



SA EXAM PAPERS

YOUR LEADING PAST YEAR EXAM PAPER
PORTAL

Visit SA Exam Papers

www.saexampapers.co.za



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE/GRAAD 12

MATHEMATICS P1/WISKUNDE V1

NOVEMBER 2014

MEMORANDUM

MARKS: 150

PUNTE: 150

**This memorandum consists of 22 pages.
*Hierdie memorandum bestaan uit 22 bladsye.***

NOTE:

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in all aspects of the marking memorandum.

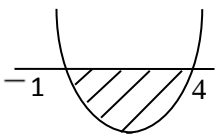
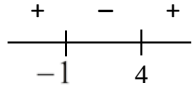
LET WEL:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is DEURGAANS op ALLE aspekte van die memorandum van toepassing.

QUESTION/VRAAG 1

1.1.1	$(x-2)(4+x) = 0$ $x = 2 \quad \text{or} \quad x = -4$	$\checkmark x = 2$ $\checkmark x = -4$ (2)
1.1.2	$3x^2 - 2x - 14 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(-14)}}{2(3)}$ $= \frac{2 \pm \sqrt{172}}{6}$ $x = 2,52 \quad \text{or/of} \quad x = -1,85$ OR/OF $x^2 - \frac{2}{3}x + \frac{1}{9} = \frac{14}{3} + \frac{1}{9}$ $\left(x - \frac{1}{3}\right)^2 = \frac{43}{9}$ $x - \frac{1}{3} = \pm \frac{\sqrt{43}}{3}$ $\therefore x = \frac{1 \pm \sqrt{43}}{3}$ $x = 2,52 \quad \text{or/of} \quad x = -1,85$	$\checkmark$ standard form/standaardvorm $\checkmark$ substitution into correct formula/substitusie in korrekte formule $\checkmark\checkmark$ answers/antwoorde (4) $\checkmark$ for adding $\frac{1}{9}$ on both sides/tel $\frac{1}{9}$ by aan beide kante $\checkmark x = \frac{1 \pm \sqrt{43}}{3}$ $\checkmark\checkmark$ answers (4)

1.1.3	$2^{x+2} + 2^x = 20$ $2^x(2^2 + 1) = 20$ $2^x = \frac{20}{5}$ $2^x = 2^2$ $\therefore x = 2$ OR/OF $2^x \cdot 2^2 + 2^x = 2^2 \cdot 5$ $2^x(2^2 + 1) = 2^2 \cdot 5$ $2^x \cdot 5 = 2^2 \cdot 5$ $\therefore x = 2$ OR/OF $4 \cdot 2^x + 2^x = 20$ $5 \cdot 2^x = 20$ $2^x = 4 = 2^2$ $\therefore x = 2$	✓ common factor/<i>gemeen. faktor</i> ✓ simplification/<i>vereenvoudiging</i> ✓ answer/<i>antwoord</i> (3) ✓ common factor/<i>gemeen. faktor</i> ✓ simplification/<i>vereenvoudiging</i> ✓ answer/<i>antwoord</i> (3) ✓ $5 \cdot 2^x = 20$ ✓ $2^x = 4$ ✓ answer/<i>antwoord</i> (3)
1.2	$x = 2y + 3 \quad \dots\dots\dots(1)$ $3x^2 - 5xy = 24 + 16y \quad \dots\dots\dots(2)$ (1) in (2): $3(2y + 3)^2 - 5(2y + 3)y = 24 + 16y$ $3(4y^2 + 12y + 9) - 10y^2 - 15y = 24 + 16y$ $12y^2 + 36y + 27 - 10y^2 - 15y - 24 - 16y = 0$ $2y^2 + 5y + 3 = 0$ $(2y + 3)(y + 1) = 0$ $y = -\frac{3}{2} \quad \text{or} \quad y = -1$ $\therefore x = 2\left(-\frac{3}{2}\right) + 3 \quad \text{or} \quad x = 2(-1) + 3$ $x = 0 \quad \text{or} \quad x = 1$ $(0; -\frac{3}{2}) \quad (1; -1)$ OR/OF	✓ substitution/<i>substitusie</i> ✓ simplification/<i>vereenvoudiging</i> ✓ standard form/<i>standaardvorm</i> ✓ factorisation/<i>faktorisering</i> ✓ y-values/<i>y-waardes</i> ✓ x-values/<i>x-waardes</i> (6)

