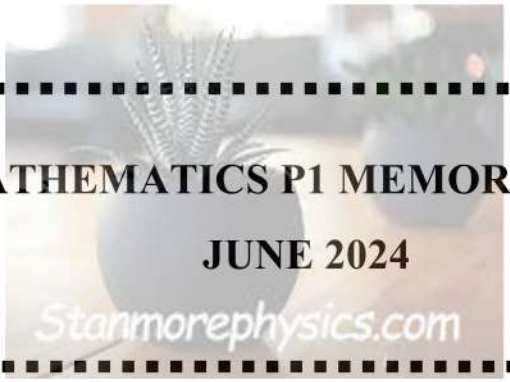
LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE



GRADE 11



MATHEMATICS P1 MEMORANDUM

JUNE 2024

MARKS: **100**

Copyright reserved

QUESTION 1		
1.1.1.	$x^2 + x - 12 = 0$ $(x + 4)(x - 3) = 0$ $x = -4$ or $x = 3$	✓Factors ✓$x = -4$ ✓$x = 3$ (3)
1.1.2.	$\sqrt{x-1} + 3 = x - 4$ $\sqrt{x-1} = x - 7$ $\left(\sqrt{x-1}\right)^2 = (x-7)^2$ $x - 1 = x^2 - 14x + 49$ $x^2 - 15x + 50 = 0$ $(x - 10)(x - 5) = 0$ $x = 10$ or $x = 5$ $\therefore x = 10$	✓Isolating the $\sqrt{\ }$ sign ✓Squaring both sides ✓Standard form ✓Factors ✓$x = 1$ or $x = 5$ ✓$x = 10$ (6)
1.1.3.	$x^2 > 3(x + 6)$ $x^2 - 3x - 18 > 0$ $(x - 6)(x + 3) > 0$ $x = 6$ or $x = -3$ $(critical\ values)$  $x < -3$ or $x > 6$	✓Standard form ✓critical values ✓$x < -3$ or $x \in (-\infty; -3)$ ✓$x > 6$ or $x \in (6; \infty)$ (4)
1.1.4.	$2^{3x+1} + 2^{3x} = 12$ $2^{3x}.2 + 2^{3x} = 12$ $2^{3x}(2 + 1) = 12$ $2^{3x} = 4$ $2^{3x} = 2^2$ $\therefore 3x = 2$ $x = \frac{2}{3}$	✓$2^{3x}.2$ ✓common factors ✓Equating exponents ✓Answer (4)

Stanmorephysics.com

1.2.1.	$0 = 5x^2 + 6x - 7$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-6 \pm \sqrt{(6)^2 - 4(5)(-7)}}{2(5)}$ $= 0{,}73 \quad$ or $\quad -1{,}93$	✓Formula ✓Substitution ✓0,73 ✓$-1{,}93$ (4)
1.2.2.	$5x^2 + 6x - d = 0$ For equal roots: $\Delta = 0$ $\Delta = b^2 - 4ac$ $0 = (6)^2 - 4(5)(-d)$ $36 + 20d = 0$ $d = \frac{-9}{5}$	✓ Substitution ✓$36 + 20d = 0$ ✓ Answer (3)
1.3.	$y + x = 2$ …(1) $x^2 + 3xy + 8 = 0$ …(2) From (1): $y = 2 - x$…(3) Sub (3) into (2): $x^2 + 3x(2 - x) + 8 = 0$ $x^2 + 6x - 3x^2 + 8 = 0$ $-2x^2 + 6x + 8 = 0$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4 \quad$ or $\quad x = -1$ $y = -2 \quad$ or $\quad y = 3$ **OR**	✓Equation (3) ✓Substitution ✓Standard form ✓Factors ✓Both values of x ✓Both values of y (6) **OR**

Stanmorephysics.com

	$y + x = 2$ …(1) $x^2 + 3xy + 8 = 0$ …(2) From (1): $x = 2 - y$…(3) Sub (3) into (2): $(2 - y)^2 + 3y(2 - y) + 8 = 0$ $4 - 4y + y^2 + 6y - 3y^2 + 8 = 0$ $-2y^2 + 2y + 12 = 0$ $y^2 - y - 6 = 0$ $(y - 3)(y + 2) = 0$ $y = 3$ or $y = -2$ $x = 4$ or $x = -1$	✓Equation (3) ✓Substitution ✓Standard form ✓Factors ✓Both values of y ✓Both values of x	(6)
			[30]

Stanmorephysics.com

QUESTION 2

2.1.1

$$\frac{3^{m+4}-6.3^{m+1}}{7.3^{m+2}}$$

$$=\frac{3^m(3^4-6.3^1)}{3^m(7.3^2)}$$

$$=\frac{3^m.63}{3^m.63}$$

$$=1$$

✓Common factor

✓$3^4-6.3^1$

✓Simplification

✓Answer (4)

