LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION



VHEMBE EAST DISTRICT

NATIONAL
SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P1
MEMORANDUM
JUNE 2022

MARKS: 100

TIME: 2 hours

NOTE:

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking memorandum.
- Assuming values/answers in order to solve a problem is unacceptable.

QUESTION 1

1.1.1	$x^2 + x - 12 = 0$ $(x + 4)(x - 3) = 0$ $x = -4$ or $x = 3$	✓ factors ✓ answer ✓ answer (3)
1.1.2	$\sqrt{2x + 1} = x - 1$ $2x + 1 = (x - 1)^2$ $2x + 1 = x^2 - 2x + 1$ $x^2 - 4x = 0$ $x(x - 4) = 0$ $x = 0$ or $x = 4$ n/a	✓ squaring both sides ✓ standard form ✓ factors ✓ answer ✓ $x = 4$ (correct selection) (5)
1.1.3	$2^{x\sqrt{x}} = 2^{27}$ $2^{x^{\frac{3}{2}}} = 2^{27}$ $x^{\frac{3}{2}} = 27$ $x = 27^{\frac{2}{3}}$ $x = 9$	✓ $2x^{\frac{3}{2}}$ ✓ $x^{\frac{3}{2}} = 27$ ✓ Raise both sides to $\frac{2}{3}$ ✓ Answer (4)
1.1.4	$x^2 - 2x - 8 \leq 0$ $(x - 4)(x + 2) < 0$ $-2 < x < 4$ OR/OF $x \in (-2; 4)$	✓ $(x - 4)(x + 2) < 0$ ✓ Critical values ✓ Inequalities (3)

1.2.1	$5x^2 + 6x - 7 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-6 \pm \sqrt{6^2 - 4(5)(-7)}}{2(5)}$ = 0, 73 or - 1, 93	✓ Formula ✓ Substitution ✓ Answers ✓ (4)

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1.2.2	$5x^2 + 6x - d = 0$ $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ $x = \frac{-6 \pm \sqrt{6^2-4(5)(-d)}}{2(5)}$ $36 + 20d = 0$ $d = -\frac{9}{5}$ **OR** for equal roots: $\Delta = 0$ $\Delta = b^2 - 4ac$ $= (6)^2 - 4(5)(-d)$ $36 + 20d = 0$ $d = -\frac{9}{5}$ **OR** $5x^2 + 6x - d = 0$ $x^2 + \frac{6x}{5} = \frac{d}{5}$ $(x + \frac{3}{5})^2 = \frac{d}{5} + \frac{9}{25}$ $= \frac{5d+9}{25}$ For equal roots $\frac{5d+9}{25} = 0$ $\therefore = \frac{-9}{5}$	✓ Substitution ✓ $36 + 20d = 0$ ✓ Answer (3) ✓ Substitution ✓ $36 + 20d = 0$ ✓ answer (3) ✓ completing the square ✓ $5d + 9 = 0$ ✓ Answer (3) 

1.3	$x = 2y - 3$ ….(1) $xy = 20$ ….(2) Substitute (1) into (2): $(2y - 3)y = 20$ $2y^2 - 3y - 20 = 0$ $(2y + 5)(y - 4) = 0$ $y = -\frac{5}{2}$ or $y = 4$ $x = -8$ or $x = 5$ **OR** $x + 3 = 2y$ $y = \frac{x+3}{2}$ .....(1) $xy = 20$ .....(2) Substitute (1) into (2) : $x\left(\frac{x+3}{2}\right) = 20$ $x^2 + 3x = 40$ $x^2 + 3x - 40 = 0$ $(x + 8)(x - 5) = 0$ $x = -8$ or $x = 5$ $y = -\frac{5}{2}$ or $y = 4$ **OR** $x - 2y = -3$ ..... (1) $y = \frac{20}{x}$ ..... (2) Substitute (2) into (1) : $x - 2(\frac{20}{x})$ = -3 $x^2 - 40 = -3x$ $x^2 + 3x - 40 = 0$ $(x + 8)(x - 5) = 0$ $x = -8$ or $x = 5$ $y = -\frac{5}{2}$ or $y = 4$ **OR**	✓ Making x the subject ✓ Substitution ✓ Standard form ✓ Factors ✓ $y-$ values ✓ $x-$ values (6) ✓ Making y the subject ✓ Subst ✓ Standard form ✓ Factors ✓ $x-$ values ✓ $y-$ values (6) ✓ Making y the subject ✓ Substitution ✓ Standard form ✓ Factors ✓ $x-$ values ✓ $y-$ values (6)

