



Province of the
EASTERN CAPE
EDUCATION

Ikhanda leMzantsi Kapa isabe leMzantsi
Provincie van die Oos-Kaap: Departement van Onderwys
Poraleziye Ya Kapa BUlababeta: Lelapha le Thuto

LEARNER'S NAME AND SURNAME
LEERDER SE NAAM EN VAN

Selwe

GRADE/GRAAD 12

**NATIONAL/NASIONALE
SENIOR
CERTIFICATE/SERTIFIKAAT**

GRADE/GRAAD 12

SEPTEMBER 2025

**MATHEMATICS P1/WISKUNDE V1
SPECIAL ANSWER BOOK/SPEZIALE ANTWOORDEBOEK**

Marker/Merker			Moderator's Initials/Moderator se paraaf							
Question Vraag	Mark Punt	Initial Parafeer	Marks Punte	S M	Marks Punte	D M	Marks Punte	P M	Marks Punte	N M
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11										
TOTAL TOTAAL										

This special answer book consists of 23 pages.
Hierdie spesiale antwoordeboek bestaan uit 23 bladsye.

QUESTION/VRAAG 1

	Solution/Oplissing	Marks/ Punte
1.1.1	$x^2 = 3 - 2x \quad x^2 + 2x - 3 = 0 \quad \checkmark$ $(x-1)(x+3) = 0 \quad \checkmark$ $x = 1 \text{ or } -3 \quad \checkmark$	3 (3)
1.1.2	$3x^2 - 9x + 2 = 0$ $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(3)(2)}}{2(3)} \quad \checkmark$ $= \frac{9 \pm \sqrt{57}}{6}$ $= 2,76 \text{ or } 0,24 \quad \checkmark$	3 (3)
1.1.3	$9 > -x(x-6)$ $9 > -x^2 + 6x$ $x^2 - 6x + 9 > 0 \quad \checkmark$ $(x-3)(x-3) > 0 \quad \text{or } x = 3 \quad \checkmark$ $\begin{array}{ccc} + & 0 & + \\ & 3 & \end{array}$ $x < 3 \text{ or } 3 < x \quad \checkmark \quad x \in \mathbb{R}; x \neq 3$	4 (4)
1.1.4	$\sqrt{x+5} - \sqrt{x} = 1$ $(\sqrt{x+5})^2 = (1 + \sqrt{x})^2 \quad \checkmark \text{ isolate}$ $x + 5 = 1 + 2\sqrt{x} + x \quad \checkmark$ $4 = 2\sqrt{x}$ $(2)^2 = (\sqrt{x})^2 \quad \checkmark \text{ simplify}$ $4 = x \quad \checkmark \text{ ans}$	4 (4)

	Solution/Oplissing	Marks/Punte
1.2	$2x = 1 - y \quad \therefore y = 1 - 2x \quad \checkmark$ $(1 - 2x)^2 - 2(1 - 2x) - 3x + 1 = 3x(1 - 2x) - 2x^2 \quad \checkmark$ $1 - 4x + 4x^2 - 2 + 4x - 3x + 1 = 3x - 6x^2 - 2x^2$ $12x^2 - 6x = 0$ $\div 6 : \quad 2x^2 - x = 0 \quad \checkmark$ $x(2x - 1) = 0 \quad \checkmark$ $x = 0 \text{ or } \frac{1}{2} \quad \checkmark \text{ both}$ $y = 1 - 2(0) \text{ or } 1 - 2\left(\frac{1}{2}\right)$ $= 1 \quad = 0 \quad \checkmark \text{ both}$ $\therefore x = 0 \text{ and } y = 1$ or $x = \frac{1}{2} \text{ and } y = 0$	6 (6)
1.3	$\sqrt[3]{k} = 4^{\frac{1}{6}} \quad 2 = \frac{1}{x^2 + 7x + 5}$ $(\sqrt[3]{k})^3 = \left(4^{\frac{1}{6}}\right)^3 \quad 2 \cdot (x^2 + 7x + 5) = 1$ $k = 2 \quad \checkmark \checkmark \quad x^2 + 7x + 5 = \frac{1}{2} \quad \checkmark$ $p = \frac{x^2 + 7x + 7}{x^2 + 7x + 5 + 2}$ $= \frac{x^2 + 7x + 7}{x^2 + 7x + 7}$ $= 1 \quad \checkmark \text{ den}$ $= \frac{2}{5} \quad \checkmark$	5 (5) [25]

QUESTION/VRAAG 2

	Solution/Oplissing	Marks/ Punte
2.1.1	<u>Amanda's</u> ✓ →	1 (1)
2.1.2	$S_{\infty} = \frac{a}{1-r}$ only applies if $-1 < r < 1$ ✓ <u>Amanda's</u> $r = 3 > 1$ ✓ →	2 (2)
2.2	$\sum_{k=1}^{10} \frac{3}{2}(2)^k = \frac{3}{2}(2)^1 + \frac{3}{2}(2)^2 + \frac{3}{2}(2)^3 + \dots + \frac{3}{2}(2)^{10}$ $= 3 + 6 + 12 + \dots + 1536$ $S_{10} = \frac{3(1 - (2)^{10})}{1-2}$ ✓ $= 3069$ ✓ →	4 (4)
2.3	$T_n = ar^{n-1} = 8\left(\frac{3}{4}\right)^{n-1}$ ✓ $T_n < \frac{1}{100}$ $8\left(\frac{3}{4}\right)^{n-1} < \frac{1}{100}$ ✓ $\left(\frac{3}{4}\right)^{n-1} < \frac{1}{800}$ $\left(\frac{3}{4}\right)^{n-1} = \frac{1}{800}$ $n-1 = \frac{\log(\frac{1}{800})}{\log(\frac{3}{4})}$ $n = 24, 23 \dots$ ✓ $\frac{1}{800} = 0,00125$ $n = 24 \quad \left(\frac{3}{4}\right)^{23} = 0,0013 \dots > \frac{1}{800} \times$ $n = 25 \quad \left(\frac{3}{4}\right)^{24} = 0,0010 \dots \text{OK}$ $\therefore T_{25}$ ✓ →	4 (4)
		[11]

QUESTION/VRAAG 3

	Solution/Oplissing	Marks/ Punte
3.1.1	$T_1; T_2; T_3; \dots$ $\begin{array}{c} \swarrow \quad \searrow \\ -4 \quad -3 \\ \swarrow \quad \searrow \\ 1 \end{array}$ $T_n = an^2 + bn + c$ $1 = 2a \quad -4 = 3\left(\frac{1}{2}\right) + b \quad T_4 = 1$ $\frac{1}{2} = a \quad -\frac{11}{2} = b \quad \frac{1}{2}(4)^2 + \left(-\frac{11}{2}\right)(4) + c = 1$ $-14 \quad c = 15$ $\therefore T_n = \frac{1}{2}n^2 - \frac{11}{2}n + 15$	4 (4)
3.1.2	$T_{16} = \frac{1}{2}(16)^2 - \frac{11}{2}(16) + 15$ $= 55$	1 (1)
3.1.3	$t_n = -4 + (n-1)(1)$ $45 = -4 + n - 1$ $50 = n$ $\therefore T_{50} \text{ and } T_{51}$ OR pg 6.1.	3 (3)
3.2.1	$S_n = 2n^2 - 6n$ $S_{30} = 2(30)^2 - 6(30)$ $= 1620$	2 (2)