	$y = \frac{x-3}{2}$ $3x^2 - 5x\left(\frac{x-3}{2}\right) = 24 + 16\left(\frac{x-3}{2}\right)$ $3x^2 - \frac{5x^2 - 15x}{2} = 24 + \frac{16x - 48}{2}$ $\times 2: 6x^2 - 5x^2 + 15x = 48 + 16x - 48$ $x^2 - x = 0$ $x(x-1) = 0$ $x = 0 \text{ or } x = 1$ $y = -\frac{3}{2} \text{ or } y = -1$	✓ substitution/substitusie ✓ simplification/ vereenvoudiging ✓ standard form / <i>standard vorm</i> ✓ factors/faktore ✓ x-values/x- waardes ✓ y-values/y-waardes (6)
1.3	$(x-1)(x-2) < 6$ $x^2 - 3x + 2 < 6$ $x^2 - 3x - 4 < 0$ $(x+1)(x-4) < 0$  OR/ OF  $-1 < x < 4 \text{ or } x \in (-1; 4)$	✓ standard form/ <i>standaardvorm</i> ✓ factorisation/faktorisering ✓ critical values in the context of inequality / <i>kritiese waardes in die konteks van die ongelykheid</i> ✓ notation/notasie (4)
1.4	$-k - 4 \geq 0$ $k \leq -4$	✓ $-k - 4 \geq 0$ ✓ answer/antwoord (2) [21]

QUESTION/VRAAG 2

2.1	$T_4 = 23$	✓23 (1)
2.2	$T_{251} = a + (n-1)d$ $= 2 + (251-1)(7)$ $= 1752$	✓ $a = 2$ and $d = 7$ ✓ subst. into correct formula /subt. in korrekte formule ✓ 1752 (3)
2.3	$\sum_{n=1}^{251} (7n-5)$ OR/OF $\sum_{p=0}^{250} (7p+2)$	✓ general term/ algemene term ✓ complete answer /volledige antwoord (2) ✓ general term/ algemene term ✓ complete answer / volledige antwoord (2)
2.4	$S_n = \frac{n}{2}[a+l]$ $S_n = \frac{251}{2}[2+1752]$ $= 220127$ OR/OF $S_n = \frac{n}{2}[2a + (n-1)d]$ $= \frac{251}{2}[2(2) + (251-1)(7)]$ $= 220127$	✓ substitution/substitusie ✓ 220127 (2) ✓ substitution/substitusie ✓ 220127 (2)
2.5	The new series/Die nuwe reeks is $16 + 44 + 72 + \dots + 1752$ $16 + 28(n-1) = 1752$ $1736 = 28(n-1)$ $62 = n-1$ $n = 63$ OR/OF $2 + 9 + \underline{16} + 23 + 30 + 37 + \underline{44} + 51 + \dots + \underline{1752}$ T_3 is divisible by /is deelbaar deur 4 Then $T_7, T_{11}, T_{15}, \dots, T_{251}$ are divisible by 4, thus each 4 th term is divisible by 4. Daarna is $T_7, T_{11}, T_{15}, \dots, T_{251}$ deelbaar deur 4, d.w.s. elke 4 ^{de} term is deelbaar deur 4. $\therefore$ number of terms divisible by 4 will be $= \frac{251-3}{4} + 1 = 63$ $\therefore$ aantal terme deelbaar deur 4 sal wees $= \frac{251-3}{4} + 1 = 63$ OR/OF	✓✓ generating new series divisible by 4/ vorming van nuwe reeks deelbaar deur 4 ✓ $T_n = 1752$ ✓ 63 (4) ✓ T_3 is divisible by 4/ is deelbaar deur 4 ✓ identifying terms divisible by 4/ identifiseer terme deelbaar deur 4 ✓ reasoning/redenering ✓ 63 (4)

	Position of terms divisible by 4: $3 ; 7 ; 11 ; \dots ; 247 ; 251$ $T_n = 4n - 1 = 251$ $4n = 252$ $n = 63$	✓✓ generating sequence involving position of terms/ <i>vorming van reeks</i> <i>i.t.v. posisie van terme</i> ✓ $T_n = 251$ ✓ 63 (4) [12]
--	---	--