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	$x - 2y = -3$ .....(1) $x = \frac{20}{y}$ .....(2) Substitute (2) into (1): $\frac{20}{y} - 2y = -3$ $20 - 2y^2 = -3y$ $0 = 2y^2 - 3y - 20$ $0 = (2y + 5)(y - 4)$ $y = -\frac{5}{2}$ or $y = 4$ $x = -8$ or $x = 5$	✓ Making x the subject ✓ Subst ✓ Standard form ✓ Factors ✓ y values ✓ x values (6) **[28]**

QUESTION 2

2.1.1	$4 - 8P = 0$ $-8P = -4$ $P = \frac{1}{2}$	✓ $4 - 8P = 0$ ✓ Answer (2)
2.1.2	$4 - 8p < 0$ $p > \frac{1}{2}$	✓ $4 - 8p < 0$ ✓ Answer (2)
2.2.1	$\sqrt{5 - x} = x + 1$ $5 - x \geq 0$ and $x + 1 \geq 0$ $x \leq 5$ and $x \geq -1$ Hence $-1 \leq x \leq 5$	✓ $5 - x \geq 0$ ✓ $x + 1 \geq 0$ ✓ And (3)
2.2.2	$5 - x = x^2 + 2x + 1$ $x^2 + 3x - 4 = 0$ $(x + 4)(x - 1) = 0$ $x = -4$ or $x = 1$ Since $-1 \leq x \leq 5$, $x = 1$ only	✓ Square both sides ✓ Standard form ✓ Factors ✓ Answers ✓ Selection of 1 (5)
2.2.3	$x = -4$	✓ Answer (1) **[13]**

QUESTION 3

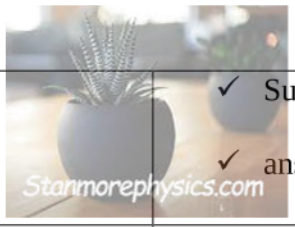
3.1.1	19 ; 24	✓ 19 ✓ 24 (2)
3.1.2	$T_n = 5n - 1$	✓ $5n - 1$ (2)
3.1.3	$T_n = 1099$ $5n - 1 = 1099$ $5n = 1100$ $n = 220$ $\therefore T_{220} = 1099$ $\therefore$ it is in the sequence	✓ Equating ✓ Simplification $5n = 1100$ ✓ Answer (3)
3.2.1	30 ; 46	✓ 30 ✓ 46 (2)
3.2.2	$T_n = an^2 + bn + c$ $2a = 4$ $\therefore a = 2$ $3a + b = 4$ $\therefore 3(2) + b = 4$ $\therefore b = -2$ $a + b + c = 6$ $2 - 2 + c = 6$ $c = 6$ $\therefore T_n = 2n^2 - 2n + 6$	✓ Second difference = 4 ✓ $a = 2$ ✓ $b = -2$ ✓ $c = 6$ (4)
3.2.3	$T_{12} = 2(12)^2 - 2(12) + 6$ $= 270$	✓ Correct substitution in T_n ✓ Answer (2)
3.2.4	$T_n = 766$ $2n^2 - 2n + 6 = 766$ $2n^2 - 2n + 760 = 0$ $n^2 - n - 380 = 0$ $(n - 20)(n + 19) = 0$ $n = 20$ $\therefore$ it is term number 20	✓ Equating ✓ Standard form = 0 ✓ Factors ✓ n = 20 (4)
3.3	T_1 ; T_2 ; T_3 ; T_4 k ; 14 ; 24 ; $7k$ $-4 + k = 7k - 24$ $6k = 30$ $K = 5$	✓ First difference ✓ Second differences ✓ Equating ✓ $6k$ = 30 ✓ Answer (5) **[24]**