	Solution/Oplissing	Marks/ Punte
3.2.2	$T_n = S_n - S_{n-1}$ $S_n = 2n^2 - 6n$ $S_{n-1} = 2(n-1)^2 - 6(n-1) = 2(n^2 - 2n + 1) - 6n + 6$ $= 2n^2 - 4n + 2 - 6n + 6$ $= 2n^2 - 10n + 8 \checkmark$ $\therefore 300 = 2n^2 - 6n - (2n^2 - 10n + 8)$ $300 = 2n^2 - 6n - 2n^2 + 10n - 8$ $300 = 4n - 8 \checkmark$ $308 = 4n$ $77 = n \checkmark$	3 (3)
		[13]

3.1.3.

$$\begin{aligned}
 T_n &= \frac{1}{2}n^2 - \frac{11}{2}n + 15 \\
 T_{n+1} &= \frac{1}{2}(n+1)^2 - \frac{11}{2}(n+1) + 15 \\
 &= \frac{1}{2}(n^2 + 2n + 1) - \frac{11}{2}n - \frac{11}{2} + 15 \\
 &= \frac{1}{2}n^2 + n + \frac{1}{2} - \frac{11}{2}n - \frac{11}{2} + 15 \\
 &= \frac{1}{2}n^2 - \frac{9}{2}n + 10
 \end{aligned}$$

$$\begin{aligned}
 T_{n+1} - T_n &= 45 \\
 \frac{1}{2}n^2 - \frac{9}{2}n + 10 - \left(\frac{1}{2}n^2 - \frac{11}{2}n + 15\right) &= 45 \\
 \frac{1}{2}n^2 - \frac{9}{2}n + 10 - \frac{1}{2}n^2 + \frac{11}{2}n - 15 &= 45 \\
 n &= 50
 \end{aligned}$$

$\therefore T_{50}$ and T_{51}

OR

$$\begin{aligned}
 T_n &= \frac{1}{2}n^2 - \frac{11}{2}n + 15 \\
 T_{n-1} &= \frac{1}{2}(n-1)^2 - \frac{11}{2}(n-1) + 15 \\
 &= \frac{1}{2}(n^2 - 2n + 1) - \frac{11}{2}n + \frac{11}{2} + 15 \\
 &= \frac{1}{2}n^2 - n + \frac{1}{2} - \frac{11}{2}n + \frac{11}{2} + 15 \\
 &= \frac{1}{2}n^2 - \frac{13}{2}n + 21
 \end{aligned}$$

$$\begin{aligned}
 T_n - T_{n-1} &= 45 \\
 \frac{1}{2}n^2 - \frac{11}{2}n + 15 - \left(\frac{1}{2}n^2 - \frac{13}{2}n + 21\right) &= 45 \\
 \frac{1}{2}n^2 - \frac{11}{2}n + 15 - \frac{1}{2}n^2 + \frac{13}{2}n - 21 &= 45 \\
 n &= 51
 \end{aligned}$$

$\therefore T_{50}$ and T_{51}

QUESTION/VRAAG 4

	Solution/Oplossing	Marks/ Punte
4.1	$f: y = 3x - 5$ $f^{-1}: x = 3y - 5$ $x + 5 = 3y$ $\frac{1}{3}x + \frac{5}{3} = y$ $x \in [-4, 5]$ $y \in [-4, 5]$ $x \in [-17, 10]$	2 (2)
4.2	$f(5) = 3(5) - 5$ $= 10$	1 (1)
4.3		4 (4)

$$f(-4) = 3(-4) - 5$$

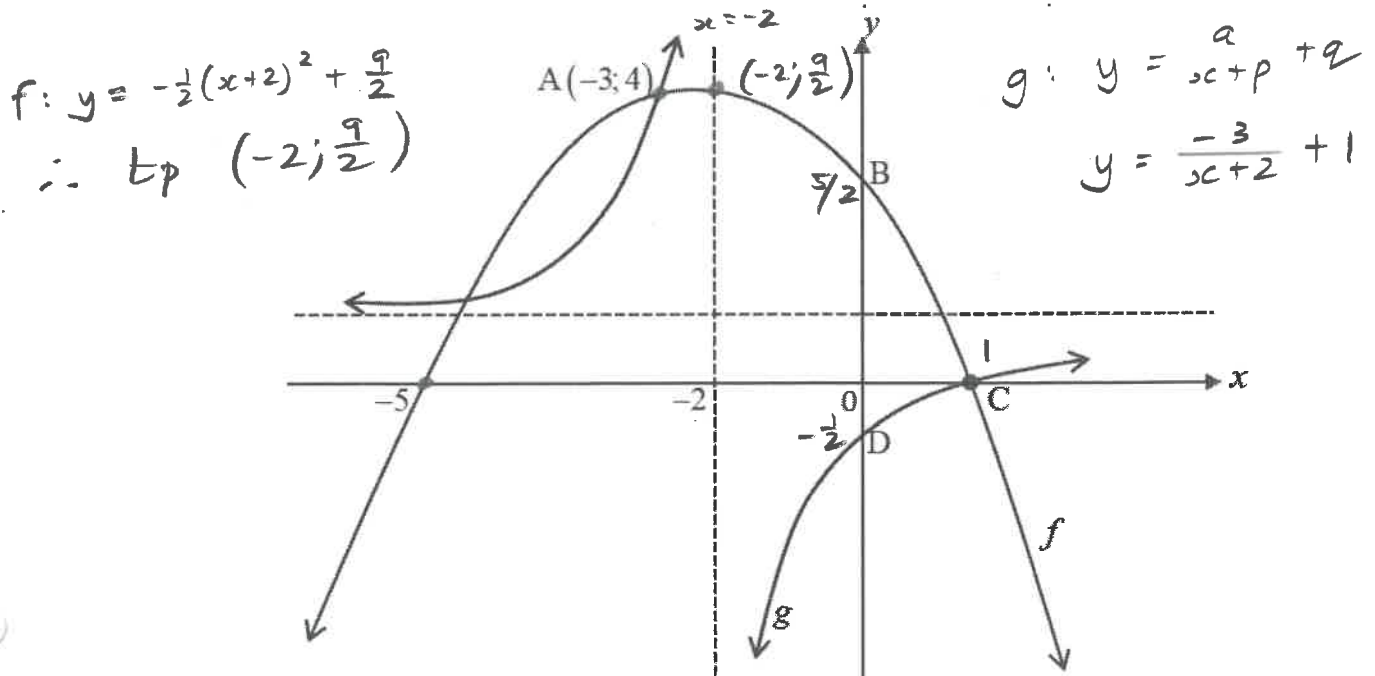
$$= -17$$

4.4	$f: y = 3x - 5 \quad f^{-1}: y = \frac{1}{3}x + \frac{5}{3}$ $3x - 5 = \frac{1}{3}x + \frac{5}{3}$ $\frac{8}{3}x = \frac{20}{3}$ $x = \frac{5}{2}$ $\therefore y = 3\left(\frac{5}{2}\right) - 5$ $= \frac{5}{2}$ $\therefore \left(\frac{5}{2}; \frac{5}{2}\right)$	4
4.5	$f(x) = g'(x)$ $g: y = ax^2 + bx + \frac{25}{6}$ $g': y = 2ax + b \quad f: y = 3x - 5$ $\therefore 2a = 3 \quad b = -5$ $a = \frac{3}{2}$ $\therefore g: y = \frac{3}{2}x^2 - 5x + \frac{25}{6}$ $g' = 0 \quad \therefore 3x - 5 = 0 \quad \therefore x = \frac{5}{3}$ $\therefore y = \frac{3}{2}\left(\frac{5}{3}\right)^2 - 5\left(\frac{5}{3}\right) + \frac{25}{6}$ $= 0 \quad g_{\min}$ $\therefore h_{\min} = 2^0$ $= 1$	5
		(5) [16]

(OR)

