GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2023

GRADE 11

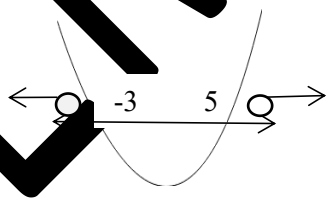
MARKING GUIDELINES

MATHEMATICS (PAPER 1)

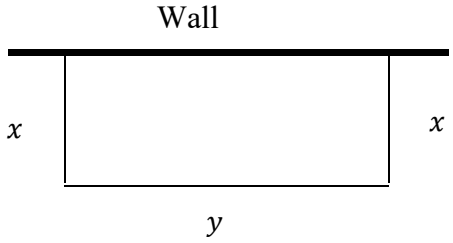
10 pages

QUESTION 1

1.1	1.1.1	$x \in \{4\ ;\ 5\}$	✓ answer ✓ answer	(2)
	1.1.2	$x \in \{0\ ;\ 3\}$	✓ answer ✓ answer	(2)
	1.1.3	$x \in \{1\ ;\ 2\}$	✓ answer ✓ answer	(2)
1.2	1.2.1	$3x^2 - 4x = 0$ $\therefore x(3x-4) = 0$ $x = 0 \cdots \textbf{or} \cdots x = \frac{4}{3}$ **NOTE**: Any other valid method.	✓ factors ✓ answers	(3)
	1.2.2	$3x - 14 = -6x^2$ $\therefore 6x^2 + 3x - 14 = 0$ $\therefore x = \frac{-(3) \pm \sqrt{(3)^2 - 4(6)(-1}}{2(6)}$ $\therefore x = 1{,}29$ ***or*** $x =$	✓ standard form ✓ substitution ✓✓ answers	(4)
	1.2.3	$(x+1)(x$ $) > 12$ $x^2 - 2x -$ > 12 $x^2 -$ $- 15 >$ $(x-5)($ $+3) > 0$ $\therefore x >$ $\cdots x <$	✓ standard form ✓ factors ✓✓ answers	(4)
	1.2.4	$\sqrt{2-x} + 2 =$ $\sqrt{2-x} = x - 2$ $(\sqrt{2-x})^2 = (x-2)^2$ $2 - x = x^2 - 4x + 4$ $0 = x^2 - 3x + 2$ $0 = (x-2)(x-1)$ $\therefore x = 2$ ... ***or*** ... $x = 1 (NA)$	✓ squaring both sides ✓ standard form ✓ factors ✓ answers with rejection	(4)

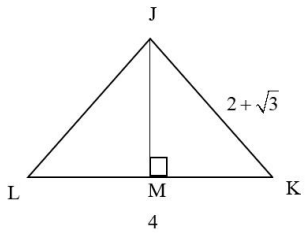


	1.2.5	$x-6=0$ $\therefore x=6$ $\because x=2y+3$ $6=2y+3$ $2y=3$ $\therefore y=\frac{3}{2}$	✓ value of x ✓ substitution ✓ value of y	(3)
1.3		$y-1=2x$ $\therefore y=2x+1$ ……(1) $x^2+xy-3x-y+2=0$ ……(2) $\therefore x^2+x(2x+1)-3x-(2x+1)+2=0$ $x^2+2x^2+x-3x-2x-1+2=0$ $\therefore 3x^2-4x+1=0$ $(3x-1)(x-1)=0$ $\therefore x=\frac{1}{3}$ ... ***or*** ... $x=1$ $\therefore y=\frac{5}{3}$ ... ***or*** ... $y=3$	✓ expression for y ✓ substitution ✓ standard form ✓ x-values ✓ y-values	(5)
1.4		$x^2-px-p^2=2$ $\therefore x^2-px-p^2-2=0$ $\Delta=b^2-4ac$ $\Delta=(-p)^2-4(1)(-p^2-2)$ $\Delta=p^2+4p^2+8$ $\Delta=5p^2+8$ $\therefore p^2\geq 0\cdots\cdots p\in\Re$ $\therefore 5p^2\geq 0\cdots\cdots p\in\Re$ $\therefore 5p^2+8>0\cdots\cdots p\in\Re$ $\therefore$ roots are real and unequal.	✓ substitute into Δ ✓ $\Delta=5p^2+8$ ✓ $p^2\geq 0$, $5p^2\geq 0$ and $5p^2+8>0$	(3)

1.5	The 100 m fencing will make up three sides because the existing wall will make one side.  $fencing = 2x + y = 100$ $\therefore y = -2x + 100$ $\because A = xy$ $A = x(-2x + 100)$ $A = -2x^2 + 100x$ $A = -2(x^2 - 50x)$ $\therefore A = -2(x^2 - 50x - 625 - 625)$ $A = -2(x - 25)^2 - 625)$ Maximum area: $x = 25$ $A = -2(25)^2 + 100(25)$ $\therefore A = 1\,250$ $\because 1\,250 = 25y$ $\therefore y = 50$	✓ expression for y ✓ expression for A ✓ complete square ✓ value of x ✓ value of A ✓ value of y	(7)
			[39]