QUESTION/VRAAG 3

3.1.1	$ \begin{array}{ccccc} -1 & ; & -7 & ; & -11 & ; & p & ; & \dots \\ & \swarrow & & \swarrow & & \swarrow & & & \\ & -6 & & -4 & & p+11 & & & \\ & & \swarrow & & \swarrow & & & & \\ & & 2 & & 2 & & & & \\ p+11 - (-4) & = & 2 \\ p+15 & = & 2 \\ p & = & -13 \end{array} $ OR/OF $ \begin{array}{ccccc} -1 & ; & -7 & ; & -11 & ; & p & ; & \dots \\ & \swarrow & & \swarrow & & \swarrow & & & \\ & -6 & & -4 & & p+11 & & & \\ & & \swarrow & & \swarrow & & & & \\ & & 2 & & 2 & & & & \\ p+11 & = & -2 \\ p & = & -13 \end{array} $	$\checkmark p + 15 = 2$ $\checkmark p = -13$ (2)
3.1.2	$2a = 2$ $a = 1$ $3a + b = -6$ $3(1) + b = -6$ $b = -9$ $a + b + c = -1$ $1 - 9 + c = -1$ $c = 7$ $T_n = n^2 - 9n + 7$ OR/OF $ \begin{aligned} T_n &= T_1 + (n-1)d_1 + \frac{(n-1)(n-2)d_2}{2} \\ &= -1 + (n-1)(-6) + \frac{(n-1)(n-2)(2)}{2} \\ &= -1 - 6n + 6 + \frac{2n^2 - 6n + 4}{2} \\ &= n^2 - 9n + 7 \end{aligned} $	$\checkmark a = 1$ $\checkmark b = -9$ $\checkmark c = 7$ $\checkmark$ answer/antwoord (4) $\checkmark$ formula/formule $\checkmark$ substitution of first and second differences/substitusie van eerste en tweede verskille $\checkmark$ simplification/vereenvoudiging $\checkmark$ answer/antwoord (4)

OR/OF $ \begin{array}{ccccccc} 7; -1 & ; & -7 & ; & -11 & ; & p & ; & \dots \\ & \swarrow & & \swarrow & & \swarrow & & \swarrow & \\ & -8 & & -6 & & -4 & & p+11 & \\ & & \swarrow & & \swarrow & & \swarrow & & \\ & & 2 & & 2 & & 2 & & \end{array} $ $T_0 = 7 = c$ $2a = 2 \quad \therefore a = 1$ $3a + b = -6 \quad \therefore b = -9$ $T_n = n^2 - 9n + 7$	✓ c-value/c-waarde ✓ a-value/a-waarde ✓ b-value/b-waarde ✓ answer/antwoord (4)
OR/OF $a = \frac{1}{2}(2) = 1$ $\therefore T_n = n^2 + bn + c$ $T_1 = -1 \therefore 1 + b + c = -1 \quad \dots\dots(1)$ $T_2 = -7 \therefore 4 + 2b + c = -7 \quad \dots\dots(2)$ $(2) - (1): 3 + b = -6$ $\therefore b = -9$ $\text{sub in (1): } c = 7$ $\therefore T_n = n^2 - 9n + 7$	✓ a-value/a-waarde ✓ b-value/b-waarde ✓ c-value/c-waarde ✓ answer/antwoord (4)

3.1.3	The sequence of first differences is/<i>Die reeks van eerste verskille is</i>: $-6; -4; -2; 0; \dots$ $-6 + (n-1)(2) = 96$ $n = 52$ $\therefore$ two terms are/<i> twee terme is</i>: $T_{52} = 52^2 - 9(52) + 7 = 2243$ $T_{53} = 53^2 - 9(53) + 7 = 2339$ OR/OF The sequence of first differences is/<i>Die reeks van eerste verskille is</i>: $-6; -4; -2; 0; \dots$ The formula for the sequence of first differences/<i>Die formule vir die reeks van eerste verskille is</i> $T_n = 2n - 8$ 1st difference/<i>1^{ste} verskil</i>: $2n - 8 = 96$ $2n = 104$ $n = 52$ $\therefore$ two terms are/<i> twee terme is</i>: $T_{52} = 52^2 - 9(52) + 7 = 2243$ $T_{53} = 53^2 - 9(53) + 7 = 2339$ OR/OF $T_n - T_{n-1} = 96$ $(n^2 - 9n + 7) - [(n-1)^2 - 9(n-1) + 7] = 96$ $n^2 - 9n + 7 - n^2 + 2n - 1 + 9n - 9 - 7 = 96$ $2n = 106$ $n = 53$ $T_{52} = 52^2 - 9(52) + 7 = 2243$ $T_{53} = 53^2 - 9(53) + 7 = 2339$	$\checkmark -6 + (n-1)(2) = 96$ $\checkmark 52$ $\checkmark 2\ 243$ $\checkmark 2\ 339$ (4) $\checkmark 2n - 8 = 96$ $\checkmark 52$ $\checkmark 2\ 243$ $\checkmark 2\ 339$ (4) $\checkmark T_n - T_{n-1} = 96$ $\checkmark 53$ $\checkmark 2\ 243$ $\checkmark 2\ 339$ (4)
	OR/OF $T_{n+1} - T_n = 96$ $[(n+1)^2 - 9(n+1) + 7] - [n^2 - 9n + 7] = 96$ $n^2 + 2n + 1 - 9n - 9 + 7 - n^2 + 9n - 7 = 96$ $2n = 104$ $n = 52$ $T_{52} = 52^2 - 9(52) + 7 = 2243$ $T_{53} = 53^2 - 9(53) + 7 = 2339$	$\checkmark T_{n+1} - T_n = 96$ $\checkmark 52$ $\checkmark 2\ 243$ $\checkmark 2\ 339$ (4)

