) = (2)^3 - 3(2)^2 + 4$ $y = 0$ $(2; 0)$	$\checkmark f'(x) = 3x^2 - 6x$ $\checkmark f'(x) = 0$ $\checkmark x$ values $\checkmark y$ values	(4)



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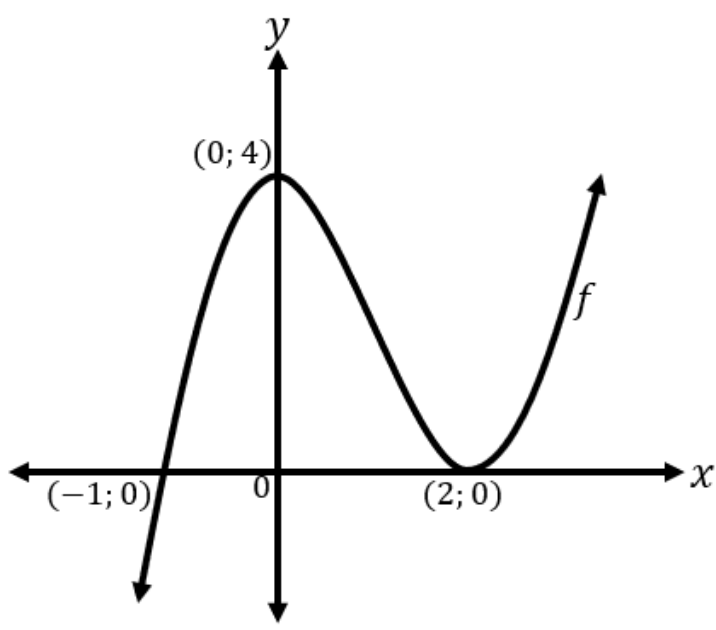
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8.3		✓ x-intercepts/afsnitte ✓ y-intercepts/afsnitte ✓ turning points/ <i>draaipunt</i> ✓ shape/vorm	(4)
8.4	$f(x) = x^3 - 3x^2 + 4$ $f'(x) = 3x^2 - 6x$ $f'(x) = 0$ $f''(x) = 6x - 6$ $f''(x) = 0$ $6x - 6 = 0$ $6x = 6$ $x = 1$ $\therefore x > 1$ OR/OF $x = \frac{0+2}{2}$ $x = 1$ $\therefore x > 1$	✓ $f''(x) = 6x - 6$ ✓ $x > 1$ 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)

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QUESTION/VRAAG 9

9.1	$P(x) = -2x^2 + 160x + 19\,600$ $P(5) = -2(5)^2 + 160(5) + 19\,600$ $= R20\,350$	$\checkmark -2(5)^2 + 160(5) + 19\,600$ $\checkmark R20\,350$	(2)
9.2	$P(x) = -2x^2 + 160x + 19\,600$ $p'(x) = -4x + 160$ $p'(x) = 0$ $-4x + 160 = 0$ $4x = 160$ $x = 40$ $\therefore 40 \text{ teachers/onderwysers}$	$\checkmark p'(x) = -4x + 160$ $\checkmark -4x + 160 = 0$ $\checkmark \text{ simplify}$ $\checkmark 40 \text{ teachers/onderwysers}$	(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	$\checkmark P(40) = -2(40)^2 + 160(40) + 19\,600$ $\checkmark R22\,800$	(2)
			[8]

TOTAL/TOTAAL: 150



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