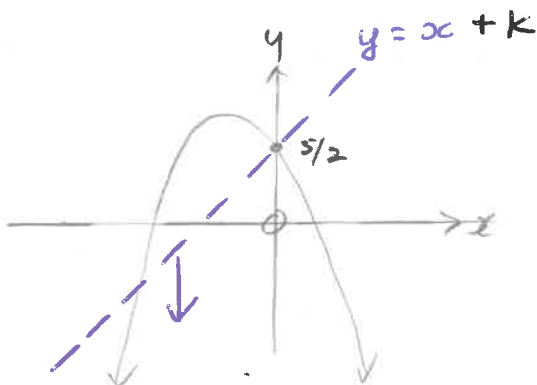
$$x = \frac{-(-5)}{2\left(\frac{3}{2}\right)} = \frac{5}{3}$$

QUESTION/VRAAG 5



	Solution/Oplissing	Marks/ Punte
5.1	$B(0; \frac{5}{2})$ ✓	1
5.2	$\text{va } x = -2 \therefore x+2=0 \quad \frac{a}{x+2} \therefore p=2$ ✓ $y = \frac{a}{x+2} + q$ $\text{sub } A(-3; 4) \quad \text{sub } D(0; -\frac{1}{2})$ $4 = \frac{a}{-3+2} + q$ ✓ $-\frac{1}{2} = \frac{a}{0+2} + q$ $4 = -a + q \quad \times 2: -1 = a + 2q$ ✓ $\therefore a = q - 4$ ✓ $-1 = q - 4 + 2q$ $3 = 3q$ $1 = q$ ✓ $a = 1 - 4$ $= -3$ ✓	6

	Solution/Oplissing	Marks/Punte
5.3	$y \in (-\infty; \frac{9}{2}]$ ✓ $\frac{9}{2}$ ✓ not ⁿ	2 (2)
5.4	$g: y = -\frac{3}{x+2} + 1$ AOS: $y = -(x+2) + 1$ ✓ method $y = -x - 2 + 1$ $y = -x - 1$ ✓	2 (2)
5.5	$\frac{x_c + (-5)}{2} = -2$ $x_c - 5 = -4$ $x_c = 1$ $C(1; 0)$ ✓ $B(0; \frac{5}{2})$ or grad = $\frac{\frac{5}{2} - 0}{0 - 1}$ ✓ $= -\frac{5}{2}$ ✓	3 (3)
5.6.1	$f(x) > 0$ $y \neq 0$ $x \in [-5; 1]$ ✓ int not ⁿ	2 (2)
5.6.2	$g(x) \cdot g'(x) > 0$ $y_{g.} + > 0$ $x \neq -2$ $x \in (-\infty; -2) \text{ or } (1; \infty)$ ✓A ✓A	2 (2)
5.7	$f(x) = x + k$ $k < \frac{5}{2}$ opp signs ✓ $\frac{5}{2}$ ✓ not ⁿ	2 (2)
		[20]



QUESTION/VRAAG 6

	Solution/Opllossing	Marks/ Punte
6.1	$A = P(1+i)^n$ $22\,350 = 8\,000 \left(1 + \frac{13}{400}\right)^n \quad \checkmark$ $\frac{447}{160} = \left(\frac{413}{400}\right)^n \quad \checkmark$ $n = \frac{\log 447/160}{\log 413/400} \quad \checkmark$ $= 32,12 \text{ quarters}$ $= 8,03 \text{ years} \quad \checkmark$ $(9 \text{ full years}) \quad \triangleright$	4 (4)
6.2	$T_0 \quad T_1 \quad T_2 \quad T_3 \quad T_4 \quad T_5 \quad T_6 \quad \quad \quad T_{13} \quad T_{14} \quad T_{15}$ $\bullet 5200 \quad \checkmark \quad \checkmark 120$ $A = 5200 \left(1 + \frac{12}{1200}\right)^{10 \times 12}$ $= 17\,162,011... \quad \checkmark$ $\bullet 700 \quad \checkmark \quad \text{both } 180$ $F = \frac{700 \left[\left(1 + \frac{12}{1200}\right)^{12 \times 12} - 1 \right]}{\frac{12}{1200}} \quad \checkmark$ $= 349\,706,138...$ $\therefore 17\,162,011... + 349\,706,138...$ $= R\,366\,868,15 \quad \checkmark \quad \triangleright$	5 (5)

	Solution/Oplissing	Marks/ Punte
6.3.1	$T_0 \quad T_1 \quad T_2 \quad T_3 \quad T_4 \quad T_5 \quad \dots \quad T_{192} \quad \dots \quad T_{240}$ $T_0 - T_3 \quad A = 900\,000 \left(1 + \frac{11,5}{1200}\right)^3$ ✓ $= 926\,123,76 \dots$ $926\,123,76 \dots = \frac{x \left[1 - \left(1 + \frac{11,5}{1200}\right)^{-237}\right]}{\frac{11,5}{1200}}$ ✓ $x = \underline{R\,9\,908,90}$ ✓	4 (4)
6.3.2	T_{192} • loan has reduced by $900\,000 - 379\,811,29$ $= 520\,188,71$ ✓ • Amt pd in is $9908,90 \times 189 \leftarrow 192 - 3$ $= 1\,872\,782,10$ ✓ $\therefore$ Interest paid is $1\,872\,782,10 - 520\,188,71$ $= \underline{R\,1\,352\,593,39}$ ✓	3 (3)
		[16]

QUESTION/VRAAG 7

	Solution/Oplossing	Marks/ Punte
	<i>N 1 penalty max</i>	
7.1	$f(x) = x^2 + 2 \quad f(x+h) = (x+h)^2 + 2$ $= x^2 + 2xh + h^2 + 2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - (x^2 + 2)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - x^2 - 2}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h)}{h}$ $= \lim_{h \rightarrow 0} (2x + h)$ $= 2x + 0$ $= 2x$	4 (4)
7.2.1	$f(x) = (5x - 7)(5x + 7)$ $= 25x^2 - 49$ $f'(x) = 50x$	2 (2)
7.2.2	$D_x \left[p(x) - 3\sqrt{x} + \frac{5}{x^4} \right]$ $= D_x \left[p(x) - x^{\frac{1}{2}} + 5x^{-4} \right]$ $= p'(x) - \frac{1}{2}x^{-2/2} - 20x^{-5}$ $= 2x^3 - \frac{1}{2}x^{-2/2} - 20x^{-5}$	4 (4)
		[10]