3.2.1	$T_{12} = 16 \left(\frac{1}{4} \right)^{12-1}$ $= \frac{1}{4^9} \quad \text{or} \quad 4^{-9} \quad \text{or} \quad \frac{1}{2^{18}} \quad \text{or} \quad 2^{-18}$	✓ $a = 16$ and $r = \frac{1}{4}$ ✓ subst. into correct formula/ <i>subt in korrekte formule</i> ✓ answer/antwoord (3)
3.2.2	$S_{10} = \frac{16 \left(1 - \left(\frac{1}{4} \right)^{10} \right)}{1 - \frac{1}{4}}$ $= 21,33$ OR/OF $S_{10} = \frac{16 \left(\left(\frac{1}{4} \right)^{10} - 1 \right)}{\frac{1}{4} - 1}$ $= 21,33$	✓ substitution into correct formula / <i>substitusie in korrekte formule</i> ✓ answer/antwoord (2) ✓ substitution into correct formula / <i>substitusie in korrekte formule</i> ✓ answer/antwoord (2)
3.3	$\left(1 + \frac{1}{2} \right) \left(1 + \frac{1}{3} \right) \left(1 + \frac{1}{4} \right) \dots \left(1 + \frac{1}{99} \right)$ $= \left(\frac{3}{2} \right) \left(\frac{4}{3} \right) \left(\frac{5}{4} \right) \left(\frac{6}{5} \right) \dots \left(\frac{100}{99} \right)$ $= \left(\frac{100}{2} \right)$ $= 50$ OR/OF $\left(1 + \frac{1}{2} \right) \left(1 + \frac{1}{3} \right) \left(1 + \frac{1}{4} \right) \dots \left(1 + \frac{1}{99} \right)$ $T_1 = \left(1 + \frac{1}{2} \right) = \frac{3}{2}$ $T_2 = \frac{3}{2} \left(1 + \frac{1}{3} \right) = \frac{3}{2} \times \frac{4}{3} = 2$ $T_3 = 2 \left(1 + \frac{1}{4} \right) = 2 \times \frac{5}{4} = \frac{5}{2}$ $\frac{3}{2}, 2, \frac{5}{2} \dots$ is an arithmetic sequence with $a = \frac{3}{2}$ and $d = \frac{1}{2}$ $\therefore T_{98} = \frac{3}{2} + (98-1) \frac{1}{2}$ $= \frac{100}{2} = 50$	✓ improper fractions/ <i>onegte breuke</i> ✓ $\left(1 + \frac{1}{99} \right)$ or $\left(\frac{100}{99} \right)$ ✓✓ answer/antwoord (4) ✓ $\left(1 + \frac{1}{99} \right)$ ✓ giving the first three terms / <i>gee die eerste drie terme</i> ✓✓ answer / <i>antwoord</i> (4)

[19]

QUESTION/VRAAG 4

4.1	$p = 1$ $q = 1$	✓ p value /waarde ✓ q value /waarde (2)
4.2	$0 = \frac{2}{x+1} + 1$ $-x - 1 = 2$ $x = -3$ OR/OF Reflect (0 ; 3) across $y = -x$ to get T(-3 ; 0) $x = -3$ Reflekteer (0 ; 3) om $y = -1$ om T(-3 ; 0) te kry $x = -3$	✓ $0 = \frac{2}{x+1} + 1$ ✓ $x = -3$ (2) ✓ reflect across/reflekteer om $y = -x$ ✓ $x = -3$ (2)
4.3	Shifting g five units to the left shifts (- 1 ; 0) five units to the left. $x = -6$	✓ answer/antwoord (1)
4.4	$\frac{2}{x+1} + 1 = x$ $2 + x + 1 = x^2 + x$ $x^2 = 3$ $\therefore x = \sqrt{3}$ since at S, $x > 0$ $y = \sqrt{3} = 1,73...$ $OS^2 = x^2 + y^2 = 3 + 3 = 6$ $\therefore OS = \sqrt{6} = 2,45 \text{ units/eenhede}$ OR/OF	✓ equating both graphs/stel grafieke gelyk ✓ $x^2 = 3$ ✓ $x = \sqrt{3}$ and $y = \sqrt{3}$ ✓ $OS^2 = 6$ ✓ answer/antwoord (5)