QUESTION 2

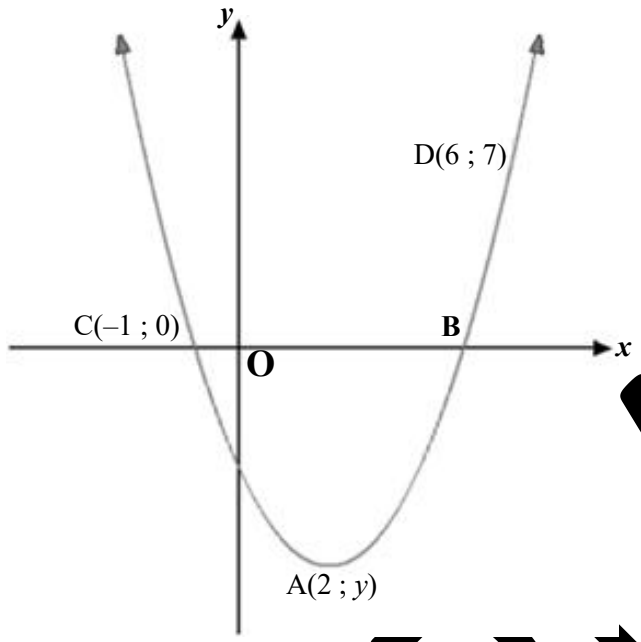
2.1	2.1.1	$\frac{3^{n+2}.9^{n+1}}{27^{n-1}}$ $\frac{3^{n+2}.3^{2n+2}}{3^{3n-3}}$ $\frac{3^{3n+4}}{3^{3n-3}}$ $3^{3n+4-3n+3}$ 3^7	✓ 3^{2n+2} and 3^{3n-3} ✓ $3^{3n+4-3n+3}$ ✓ answer	(3)
	2.1.2	$\frac{x^2}{1+x}$ $=\frac{(1+\sqrt{3})^2}{1+1+\sqrt{3}}$ $=\frac{1+2\sqrt{3}+3}{2+\sqrt{3}}$ $=\frac{4+2\sqrt{3}}{2+\sqrt{3}}$ $=\frac{2(2+\sqrt{3})^2}{2+\sqrt{3}}$ $=2$	✓ substitution ✓ simplification ✓ factorisation ✓ answer	(4)
	2.1.3	$\frac{\sqrt{(a^2-b^2)} \times (a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$ $=\frac{\sqrt{(a-b)(a+b)} \times (a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$ $=\frac{(a-b)^{\frac{1}{2}}(a+b)^{\frac{1}{2}} \times (a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$ $(a+b)^{\frac{1}{2}} \times (a+b)^{\frac{5}{2}}$ $(a+b)^3$ $a^3+3a^2b+3ab^2+b^3$	✓ factorisation ✓ simplification ✓ simplification ✓ answer	(4)

2.2	*RTP*: $\frac{2}{1+\sqrt{2}} - \frac{8}{\sqrt{8}} = -2$ $\frac{2}{1+\sqrt{2}} - \frac{8}{\sqrt{8}}$ $= \frac{2}{1+\sqrt{2}} - \frac{8}{2\sqrt{2}}$ $= \frac{2(2\sqrt{2}) - 8(1+\sqrt{2})}{2\sqrt{2}(1+\sqrt{2})}$ $= \frac{4\sqrt{2} - 8 - 8\sqrt{2}}{2\sqrt{2} + 2\sqrt{4}}$ $= \frac{4\sqrt{2} - 8 - 8\sqrt{2}}{2\sqrt{2} + 4}$ $= \frac{-4\sqrt{2} - 8}{2\sqrt{2} + 4}$ $= \frac{-4\sqrt{2} + 2}{2\sqrt{2} + 2}$ $= -2$	✓ $2\sqrt{2}$ ✓ $2\sqrt{2}(1+\sqrt{2})$ ✓ simplification ✓ factorisation	(4)
2.3	 $MK = LM = 2$ $JM^2 = (2+\sqrt{3})^2 - 2^2$ pythag $JM^2 = 4 + 4\sqrt{3} + 3 - 4$ $JM^2 = 4\sqrt{3} + 3$ $JM = \sqrt{4\sqrt{3}+3}$ $A = \frac{1}{2}(4)\sqrt{4\sqrt{3}+3}$ $A = 6{,}3\ units^2$	✓ MK= 2 ✓ substitution ✓ simplification ✓ JM ✓ substitution into area formula ✓ answer	(6)
			[21]