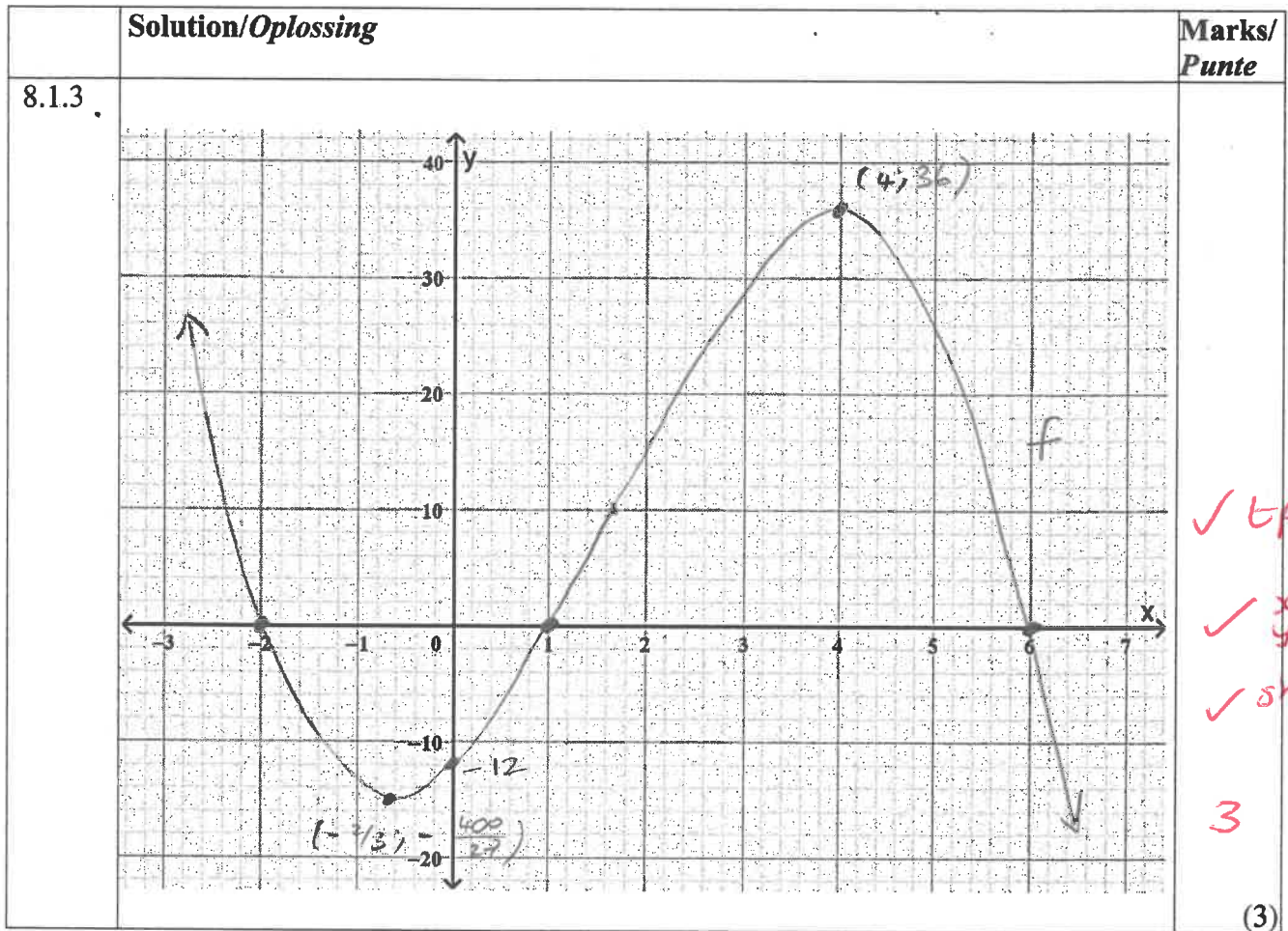
QUESTION/VRAAG 8

$$f(x) = -x^3 + 5x^2 + 8x - 12$$

$$f'(x) = -3x^2 + 10x + 8$$

$$f''(x) = -6x + 10$$

	Solution/Oplissing	Marks/Punte
8.1.1	y int: $y = -12$ ✓ $(0; -12)$ x int: $0 = -x^3 + 5x^2 + 8x - 12$ $0 = x^3 - 5x^2 - 8x + 12$ $f(1) = (1)^3 - 5(1)^2 - 8(1) + 12 = 0$ $0 = (x-1)(x^2 - 4x + 12)$ $-x^2 + 4x^2 = -5x^2$ $bx^2 = -4x^2$ $b = -4$ $0 = (x-1)(x+2)(x-6)$ ✓ $x = 1; -2$ or 6 ✓ $(-2; 0) (1; 0) (6; 0)$	4 (4)
8.1.2	t p $f'(x) = 0$ $-3x^2 + 10x + 8 = 0$ ✓ $3x^2 - 10x - 8 = 0$ $(x-4)(3x+2) = 0$ $x = 4$ or $-2/3$ ✓ both x $x = 4: y = -(4)^3 + 5(4)^2 + 8(4) - 12$ $= 36$ $(4; 36)$ $x = -2/3: y = -(-2/3)^3 + 5(-2/3)^2 + 8(-2/3) - 12$ $= -\frac{400}{27}$ $(-2/3; -\frac{400}{27})$ $-0,67$ $-14,81$ ✓ both y	4 (4)



poi

$$f''(x) = 0$$

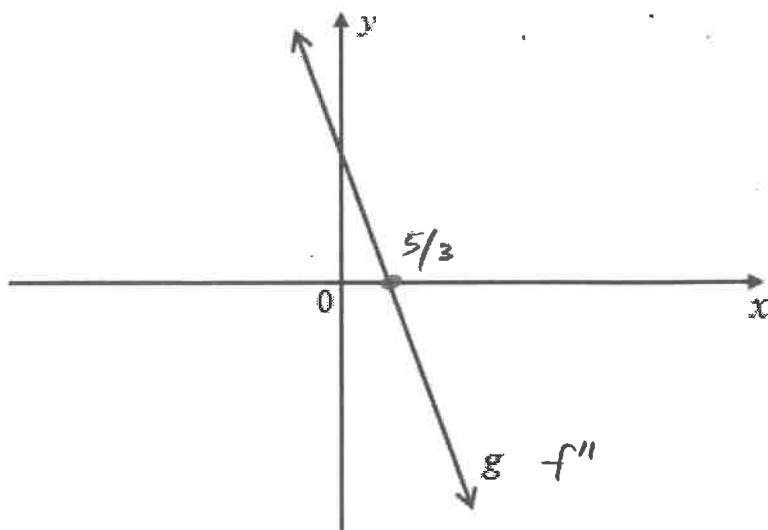
$$-6x + 10 = 0$$

$$x = \frac{5}{3}$$

$$y = -\left(\frac{5}{3}\right)^3 + 5\left(\frac{5}{3}\right)^2 + 8\left(\frac{5}{3}\right) - 12 = \frac{286}{27}$$

$$\left(\frac{5}{3}, \frac{286}{27}\right)$$

$$1,67 \quad 10,59 \quad \text{OK}$$



	Solution/Oplissing	Marks/ Punte
8.2.1	$f \quad y = kx^3 + px^2 + 4x - 3$ $f' \quad y = 3kx^2 + 2px + 4$ $f'' \quad y = 6kx + 2p \quad y = -6x + 10$ $6k = -6$ $k = -1$ $2p = 10$ $p = 5$	3 (3)
8.2.2	$f''(x) > 0$ $-6x + 10 > 0$ $-6x > -10$ $x < 5/3$	2 (2)
		[16]

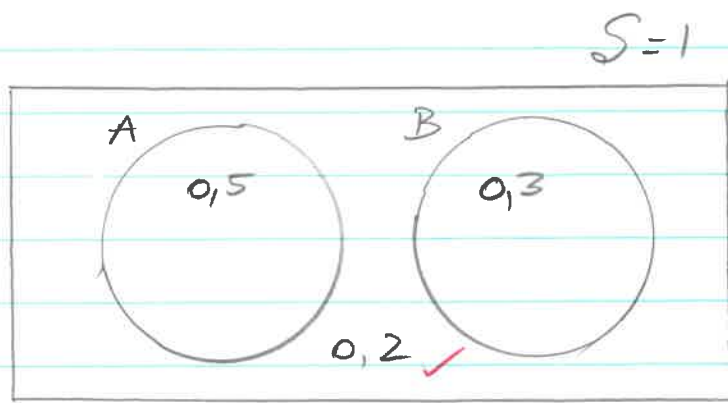
QUESTION/VRAAG 9

Solution/Oplissing	Marks/ Punte
Let numbers be x and y	
$x + y = 25$	
$y = 25 - x$ ✓	
$M = x^2 + 3y^2$ ✓	
$= x^2 + 3(25 - x)^2$ ✓ sub	
$= x^2 + 3(625 - 50x + x^2)$	
$= x^2 + 1875 - 150x + 3x^2$	
$= 4x^2 - 150x + 1875$	
$M' = 8x - 150$	
✓ $0 = 8x - 150$ ✓	
$\frac{75}{4} = x$	
$y = 25 - \frac{75}{4}$	
$= \frac{25}{4}$	
$\frac{25}{4}$ ✓ and $\frac{75}{4}$ ✓	
$\xrightarrow{\quad\quad\quad} \triangleright$	
	6,25 18,75
	7
	[7]