	Translate g one unit down and one unit to the right/<i>Transleer g een eenheid af en een eenheid na regs</i> The new equation/<i>Die nuwe vergelyking</i> : $p(x) = \frac{2}{x}$ Therefore the image of S is $S'(\sqrt{2}; \sqrt{2})$/ <i>Daarom is die beeld van S nou $S'(\sqrt{2}; \sqrt{2})$</i> Now translate p back to g/<i>Transleer p terug na g</i>: $S(\sqrt{2} - 1; \sqrt{2} + 1)$ $OS^2 = (\sqrt{2} - 1)^2 + (\sqrt{2} + 1)^2 = 2 - 2\sqrt{2} + 1 + 2 + 2\sqrt{2} + 1$ $\therefore OS = \sqrt{6} = 2,45 \text{ units/eenhede}$	✓ $p(x) = \frac{2}{x}$ ✓✓ coord. of/koörd. van S' ✓ coord. of/koörd. van S ✓ answer/antwoord (5)
4.5	$k < 3$ will give roots with opposite signs/ <i>$k < 3$ sal wortels met teenoorgestelde tekens gee</i>	✓ $k < 3$ (1) [11]

QUESTION 5

5.1	$y = \log_a x$ $-1 = \log_a \frac{1}{3}$ $a^{-1} = \frac{1}{3}$ $a = \left(\frac{1}{3}\right)^{-1}$ $\therefore a = 3$	$\checkmark$ subt. $\left(\frac{1}{3}; -1\right)$ $\checkmark a^{-1} = \frac{1}{3}$ or $a = \left(\frac{1}{3}\right)^{-1}$ (2)
5.2	$h: x = \log_3 y$ $\therefore y = 3^x$	$\checkmark$ swop x and y /ruil x en y $\checkmark$ answer/antwoord (2)
5.3	$g(x) = -\log_3 x$ OR/OF $g(x) = \log_3 \frac{1}{x}$ OR/OF $g(x) = \log_{\frac{1}{3}} x$ OR/OF $x = 3^{-y}$ OR/OF $x = \left(\frac{1}{3}\right)^y$	$\checkmark$ answer/antwoord (1) $\checkmark$ answer/antwoord (1) $\checkmark$ answer/antwoord (1) $\checkmark$ answer/antwoord (1) $\checkmark$ answer/antwoord (1)
5.4	$x > 0$ OR/OF $(0; \infty)$	$\checkmark$ answer/antwoord (1) $\checkmark$ answer/antwoord (1)
5.5	$\log_3 x = -3$ $x = 3^{-3}$ $x = \frac{1}{27}$ $x \geq \frac{1}{27}$	$\checkmark$ exponential form/ eksponensiële vorm $\checkmark$ simplification/vereenvoudiging $\checkmark$ answer/antwoord (3) [9]

QUESTION/VRAAG 6

6.1	$4x^2 - 6 = 0$ $x^2 = \frac{3}{2}$ $x = 1,22$ (x - coordinate of S is positive)	$\checkmark y = 0$ $\checkmark 1,22$ (2)
6.2	$(0 ; -6)$	$\checkmark 0$ $\checkmark -6$ (2)
6.3.1	$QT = f(x) - g(x)$ $= 2\sqrt{x} - (4x^2 - 6)$ or $= 2\sqrt{x} - 4x^2 + 6$	$\checkmark\checkmark$ correct formula/ <i>korrekte formule</i> $\checkmark$ substitution/substitusie (3)
6.3.2	$QT = 2x^{\frac{1}{2}} - 4x^2 + 6$ Deravitive of $QT = x^{\frac{-1}{2}} - 8x = 0$ $\frac{1}{\sqrt{x}} = 8x$ $x^{\frac{3}{2}} = \frac{1}{8}$ or $\frac{1}{x} = 64x^2$ $x = \left(\frac{1}{8}\right)^{\frac{2}{3}}$ $x = \left(\frac{1}{2}\right)^2$ or $x^3 = \frac{1}{64}$ $x = \frac{1}{4} = 0,25$ Max/Maks $QT = 2\left(\frac{1}{4}\right)^{\frac{1}{2}} - 4\left(\frac{1}{4}\right)^2 + 6$ $= 6\frac{3}{4} = 6,75$ units/eenhede	$\checkmark$ derivative/afgeleide $\checkmark$ derivative equal to 0/ <i>afgeleide gelyk aan 0</i> $\checkmark x^{\frac{3}{2}} = \frac{1}{8}$ $\checkmark x$ -value/ x -waarde $\checkmark$ substitution/substitusie $\checkmark$ answer/antwoord (6) [13]