OR

$$\frac{3^{m+4}-6.3^{m+1}}{7.3^{m+2}}$$

$$=\frac{3^{m+1}(3^3-6.)}{3^{m+1}(7.3^1)}$$

$$=\frac{3^{m+1}.21}{3^{m+1}.21}$$

$$=1$$

✓Common factor

✓$3^3-6.$

✓Simplification

✓Answer (4)

2.1.2.

$$\frac{2^{n+2}.4^{n+1}}{8^{n-1}}$$

$$=\frac{2^{n+2}.2^{2n+2}}{2^{3n-3}}$$

$$=2^{n+2+2n+2-3n+3}$$

$$=2^7$$

$$=128$$

✓Writing prime bases

✓Applying exp law

✓Answer (3)

OR

$$\frac{2^{n+2}.4^{n+1}}{8^{n-1}}$$

$$=\frac{2^n.4^n4^2}{8^n.8^{-1}}$$

$$=\frac{8^n.2^22^2}{8^n.2^{-3}}$$

$$=2^7$$

$$=128$$

✓Writing as separate bases

✓Applying exp law

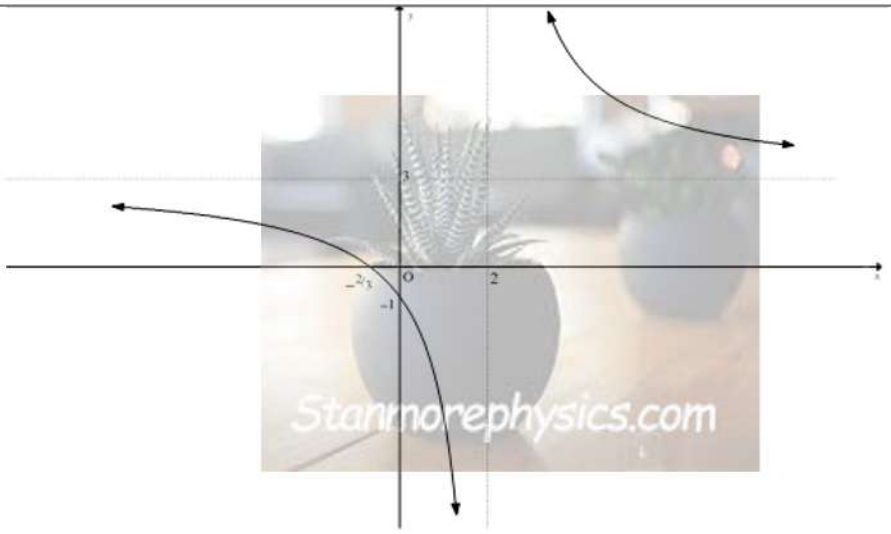
✓Answer (3)

Stanmorephysics.com

2.1.3.	$\sqrt{x+\sqrt{2x-1}}.\sqrt{x-\sqrt{2x-1}}$ $=\sqrt{(x+\sqrt{2x-1})(x-\sqrt{2x-1})}$ $=\sqrt{x^2-2x+1}$ $=\sqrt{(x-1)^2}$ $=x-1$		✓Writing as one surd ✓$\sqrt{x^2-2x+1}$ ✓$\sqrt{(x-1)^2}$ ✓Answer (4)
2.2.	$2^{2021}\times 5^{2024}$ $=2^{2021}\times 5^{2021}\times 5^3$ $=125\times 10^{2021}$ $=125\,000\ldots 0$ ∴ Sum of digits will be $=1+2+5+0+0+0+\cdots 0$ $=8$		✓$2^{2021}\times 5^{2021}\times 5^3$ ✓10^{2021} ✓$125\,000\ldots 0$ ✓Answer (4)
			[15]

Stanmorephysics.com

QUESTION 3		
	$AC(x-2) = x^2 + 2x - 8$ $AC(x-2) = (x+4)(x-2)$ $AC = (x+4)cm$ $\therefore FD = (x+4)cm$ $\therefore ED = (x+4) - (x-2)$ $ED = 6cm$	✓Statement ✓Factors ✓$AC = (x+4)cm$ ✓Method ✓Answer (5)
		[5]

QUESTION 4		
4.1.	$x = 2$ $y = 3$	✓$x = 2$ ✓$y = 3$ (2)
4.2.	$y - intercept$ $y = \frac{8}{0-2} + 3$ $= -1$ $x - intercept$ $0 = \frac{8}{x-2} + 3$ $-3(x-2) = 8$ $-3x + 6 = 8$ $x = \frac{-2}{3}$	✓$y = -1$ OR $(0;-1)$ ✓$0 = \frac{8}{x-2} + 3$ ✓$x = \frac{-2}{3}$ OR $(\frac{-2}{3};0)$ (3)
4.3.		✓Asymptotes ✓Intercept with axes ✓Shape (3)