QUESTION/VRAAG 10

	Solution/Oplossing	Marks/ Punte
10.1.1	$P(B) + P(B') = 1$ $P(B) + 0,7 = 1 \quad \checkmark$ $P(B) = 0,3 \quad \checkmark$	2 (2)
10.1.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= 0,5 + 0,3 - 0 \quad \checkmark$ $= 0,8 \quad \checkmark$ $P(A \text{ or } B) + P((A \text{ or } B)') = 1$ $0,8 + P((A \text{ or } B)') = 1$ $P((A \text{ or } B)') = 0,2 \quad \checkmark \quad \textcircled{OR} 18.1.$	3 (3)
10.2.1	$y = 1 - \frac{9}{10}$ $= \frac{1}{10} \quad \checkmark$ $\frac{13}{30} + \frac{1}{15} + \frac{1}{75} + \frac{2}{15} + x + \frac{1}{30} + \frac{1}{50} = \frac{9}{10}$ $x + \frac{7}{10} = \frac{9}{10}$ $x = \frac{2}{10}$ $= \frac{1}{5} \quad \checkmark$	3 (3)
10.2.2	$P(CNT) = \frac{1}{15} + x = \frac{1}{15} + \frac{1}{5} = \frac{4}{15} \quad \checkmark$	1 (1)
10.2.3	$P(L \text{ only}) = \frac{1}{50}$ $\therefore n(L \text{ only}) = \frac{1}{50} \times 150 \quad \checkmark$ $= 3 \quad \checkmark$	2 (2)
		[11]

10.12.



No $\cap$ ✓
 $0,5; 0,3$ ✓

$$P((A \cup B)') = 0,2 \rightarrow$$

QUESTION/VRAAG 11

	Solution/Oplossing	Marks/ Punte
11.1	$\bullet$ A - 2 26 $\bullet$ 0 - 9 10 1 letter 2 letters 3 letters $26 \times 10 \times 10$ $26 \times 26 \times 10$ $26 \times 26 \times 26$ $\times 3$ $\times 3$ $\therefore 7\ 800 + 20\ 280 + 17\ 576$ $= 45\ 656$ OR below	4 (4)
11.2	5 10 5 5 AEIOU Vowel 5 0 2 4 6 8 Vowel even $\therefore 5 \times 10 \times 5 = 250$ $\therefore \frac{250}{45\ 656} = \frac{125}{22\ 828}$	1 (1)
		5

11.1. At least 3 letters
= all possibilities - no letters

$$\begin{aligned}
 & \overline{36} \quad \overline{36} \quad \overline{36} \quad - \quad \overline{10} \quad \overline{10} \quad \overline{10} \\
 & = 36 \times 36 \times 36 - 10 \times 10 \times 10 \\
 & = 46\ 656 - 1000 \\
 & = 45\ 656
 \end{aligned}$$

	Additional space/ <i>Addisionele ruimte</i>	Marks/ <i>Punte</i>

[illegible]

Additional Space/Adisioanele Ruimte**Marks/
Punte**

Additional Space/Addisionele Ruimte

**Marks/
Punte**

TOTAL/TOTAAL: 150





Province of the
EASTERN CAPE
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**NATIONAL
SENIOR CERTIFICATE
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GRADE/GRAAD 12

SEPTEMBER 2025

**MATHEMATICS P1 MARKING GUIDELINE
WISKUNDE V1 NASIENRIGLYN**

MARKS/PUNTE: 150

This marking guideline consists of 19 pages./
Hierdie nasienriglyn bestaan uit 19 bladsye.

NOTE/LET OP:

- If a candidate answered a question TWICE, mark the FIRST attempt ONLY.
Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, merk SLEGS die EERSTE poging.
- Consistent accuracy(CA) applies in ALL aspects of the marking guideline.
Volgehoue akkuraatheid geld deurgaans in ALLE aspekte van die nasienriglyn.
- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out attempt.
Indien 'n kandidaat 'n poging vir 'n vraag deurgetrek het en nie die vraag weer beantwoord het nie, merk die poging wat deurgetrek is.
- The mark for substitution is awarded for substitution into the correct formula.
Die punt vir substitusie word toegeken vir substitusie in die korrekte formule.

QUESTION/VRAAG 1

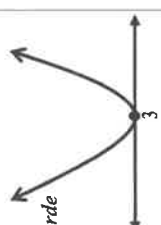
1.1	1.1.1	$x^2 = 3 - 2x$ $x^2 + 2x - 3 = 0$ $(x+3)(x-1) = 0$ $x+3=0$ or/of $x-1=0$ $x=-3$ or/of $x=1$	OR/OF	✓ standard form/standaardvorm ✓ factors/fakore ✓ both answers/beide antwoorde (3)
		$x^2 + 2x - 3 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-(2) \pm \sqrt{(2)^2 - 4(1)(-3)}}{2(1)}$ $x = 1$ or/of $x = -3$	OR/OF	✓ standard form/standaardvorm ✓ correct substitution into correct formula/ korrekte vervanging in korrekte formule ✓ both answers/beide antwoorde (3)
	1.1.2	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-9) \pm \sqrt{(-9)^2 - 4(3)(2)}}{2(3)}$ $x = \frac{9 \pm \sqrt{57}}{6}$ $\therefore x = 2,76$ or/of $x = 0,24$		✓ substitution/vervanging ✓ x-values/x-waardes (3)

Answers only – Full
Marks
Slegs antwoorde –
Volpunte

Penalise 1 mark for
incorrect rounding off./
Penaliseer 1 punt vir
verkeerde afronding.

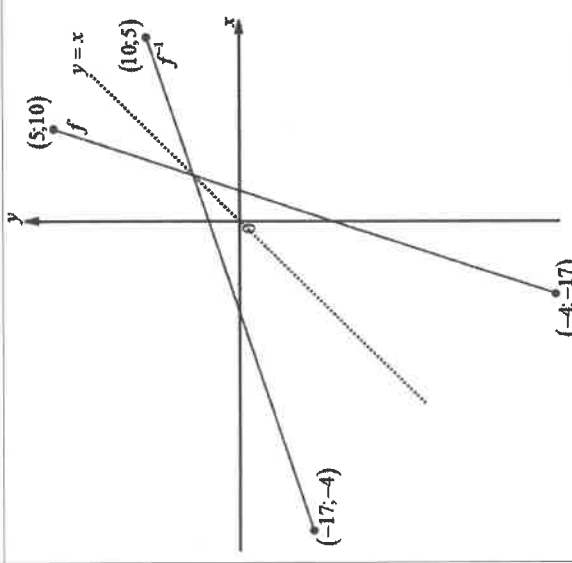
1.3	$\sqrt[3]{k} = 4^{\frac{1}{6}}$ $k^{\frac{1}{3}} = (2^2)^{\frac{1}{6}} = 2^{\frac{1}{3}}$ $\therefore k = 2$ $2 = \frac{1}{x^2 + 7x + 5}$ $x^2 + 7x + 5 = \frac{1}{2}$ $x^2 + 7x + 5 + 2 = \frac{1}{2} + 2$ (add 2 both sides/tel 2 beide kante by) $x^2 + 7x + 7 = \frac{5}{2}$ $\frac{1}{x^2 + 7x + 7} = \frac{2}{5}$ (invert fractions/keer breuke om) $p = \frac{2}{5}$	✓ surd form to exp. form/ wortelvorm na eks. vorm ✓ $k = 2$ ✓ $x^2 + 7x + 5 = \frac{1}{2}$ ✓ $x^2 + 7x + 7 = \frac{5}{2}$ ✓ $p = \frac{2}{5}$	(5)
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[25]