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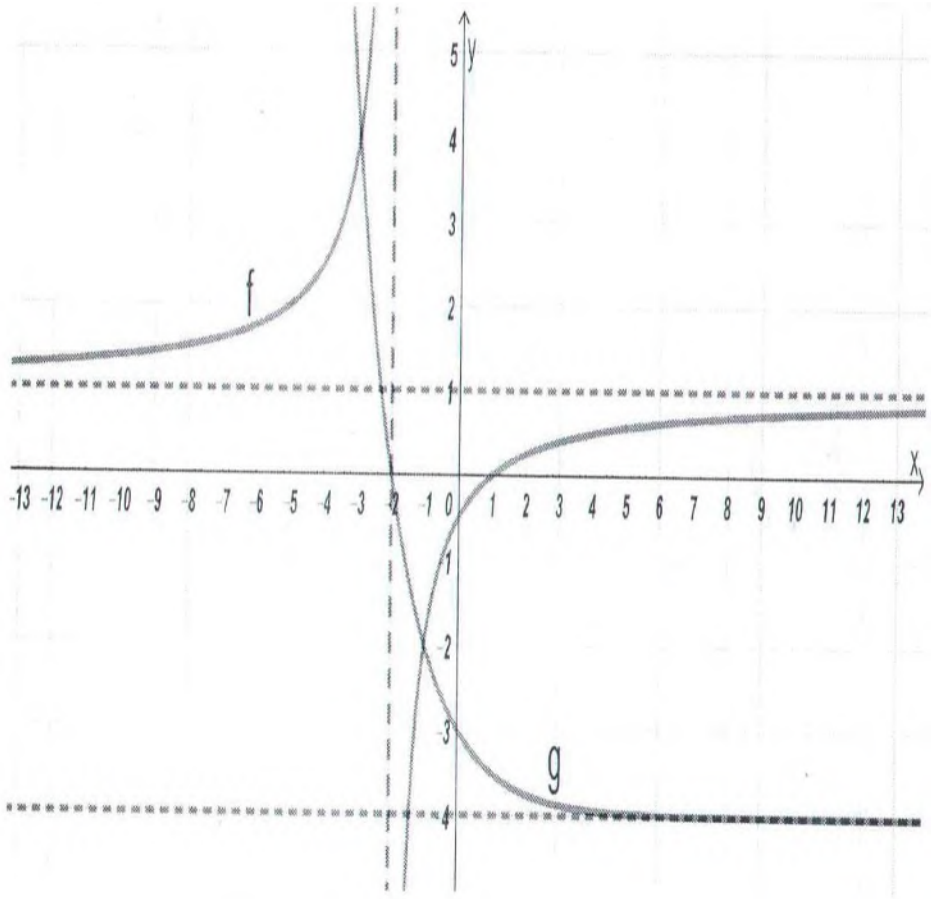
QUESTION 4

4.1	$y = a(x - x_1)(x - x_2)$ $y = a(x - (-2))(x - 4)$ $y = a(x + 2)(x - 4)$ Substituting (0 ; -16), we have : $-16 = a(0 + 2)(0 - 4)$ $-16 = -8a$ $2 = a$ Substituting 2 for a : $y = 2(x + 2)(x - 4)$ $y = 2(x^2 - 2x - 8)$ $y = 2x^2 - 4x - 16$ $\therefore a = 2, \quad b = -4, \quad c = -16$	✓ Substitution ✓ Value of *a* ✓ Substitution & simplification ✓ Value of *b* ✓ Value of *c* (5)
4.2	The points (-2 ; 0)(0 ; -8) lie on g $m = \frac{y_2 - y_1}{x_2 - x_1}$ $m = \frac{-8 - 0}{0 - (-2)}$ $= -4$ $\therefore y = -4x + c$ Substituting (0 ; -8) , we have : $-8 = -4(0) + c$ $\therefore -8 = c$ $\therefore g(x) = -4x - 8$	✓ Substitution ✓ Gradient ✓ Value of c ✓ Equation of g (4)
4.3	At A, $2x^2 - 4x - 16 = -4x - 8$ $2x^2 - 8 = 0$ $x^2 - 4 = 0$ $(x - 2)(x + 2) = 0$ $x = 2 \quad or \quad x = -2$ $y = 4(2) - 8$ $\quad y = -4(-2) - 8$ $y = -8 - 8$ or $y = 8 - 8$ $y = -16$ or $y = 0$ $\therefore y = -16$ $\therefore A$ (2 ; -16)	✓ Equating equations ✓ Factorization ✓ Values of *x* ✓ Substitution ✓ *y* value ✓ Coordinate of A (6) **[15]**

QUESTION 5



5.1	$f(-3) = \frac{-3}{-3+2} + 1$ $= 4$	✓ Substitution ✓ answer (2)
5.2	$4 = 2^{-x} - 4$ $8 = 2^{-x}$ $2^3 = 2^{-x}$ $\therefore x = -3$	✓ Substitution ✓ Raise to exponent ✓ x – value (3)
5.3	$x = -2$ $y = 1$	✓ x values & ✓ y value (2)
5.4	$y \geq -4$	✓ Answer (1)
5.5	$f(x) = \frac{-3}{x+2} + 1$ $0 = \frac{-3}{x+2} + 1$ $-1 = \frac{-3}{x+2}$ $-1(x+2) = -3$ $-x - 2 = -3$ $x = 1$ $y = \frac{-3}{0+2} + 1$ $y = -\frac{1}{2}$	✓ Substitution ✓ (1 ; 0) Multiplication ✓ $x-$ value ✓ $(0 ; -\frac{1}{2})$ or $y-$ value (4)

5.6\		✓ Asymptotes ✓ ✓ Correct ✓  (4)
5.7	$x \leq -3$ or $-2 \leq x \leq -1$	✓ $-2 \leq x \leq -1$ ✓ ✓ $x \leq -3$ (3) **[19]**