Stanmorephysics.com

4.4.	$3 = 2 + k$ $k = 1$ **OR** $y = (x - 2) + 3$ $y = x + 1$ $\therefore k = 1$	✓Substitution ✓Answer (2) **OR** ✓$y = x + 1$ ✓Answer (2)
4.5.	$g(x) = \frac{-8}{x-2} - 3$	✓✓Answer (2)
4.6.	$x \epsilon R, x \neq 2$	✓✓Answer (2)
		[14]

QUESTION 5		
5.1.	$q = -6$	✓Answer (1)
5.2.	$-5\frac{1}{4} = a.2^{-1-1} - 6$ $\frac{3}{4} = \frac{1}{4}a$ $a = 3$	✓Substitution of x ✓Substitution of y ✓Simplification ✓Answer (4)
5.3.	x-intercept: $2^{x-1} = 2$ $\therefore x = 2$ $\therefore (2; 0)$ y-intercept: $3.2^{-1} - 6 = -4\frac{1}{2}$ $\therefore (0; -4\frac{1}{2})$ Average gradient $= \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{0+4\frac{1}{2}}{2-0}$ $= \frac{9}{4} \quad OR \quad 2\frac{1}{4}$	✓$2^{x-1} = 2$ ✓$x = 2$ ✓$y = -4\frac{1}{2}$ ✓Sub into the gradient formula ✓Answer (5)
5.4.	$g(x) = 3.2^{x-3} - 6$	✓✓Answer (2)
5.5.	$y > -6$	✓✓Answer (2)
		[14]

Stanmorephysics.com

QUESTION 6		
6.1.	$0 = -x^2 - x + 6$ $x^2 + x - 6 = 0$ $(x+3)(x-2) = 0$ $x = -3$ or $x = 2$ $\therefore B(-3;0)$ *and* $C(2;0)$	✓$y = 0$ ✓Factors ✓$B(-3;0)$ ✓ $C(2;0)$ (4)
6.2.	$x = \frac{-b}{2a}$ $= \frac{-(-1)}{2(-1)}$ $= \frac{-1}{2}$ **OR** $x = \frac{x_2+x_1}{2}$ $= \frac{-3+2}{2}$ $= \frac{-1}{2}$	✓Substitution ✓Answer (2) **OR** ✓Substitution ✓Answer (2)
6.3.	$f\left(\frac{-1}{2}\right) = -\left(\frac{-1}{2}\right)^2 - \left(\frac{-1}{2}\right) + 6$ $= \frac{25}{4}$ $TP(\frac{-1}{2};\frac{25}{4})$ $\therefore Range: y \leq \frac{25}{4}$ **OR** $y \in (-\infty;\frac{25}{4}]$	✓Substitution ✓y-value of T.P ✓Answer (3)
6.4.	$D(0;6)$ $m_{AD} = \frac{y_2-y_1}{x_2-x_1}$ $= \frac{6-4}{0-(-2)}$ $= 1$ $\therefore g(x) = x + 6$	✓Coordinates of D ✓Gradient ✓Answer (3)
6.5.	Average gradient = gradient of g $= 1$	✓Answer (1)

Stanmorephysics.com

6.6.	$f(x) = -(x+\frac{1}{2})^2 + \frac{25}{4}$ $h(x) = (x+\frac{1}{2}-3)^2 - \frac{25}{4}$ $\therefore h(x) = (x-\frac{5}{2})^2 - \frac{25}{4}$ **OR** $f(x) = -x^2 - x + 6$ $h(x) = (x-3)^2 + (x-3) - 6$ $h(x) = x^2 - 5x$ $\therefore h(x) = (x-\frac{5}{2})^2 - \frac{25}{4}$	✓$f(x) = -(x+\frac{1}{2})^2 + \frac{25}{4}$ ✓$(x-\frac{5}{2})^2$ ✓$-\frac{25}{4}$ (3) **OR** ✓$(x-3)^2 + (x-3) - 6$ ✓$(x-\frac{5}{2})^2$ ✓$-\frac{25}{4}$ (3)
6.7.1.	$x < -3 \quad or \quad x > 2$ **OR** $x \in (-\infty; -3)\ or\ x \in (2; \infty)$	✓$x < -3$ ✓$x > 2$ (2)
6.7.2.	$-3 \leq x \leq 0$ **OR** $x \in [-3; 0]$	✓✓Answer (2)
6.8.	$k = \frac{25}{4}$ **OR** $-x^2 - x + 6 = k$ $-x^2 - x + 6 - k = 0$ For equal roots: $\Delta = 0$ $\Delta = b^2 - 4ac$ $0 = (-1)^2 - 4(-1)(6-k)$ $1 + 24 - 4k = 0$ $4k = 25$ $k = \frac{25}{4}$	✓✓$k = \frac{25}{4}$ (2) **OR** ✓✓$k = \frac{25}{4}$ (2)
		[22]
		TOTAL:100

Stanmorephysics.com