1.1.3	$9 > -x(x-6)$ $x^2 - 6x + 9 > 0$ $(x-3)^2 > 0$ critical value/kritieke waarde $x = 3$ $x \in \mathbb{R}, x \neq 3$ OR/OF $x \in (-\infty; -\infty), x \neq 3$		✓ standard form/standaardvorm ✓ critical value/kritieke waarde ✓ $x \in \mathbb{R}, x \neq 3$ (accuracy/akkturaathed) OR/OF ✓ $x \in (-\infty; -\infty), x \neq 3$	(4)
1.1.4	$(\sqrt{x+5}) = 1 + \sqrt{x}$ $(\sqrt{x+5})^2 = (1 + \sqrt{x})^2$ $x+5 = 1 + 2\sqrt{x} + x$ $4 = 2\sqrt{x}$ $2 = \sqrt{x}$ $\therefore x = 4$		✓ isolating surd/isoleer wortelvorm ✓ square both sides/ kwadreer beide kante ✓ simplification/vereenvoudiging ✓ answer/antwoord	(4)
1.2	$2x = 1 - y$(1) $y^2 - 2y - 3x + 1 = 3xy - 2x^2$(2) From / Vanaf (1): $y = 1 - 2x$(3) (3) into/in (2): $(1 - 2x)^2 - 2(1 - 2x) - 3x + 1 = 3x(1 - 2x) - 2x^2$ $1 - 4x + 4x^2 - 2 + 4x - 3x + 1 = 3x - 6x^2 - 2x^2$ $12x^2 - 6x = 0$ $6x(2x - 1) = 0$ $x = 0$ or/of $x = \frac{1}{2}$ $y = 1$ or/of $y = 0$ Note: the last mark is an independent mark and can always be awarded as a CA mark Nota: die laaste punt is onafhanklik en kan altyd as 'n CA punt toegeken word.		✓ $y = 1 - 2x$ ✓ substitution/vervanging ✓ standard form/standaardvorm ✓ factors/faktore ✓ x-values/waardes ✓ y-values/waardes	(6)

QUESTION/VRAG 2	
2.1	2.1.1 Amanda 2.1.2 For a series to converge the ratio (r) , $-1 < r < 1$. Vir 'n reeks om te konvergeer moet verhouding, $-1 < r < 1$ Amanda's r is out of the interval $-1 < r < 1$. Amanda se r is buite die interval $-1 < r < 1$. Formula s_{∞} cannot be used in such a case. Formule s_{∞} geld nie in so geval nie.
	✓ answer/antwoord (1) ✓ r is out of the interval $r \in (-1; 1)$ r is buite die interval $r \in (-1; 1)$ ✓ s_{∞} cannot be used in such a case/ s_{∞} kan dus nie gebruik word nie (2)
2.2	$\frac{3}{2}(2)^1 + \frac{3}{2}(2)^2 + \frac{3}{2}(2)^3 + \dots + \frac{3}{2}(2)^m$ $3 + 6 + 12 + \dots$ $a = 3$ and/en $r = 2$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{3(2^{10} - 1)}{2 - 1}$ $= 3069$
	✓ $a = 3$ ✓ $r = 2$ ✓ substitution/vervanging ✓ answer/antwoord (4)
2.3	$T_n = ar^{n-1}$ $\therefore 8\left(\frac{3}{4}\right)^{n-1} < \frac{1}{100}$ $\therefore \left(\frac{3}{4}\right)^{n-1} < \frac{1}{800}$ $\therefore (n-1)\log\left(\frac{3}{4}\right) < \log\left(\frac{1}{800}\right)$ $\therefore n-1 > \frac{\log\left(\frac{1}{800}\right)}{\log\left(\frac{3}{4}\right)}$; since/omdat $\log\left(\frac{3}{4}\right) < 0$ $n-1 > 23,236\dots$ $n > 24,236$ $\therefore 25^{\text{th}}$ term will thus be the first term to be less than $\frac{1}{100}$. 25^{th} term sal dus die eerste term kleiner as $\frac{1}{100}$ wees.
	✓ general term/algemene term ✓ $8\left(\frac{3}{4}\right)^{n-1} < \frac{1}{100}$ ✓ $n-1 > 23,236\dots$ ✓ answer/antwoord (4)

QUESTION/VRAG 3	
3.1	3.1.1 $2a = 1$ $\therefore a = \frac{1}{2}$ $3a + b = -4$ $3\left(\frac{1}{2}\right) + b = -4$ $b = -\frac{11}{2}$ $T_n = an^2 + bn + c$ $= \frac{1}{2}n^2 - \frac{11}{2}n + c$ $T_4 = 1$ $1 = \frac{1}{2}(4)^2 - \frac{11}{2}(4) + c$ $c = 15$ $T_n = \frac{1}{2}n^2 - \frac{11}{2}n + 15$
	✓ 2 nd difference/2 ^{de} verskil = 1 ✓ $a = \frac{1}{2}$ ✓ $b = -\frac{11}{2}$ ✓ $c = 15$ (4)
	3.1.2 $T_{16} = \frac{1}{2}(16)^2 - \frac{11}{2}(16) + 15 = 55$ 3.1.3 $-4; -3; -2; \dots$ $a = -4$ $d = 1$ $T_n = a + d(n-1)$ $= -4 + (n-1)$ $= -4 - 1 + n$ $45 = -5 + n$ $n = 50$ $\therefore$ between/tussen T_{50} and/en T_{51}
	✓ answer/antwoord (1) ✓ sequence of 1 st difference/ry van 1 ^{ste} verskille ✓ equating/gelykstel ✓ answer/antwoord (3)
3.2	3.2.1 $S_{30} = 2(30)^2 - 6(30)$ $= 1620$
	✓ substitution/vervanging ✓ answer/antwoord (2)

QUESTION/VRAAG 4	
4.1	$y = 3x - 5$ $x = 3y - 5$ $y = \frac{1}{3}x + \frac{5}{3}, x \in [-17; 10]$ ✓ swapping x and y / omruil van x en y ✓ answer/antwoord (accuracy/akkuraatheid) (2) ✓ answer / antwoord (1)
4.2	$f(5) = 3(5) - 5 = 10$
4.3	 ✓ shape of f / vorm van f ✓ shape of f^{-1} / vorm van f^{-1} ✓ endpoints of f / eindpunte van f ✓ endpoints of f^{-1} / eindpunte van f^{-1}
4.4	$f(x) = f^{-1}(x)$ $3x - 5 = \frac{1}{3}x + \frac{5}{3}$ $\frac{8}{3}x = \frac{20}{3}$ $x = \frac{5}{2}$ $\therefore \left(\frac{5}{2}, \frac{5}{2}\right)$ OR / OF $9x - 15 = x + 5$ $8x = 20$ $x = \frac{5}{2}$ $y = \frac{5}{2}$ $\therefore \left(\frac{5}{2}, \frac{5}{2}\right)$ ✓ equating f to f^{-1} / gelyk stel f aan f^{-1} ✓ $\frac{8}{3}x = \frac{20}{3}$ OR / OF $8x = 20$ ✓ solving of x / oplos vir x ✓ answer/antwoord (4)