QUESTION/VRAAG 7

7.1	$A = P(1-i)^n$ $72\,500 = 145\,000(1-i)^5$ $i = 1 - \sqrt[5]{\frac{72\,500}{145\,000}}$ $= 0,1294\dots$ $\therefore \text{Rate of interest/Rentekoers is } 12,94 \% \text{ p.a./p.j.}$ OR/OF $(1-i)^5 = \frac{1}{2}$ $\therefore i = 1 - \left(\frac{1}{2}\right)^{\frac{1}{5}}$ $i = 0,1294$ $\therefore \text{Rate of interest/Rentekoers is } 12,94 \% \text{ p.a./p.j.}$	✓substitution/substitusie ✓writing in terms of i herskryf in terme van i ✓answer/antwoord (3) ✓substitution/substitusie ✓writing i.t.o i ✓answer (3)
7.2.1	$P = \frac{x[1-(1+i)^{-n}]}{i}$ $500\,000 = \frac{x \left[1 - \left(1 + \frac{0,12}{12} \right)^{-240} \right]}{\frac{0,12}{12}}$ $x = \frac{500\,000 \times \frac{0,12}{12}}{\left[1 - \left(1 + \frac{0,12}{12} \right)^{-240} \right]}$ $x = \text{R}5505,43$	✓ $i = \frac{0,12}{12}$ ✓ $n = 240$ ✓substitution into correct formula ✓answer/antwoord (4)

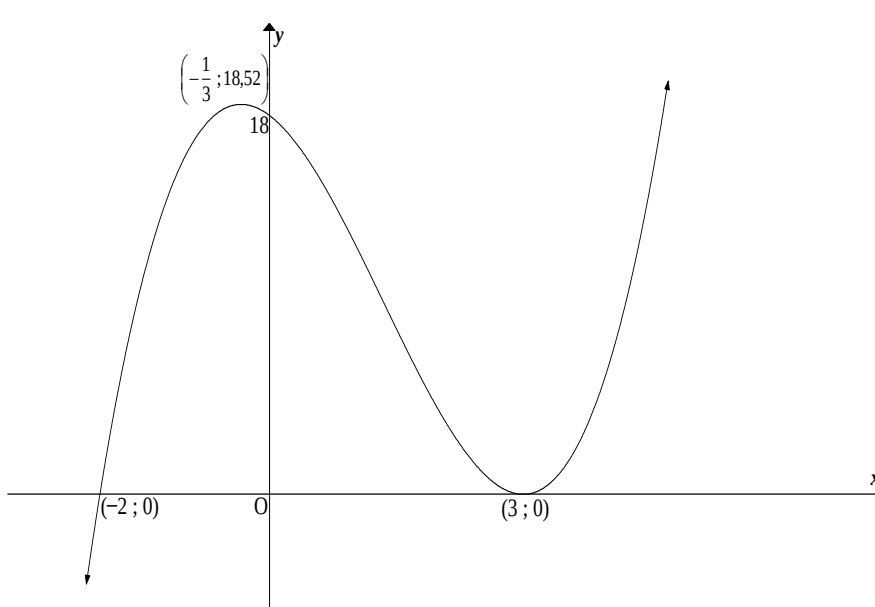
7.2.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $500000 = \frac{6000 \left[1 - \left(1 + \frac{0,12}{12} \right)^{-n} \right]}{\frac{0,12}{12}}$ $\frac{500000}{6000} \times 0,01 = 1 - (1,01)^{-n}$ $(1,01)^{-n} = 1 - \frac{5}{6}$ $-n = \frac{\log \frac{1}{6}}{\log 1,01}$ $n = 180,07$ ∴ Melissa settles the loan in 181 months	✓ 6000 ✓ substitute into correct formula/substitusie in korrekte formule ✓ use of logs/gebruik van logs ✓ answer/antwoord (4)
7.2.3	Samuel He is paying off his loan over a longer period thus more interest will be paid./Hy betaal sy lening oor 'n langer tydperk af, dus sal hy meer rente betaal. OR/OF Samuel He will pay/Hy betaal $R5505,43 \times 240 - R500\,000 = R821\,303,20$ She will pay between/Sy sal tussen R580 000 and/en R586 000,00 betaal.	✓ Samuel ✓ reason/rede (2) ✓ Samuel ✓ reason/rede (2) [13]