3.2.2	$T_1 = S_1 = 2(1)^2 - 6(1) = -4$ $T_2 = S_2 - S_1 = -4 + 4 = 0$ $T_3 = S_3 - S_2 = 0 + 4 = 4$ $\therefore d = 4$ $\Rightarrow T_n = 4n - 8$ $4n - 8 = 300$ $4n = 308$ $n = 77$ OR / OF $T_n = S_n - S_{n-1}$ $300 = 2n^2 - 6n - 2(n-1)^2 + 6(n-1)$ $300 = 2n^2 - 6n - 2n^2 + 4n - 2 + 6n - 6$ $300 = 4n - 8$ $308 = 4n$ $n = 77$ OR / OF ✓ first 3 terms/eerste 3 terme ✓ general term in terms of n / algemene term i.t.v. n ✓ value of n/waarde van n OR / OF ✓ substitution/vervanging ✓ general term in terms of n / algemene term i.t.v. n ✓ value of n/waarde van n	(3)
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QUESTION/VRAAG 5	
5.1	$B\left(0; 2\frac{1}{2}\right)$ ✓ answer/antwoord (1)
5.2	$y = \frac{a}{x+p} + q$ if vertical asymptote of g is $x = -2$ / as die vertikale asymptoot van g ; $x = -2$, is $\therefore p = 2$ $y = \frac{a}{x+2} + q$ substitute/vervang: $(-3; 4)$ $4 = \frac{a}{-3+2} + q$ $4 = -a + q$ $a = q - 4, \dots \dots \dots (1)$ substitute/vervang: $\left(0; -\frac{1}{2}\right)$ $-\frac{1}{2} = \frac{a}{2} + q$ $-1 = a + 2q$ $a = -1 - 2q, \dots \dots \dots (2)$ $(1) = (2)$ $q - 4 = -2q - 1$ $-3q = -3$ $q = 1$ For $q = 1: a = -3$ $\{y \mid y \leq 4\frac{1}{2}; y \in \mathbf{R}\}$ OR/OF $y \in \left(-\infty; 4\frac{1}{2}\right]; y \in \mathbf{R}$ ✓ value of p / waarde van p ✓ substitution of $(-3; 4)$ / vervanging van $(-3; 4)$ ✓ formulating the first equation / formulerings van eerste vergelyking ✓ formulating the second equation / formulerings van tweede vergelyking ✓ equating/gegelykstelling ✓ values of a and q / waardes van a en q ✓ answer/antwoord (6)
5.3	OR/OF $y \in \left(-\infty; 4\frac{1}{2}\right]; y \in \mathbf{R}$ ✓ answer/antwoord (2)

4.5	$f(x) = 3x - 5$ $g'(x) = 2ax + b$ $\therefore 2a = 3 \Rightarrow a = \frac{3}{2}$ and/en $b = -5$ $g(x) = \frac{3}{2}x^2 - 5x + \frac{25}{6}$ $x = \frac{-(-5)}{2\left(\frac{3}{2}\right)} = \frac{5}{3}$ min. value of g / min waarde van $g: g\left(\frac{5}{3}\right) = 0$ Min. value of h / Min. waarde van $h: h(x) = 2^0 = 1$ ✓ value of a / waarde van a ✓ value of b / waarde van b $x = \frac{5}{3}$ ✓ min. of $g(x)$ / min. van $g(x)$ ✓ answer/antwoord (5)	16
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5.4	$y = -(x+2)+1$ $= -x-1$ $y = -x+c$ subst./vervang : $(-2;1)$ $1 = -(-2)+c$ $c = -1$ $y = -x-1$	✓ substitution/vervanging ✓ answer/antwoord OR/OF ✓ substitution/vervanging ✓ answer/antwoord	(2)
5.5	$B\left(0; \frac{5}{2}\right)$ $C(x; 0)$ $x_c = 1$ (by using symmetry / deur simmetrie te gebruik) OR/OF $-1 = -\frac{3}{x+2}$ $-x-2 = -3$ $x = 3-2$ $x = 1$ $C(1; 0)$ $m = \frac{\frac{5}{2}-0}{0-1}$ $= -\frac{5}{2}$	✓ coordinates of C/koördinate van C ✓ substitution/vervanging ✓ answer/antwoord	(2)
5.6	$5.6.1$ $-5 \leq x \leq 1$ $5.6.2$ $x < -2$ or / of $x > 1$	✓ ✓ answer/antwoord ✓ ✓ answer/antwoord	(2)
5.7	$k < \frac{5}{2}$	✓ ✓ answer/antwoord	(2)
			[20]

6.1	$A = P(1+i)^n$ $22350 = 8000 \left(1 + \frac{13\%}{4}\right)^{4n}$ $\frac{447}{160} = \left(\frac{413}{400}\right)^{4n}$ $4n = \log_{\left(\frac{413}{400}\right)} \frac{447}{160}$ $4n = 32,12279 \dots$ $n = 8,03 \text{ years/jaar}$	✓ substitution/vervanging ✓ simplification/vereenvoudiging ✓ correct use of log/korrekte gebruik van 'n log ✓ answer/antwoord	(4)
6.2	$F_v = \frac{x \left[(1+i)^n - 1 \right]}{i} + P(1+i)^n$ $= \frac{700 \left[\left(1 + \frac{12\%}{12}\right)^{180} - 1 \right]}{\frac{12\%}{12}} + 5200 \left(1 + \frac{12\%}{12}\right)^{120}$ $= R366\,868,15$	✓ i and/en $n = 180$ ✓ $n = 120$ ✓ correct substitution into F_v / korrekte vervanging in F_v ✓ correct substitution into A / korrekte vervanging in A ✓ answer/antwoord	(5)
OR/OF			
	$F_v = \frac{700 \left[\left(1 + \frac{12\%}{12}\right)^{60} - 1 \right]}{\frac{12\%}{12}} + 5200 \left(1 + \frac{12\%}{12}\right)^{120}$ $= 205841,0675 + 161027,0826$ $= R366\,868,15$	✓ i and/en 60 in F_v ✓ adding/optel 5200 and/en $\left(1 + \frac{12\%}{12}\right)^{120}$ ✓ second/tweede F_v ✓ 205841,0675 + 161027,0826 ✓ answer/Antwoord	(5)

QUESTION/VRAAG 7	
7.1	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^2 + 2 - (x^2 + 2)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + 2 - x^2 - 2}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h)}{h}$ $= 2x$ Penalise 1 mark for incorrect notation in this question <i>Penaliseer 1 punt vir verkeerde notasie in hierdie vraag</i> ✓ substitution/vervangings ✓ simplification/vereenvoudiging ✓ factorisation/faktorisering (dividing by h/deel deur h) ✓ answer/antwoord Answer ONLY: 0 marks <i>SLEGS antwoord: 0 punte</i>
7.2	7.2.1 $f(x) = (5x - 7)(5x + 7)$ $= 25x^2 - 49$ $f'(x) = 50x$ 7.2.2 $p'(x) = 2x^3$ $D_x \left[p(x) - \sqrt[3]{x} + \frac{5}{x^4} \right]$ $= D_x \left[p(x) - x^{-\frac{1}{3}} + 5x^{-4} \right]$ $= p'(x) - \frac{1}{3}x^{-\frac{1}{3}-1} - 20x^{-5}$ $= 2x^3 - \frac{1}{3}x^{-\frac{4}{3}} - 20x^{-5}$

6.3	6.3.1	$P_T = \frac{[1 - (1+i)^{-n}]}{i}$ $900000 \left(1 + \frac{11,5\%}{12} \right)^3 = \frac{11,5\%}{12} \times \frac{11,5\%}{12}$ $x = \frac{900000 \left(1 + \frac{11,5\%}{12} \right)^3 \times \frac{11,5\%}{12}}{\left[1 - \left(1 + \frac{11,5\%}{12} \right)^{-237} \right]}$ $x = R9908,90$ ✓ $n = -237$ ✓ $900000 \left(1 + \frac{11,5\%}{12} \right)^3$ ✓ correct substitution/ <i>korrekte vervanging</i> ✓ answer/antwoord	(4)
	6.3.2	Total paid in the 16 years/Totaal betaal in die 16 jaar $= R9908,90 \times 189 = R1\,872\,782,10$ Interest paid/Rente betaal $= R1\,872\,782,10 - (R900\,000 - R379\,811,29)$ $= R1\,352\,593,39$ ✓ R1 872 782,10 ✓ subtracting (.....)/ <i>afrekening van (.....)</i> ✓ answer/antwoord	(3)
		116	

8.1.3		✓ x-intercepts/x-afsnitte ✓ y-intercept/y-afsnit ✓ turning points/draaipunte ✓ shape/vorm	(3)
8.2	$f'(x) = 3kx^2 + 2px + 4$ $f''(x) = 6kx + 2p$ $g(x) = -6x + 10$ $\therefore 6k = -6$ and $2p = 10$ $k = -1$ and $p = 5$	✓ $f''(x) = 6kx + 2p$ ✓ $p = 5$ ✓ $k = -1$	(3)
8.2.2	x – coordinate of inflection point: x – koördinaat van buigpunt: $-6x + 10 = 0$ $x = \frac{5}{3}$ and $a < 0$ $\therefore f$ is concave up when: f is konkaf op vir: $x < \frac{5}{3}$ OR/OR f is concave up when: f is konkaf op wanneer: $f''(x) > 0$ $-6x + 10 > 0$ $-6x > -10$ $x < \frac{5}{3}$	✓ $f''(x) = 0$ ✓ answer /antwoord - OR/OR ✓ $f''(x) > 0$ ✓ answer /antwoord	(2)
			16

8.1	QUESTION/VRAG 8 $f(x) = -x^3 + 5x + 8x - 12$ y – int. / afsnit: $y = -12$ x – int s. / x – afsnitte: $y = 0$: $(x+2)(x-1)(x-6) = 0$ $x = -2$ or / of $x = 1$ or / of $x = 6$ $(-2; 0); (1; 0); (6; 0)$	✓ y-intercept/y-afsnit ✓ first factor/ eerste faktor ✓ other two factors/ander twee faktore ✓ x-intercepts/x-afsnitte	(4)
8.1.2	$f(x) = -x^3 + 5x + 8x - 12$ $f'(x) = -3x^2 + 10x + 8$ $f''(x) = 0$ $-3x^2 + 10x + 8 = 0$ $(x-4)(3x+2) = 0$ $x = 4$ or / of $x = -\frac{2}{3}$ $f(4) = 36$ $f\left(-\frac{2}{3}\right) = -\frac{400}{27} \approx -14,81$ $(4; 36) \left(-\frac{2}{3}; -\frac{400}{27}\right)$ OR / OF $-b \pm \sqrt{b^2 - 4ac}$ $\frac{2a}{-(-10) \pm \sqrt{(10)^2 - 4(-3)(8)}}$ $x = -\frac{2}{3}$ or / of $x = 4$ $f(4) = 36$ $f\left(-\frac{2}{3}\right) = -\frac{400}{27} \approx -14,81$ $(4; 36) \left(-\frac{2}{3}; -\frac{400}{27}\right)$	✓ $f'(x)$ ✓ $f''(x) = 0$ ✓ x – values /x-waardes ✓ y – values /y-waardes - OR/OR ✓ $f'(x)$ ✓ $f''(x) = 0$ ✓ x – values /x-waardes ✓ y – values /y-waardes	(4)

QUESTION/VRAAG 10	
10.1	10.1.1 $P(B) = 1 - P(\text{not/nie } B)$ $= 1 - 0,7$ $= 0,3$
	10.1.2 $P(A \text{ and/en } B) = 0$ $P(A \text{ or/of } B) = P(A) + P(B)$ $P(A \text{ or/of } B) = 0,5 + 0,3$ $= 0,8$ $\therefore P[\text{not/nie}(A \text{ or/of } B)] = 0,2$
10.2	10.2.1 $y = 1 - \frac{9}{10}$ $= 0,1$ $= \frac{1}{10}$
	$x = \frac{9}{10} - \left(\frac{13}{30} + \frac{1}{15} + \frac{2}{75} + \frac{1}{15} + \frac{1}{50} \right)$ $= \frac{1}{5}$
	10.2.2 $P(\text{cellphone and tablet}) = \frac{4}{15}$ $P(\text{selfoon en tablet}) = \frac{4}{15}$
	10.2.3 $P(E) = \frac{n(E)}{n(S)}$ $\frac{1}{50} = \frac{n(E)}{150}$ $n(E) = 3$ $\therefore$ only 3 learners owning laptops/ slegs 3 leerders besit skootrekenaars
	✓ substitution/vervang ✓ answer/antwoord (2)
	✓ substitution into the correct rule/ vervang in korrekte reël ✓ answer/antwoord (3)
	✓ value of y /waarde van y
	✓ sum of at least 3/som van ten minste 3 $= \frac{9}{10}$ ✓ value of x /waarde van x (3)
	✓ answer/antwoord (1)
	✓ $n(E) = \frac{1}{50} \times 150$ ✓ answer/antwoord (2)
	11

QUESTION/VRAAG 9	
9	$x + y = 25$ let the expression to be minimised be A: laat A die uitdrukking wees wat ge-minimeer moet word $\therefore A = x^2 + 3y^2$ but/maar: $y = 25 - x$ $A = x^2 + 3(25 - x)^2$ $= x^2 + 3(625 - 50x + x^2)$ $= x^2 + 1875 - 150x + 3x^2$ $= 4x^2 - 150x + 1875$ $A'(x) = 8x - 150$ $A'(x) = 0$ $150 = 8x$ $x = \frac{75}{4}$ $y = \frac{25}{4}$
	✓ $x^2 + 3y^2$ ✓ $y = 25 - x$ ✓ $x^2 + 3(25 - x)^2$ ✓ $A'(x)$ ✓ $A'(x) = 0$ ✓ $x = \frac{75}{4}$ ✓ $y = \frac{25}{4}$ (7)
	7

QUESTION/VRAAG 11		Accuracy/Akkuraantheid
11.1	Case 1 (1 letter) : $26 \times 10 \times 10 = 2\,600$ But the letter can be in any of three positions $\therefore 3 \times 2\,600 = 7\,800$ codes Case 2 (2 letter codes) : $26 \times 26 \times 10 = 6\,760$ But the digit can be in any of three different positions $\therefore 3 \times 6\,760 = 20\,280$ codes Case 3 (3 letter codes) : $26 \times 26 \times 26 = 17\,576$ codes $\Rightarrow$ Total number of codes = 45 656 codes	✓ 7 800 answer/antwoord ✓ 20 280 answer/antwoord ✓ 17 576 answer/antwoord ✓ answer/antwoord (4)
11.2	Opsie 1 (1 letter) : $26 \times 10 \times 10 = 2\,600$ <i>Maar die letter kan in enige van drie posisies wees</i> $\therefore 3 \times 2\,600 = 7\,800$ kodes Opsie 2 (2 letter codes) : $26 \times 26 \times 10 = 6\,760$ <i>Maar die syfer kan in enige van drie posisies wees</i> $\therefore 3 \times 6\,760 = 20\,280$ kodes Opsie 3 (3 letter codes) : $26 \times 26 \times 26 = 17\,576$ kodes $\Rightarrow$ Totale aantal kodes = 45 656 kodes $P(\text{Letter, Even Code}) / P(\text{Letter, Ewe kode}) = \frac{250}{45\,656}$	✓ answer / antwoord (1) 15
TOTAL/TOTAAL: 150		