QUESTION/VRAAG 8

8.1	$f(x+h) = (x+h)^3 = (x^2 + 2xh + h^2)(x+h)$ $= x^3 + x^2h + 2x^2h + 2xh^2 + h^2x + h^3$ $= x^3 + 3x^2h + 3xh^2 + h^3$ $f(x+h) - f(x) = x^3 + 3x^2h + 3xh^2 + h^3 - x^3$ $= 3x^2h + 3xh^2 + h^3$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{3x^2h + 3xh^2 + h^3}{h}$ $= \lim_{h \rightarrow 0} \frac{h(3x^2 + 3xh + h^2)}{h}$ $= \lim_{h \rightarrow 0} (3x^2 + 3xh + h^2)$ $= 3x^2$ OR/OF $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)(x+h)^2 - x^3}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)(x^2 + 2xh + h^2) - x^3}{h}$ $= \lim_{h \rightarrow 0} \frac{x^3 + 3x^2h + 3xh^2 + h^3 - x^3}{h}$ $= \lim_{h \rightarrow 0} \frac{h(3x^2 + 3xh + h^2)}{h}$ $= \lim_{h \rightarrow 0} (3x^2 + 3xh + h^2)$ $= 3x^2$ OR	✓simplifying/vereenvouding ✓formula/formule ✓subst. into formula/subst. in formule ✓factorization/faktoriseren ✓answer/antwoord (5) ✓formula/formule ✓subst. into formula/subst. in formule ✓simplifying/vereenvoudiging ✓factorization/faktoriseren ✓answer/antwoord (5)
-----	---	---

	$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h)^3 - x^3}{h}$ $= \lim_{h \rightarrow 0} \frac{(x+h-x)(x^2 + 2xh + h^2 + x^2 + xh + x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{h(3x^2 + 3xh + h^2)}{h}$ $= \lim_{h \rightarrow 0} (3x^2 + 3xh + h^2)$ $= 3x^2$	✓ formula/formule ✓ subst. into formula/subst. in formule ✓ factorization/faktorisering ✓ simplifying/vereenvoudiging ✓ answer/antwoord (5)
8.2	$f'(x) = 4x + 2x^3$	✓ $4x$ ✓ $2x^3$ (2)
8.3	$y = x^{12} - 2x^6 + 1$ $\frac{dy}{dx} = 12x^{11} - 12x^5$ $= 12x^5(x^6 - 1)$ $= 12x^5\sqrt{y}$	✓ simplification/vereenvoudiging ✓ derivative/afgeleide ✓ factors/faktore (3)
8.4	$f(x) = 2x^3 - 2x^2 + 4x - 1$ $f'(x) = 6x^2 - 4x + 4$ $f''(x) = 12x - 4$ $f \text{ is concave up when/is konkaaf op as } f''(x) > 0$ $\therefore 12x - 4 > 0$ $12x > 4$ $x > \frac{1}{3}$	✓ first derivative/eerste afgeleide ✓ second derivative/tweede afgeleide ✓ $f''(x) > 0$ ✓ $x > \frac{1}{3}$ (4) [14]

QUESTION/VRAAG 9

9.1	$f'(x) = 3x^2 - 8x - 3 = 0$ $(3x+1)(x-3) = 0$ $x = -\frac{1}{3}$ or $x = 3$ $y = \frac{500}{27}$ (or $y = 18\frac{14}{27}$ or 18,52) $y = 0$ Turning points are/Draaipunte is $\left(-\frac{1}{3}; \frac{500}{27}\right)$ and $(3; 0)$	✓ derivative/afgeleide ✓ derivative/afgeleide = 0 ✓ factors/faktore ✓ x-values/waardes ✓✓ each y-values/elke y-waarde (6)
9.2		✓ x-intercepts/afsnitte ✓ y-intercept/afsnit ✓ turning points/draaipunte ✓ shape/vorm (4)
9.3	$x < -\frac{1}{3}$ or $0 < x < 3$ OR $(-\infty; -\frac{1}{3}) \cup (0; 3)$	✓ $x < -\frac{1}{3}$ ✓ both critical points/beide kritieke-punte ✓ notation/notasie (3)

QUESTION/VRAAG 10

10.1	$l + 2h = 40$ $l = 40 - 2h$	✓ answer (1)
10.2	$2b + 2h = 100$ $b = 50 - h$ $V = lbh$ $V = h(40 - 2h)(50 - h)$	✓ $2b + 2h = 100$ ✓ $b = 50 - h$ ✓ volume formula (3)
10.3	$V = (50h - h^2)(40 - 2h)$ $V = 2h^3 - 140h^2 + 2000h$ $V' = 6h^2 - 280h + 2000 = 0$ $h = \frac{280 \pm \sqrt{(-280)^2 - 4(6)(2000)}}{2(6)}$ $h \neq 37,86$ or $h = 8,80$ $\therefore$ for a box as large as possible, $h = 8,80$ cm <i>vir die grootste moontlike boks = 8,80 cm</i>	✓ simplifying/vereenvoudig ✓ derivative / afgeleide ✓✓ h -values in any form / h -waardes in enige vorm ✓ answer/antwoord (5) [9]

QUESTION/VRAAG 11

11.1.1	$P(\text{male/manlik}) = \frac{83}{180}$ or 0,46 or 46,11%	✓ answer/antwoord (1)
11.1.2	$P(\text{not game park/nie wildreservaat})$ $= 1 - P(\text{game park/wildreservaat})$ $= 1 - \frac{62}{180}$ $= \frac{59}{90}$ or 0,66 or 65,56% OR/OF $P(\text{not game park/nie wildreservaat})$ $= \frac{98}{180} + \frac{20}{180}$ $= \frac{118}{180}$ $= \frac{59}{90}$ or 0,66 or 65,56%	✓ $1 - \frac{62}{180}$ ✓ answer/antwoord (2) ✓ $\frac{98}{180} + \frac{20}{180}$ ✓ answer/antwoord (2)

11.2	Events are independent if /<i>Gebeure is onafhanklike indien</i> $P(\text{male}) \times P(\text{home}) = P(\text{male and home})$ $P(\text{manlik}) \times P(\text{huis}) = P(\text{manlik en huis})$ $P(\text{male/manlik}) = \frac{83}{180}$ and/en $P(\text{home/huis}) = \frac{20}{180}$ or 0,11 or 11,11% $P(\text{male/manlik}) \times P(\text{home/huis})$ $= \frac{83}{180} \times \frac{20}{180}$ $= \frac{83}{1620}$ $= 0,05123$ or 5,12% $P(\text{male and home/manlik en huis})$ $= \frac{13}{180}$ $= 0,07222\dots$ or 7,22% Therefore $P(\text{male}) \times P(\text{home}) \neq P(\text{male and home})$ Dus $P(\text{manlik}) \times P(\text{huis}) \neq P(\text{manlik en huis})$ Thus the events are not independent./<i>Dus is die gebeure nie onafhanklik nie</i> OR/OF <table><tr><td></td><td>Home/Huis</td><td>Not Home/ Nie huis</td><td></td></tr><tr><td>M</td><td>13</td><td>70</td><td>83</td></tr><tr><td>F</td><td>7</td><td>90</td><td>97</td></tr><tr><td></td><td>20</td><td>160</td><td>180</td></tr></table> $P(\text{female/vroulik}) \times P(\text{not home/nie huis})$ $= \frac{97}{180} \times \frac{160}{180}$ $= \frac{194}{405}$ $= 0,479012345\dots$ or 47,90% $P(\text{female and not home/vroulik en nie-huis})$ $= \frac{90}{180}$ $= 0,5$ or 50% Therefore $P(\text{female}) \times P(\text{not home}) \neq P(\text{female and not home})$ Thus the events are not independent. Dus $P(\text{vroulik}) \times P(\text{nie-huis}) \neq P(\text{vroulik en nie-huis})$ Dus is die gebeure nie onafhanklik nie.		Home/Huis	Not Home/ Nie huis		M	13	70	83	F	7	90	97		20	160	180	✓$P(m) \times P(h)$ and their values/en hulle waardes ✓answer of product ✓$P(m \text{ and/en } h)$ value/waarde ✓conclusion/afleiding (4) ✓$P(f) \times P(\text{not } h)$ and their values/en hulle waardes ✓answer of product ✓$P(f \text{ and/en not } h)$ value/waarde ✓conclusion/afleiding (4)
	Home/Huis	Not Home/ Nie huis																
M	13	70	83															
F	7	90	97															
	20	160	180															

[7]