QUESTION 3

3.1		$T_2 - T_1 = T_3 - T_2$ $4x + 5 - x = 10x - 5 - (4x + 5)$ $3x + 5 = 10x - 5 - 4x - 5$ $3x + 5 = 6x - 10$ $\therefore 3x = 15$ $\therefore x = 5$	✓ method ✓ answer	(2)
3.2	3.2.1	$-3n + 20 = -106$ $3n = 126$ $\therefore n = 42$	✓ equating ✓ answer	(2)
	3.2.2	$-3n + 20 < 0$ $20 < 3n$ $\therefore \frac{20}{3} < n$ $\therefore n = 7$	✓ $-3n + 20 < 0$ ✓ answer	(2)
	3.2.3	Odd valued terms: 17; 11; 5; …….. General term: $T_n = -6n + 23$ $T_n = -6(20) + 23$ $\therefore T_n = -97$	✓ sequence ✓ T_n ✓ answer	(3)
3.3		3; a; 10; b; 21 $a - 3$; $10 - a$; $b - 10$; $21 - b$ 2nd difference 2nd differences: $10 - a - a + 3 = 1$ $-2a + 13 = 1$ $-2a = -12$ $\therefore a = 6$ and $21 - b - b + 10 = 1$ $-2b + 31 = 1$ $-2b = -30$ $\therefore b = 15$	✓ 1st differences ✓ equating 2nd difference in terms of a, then b. ✓ value of a ✓ value of b	(4)
				[13]

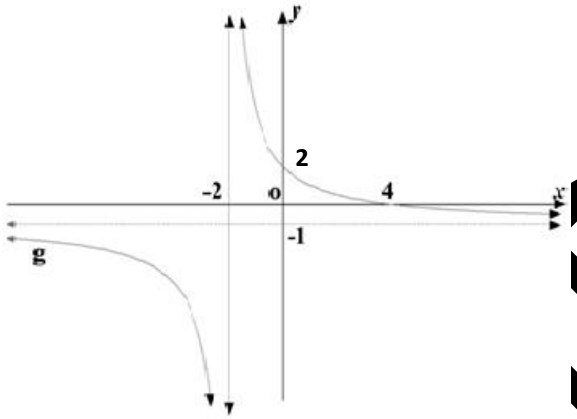
QUESTION 4



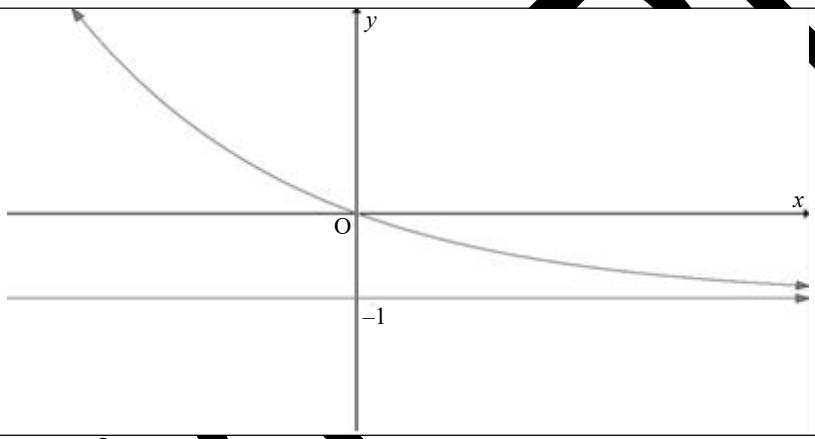
4.1	B(5; 0) **NOTE**: Must be in coordinate form.	✓✓ answer	(2)
4.2	$y = a(x-x_1)(x-x_2)$ $\therefore 7 = a(6-(-1))(6-5)$ $7 = 7a$ $\therefore a = 1$ $\therefore y = 1(x+1)(x-5)$ $y = x^2 - 5x + x - 5$ $y = x^2 - 4x - 5$	✓ substitute roots and point D(6;7) ✓ value for a ✓ $y = x^2 - 5x + x - 5$	(3)
4.3	B(5 ; 0) C(0 ; –5) $m_{BC} = \frac{-5-0}{0-5}$ $m_{BC} = \frac{-5}{-5}$ $\therefore m_{BC} = 1$ $\therefore m_h = -1$ $\therefore y - y_1 = m(x-x_1)$ $y-(-1) = -1(x-0) \cdots\cdots pt(-1;0)$ $\therefore y = -x - 1$	✓ m_{BC} ✓ m_h ✓ answer	(3)

4.4	$-1 \le x \le 0$ $x \ge 5$ **OR** $x \in [-1\ ;\ 0]$ **or** $[5\ ;\ \infty]$ **NOTE**: Deduct 1 mark if brackets are incorrect in the alternative solution.	✓ all critical values (independent) ✓ answers ✓ all critical values (independent) ✓ answers	(2)
			[10]

QUESTION 5

5.1	 **NOTE**: If the candidate calculates the intercepts and lists the asymptotes but does not sketch the graph, award 2 marks.	✓ asymptotes ✓ intercepts ✓ shape	(3)
5.2	tan 135° = –1 $y - y_1 = m(x - x_1)$ $y - (-1) = -1(x - 2)$ $y + 1 = -x - 2$ $y = -x - 3$	✓ $m = -1$ ✓ subs. point (2;–1) ✓ answer	(3)
5.3	$x < -2$	✓ answer	(1)
5.4	5.4.1 5 units right **NOTE**: Accept an answer of 5 units.	✓ answer	(1)
	5.4.2 3 units up **NOTE**: Accept an answer of 3 units.	✓ answer	(1)
			[9]

QUESTION 6

6.1	6.1.1	$y = -6$	✓ answer	(1)
	6.1.2	$h(x) = 3.2^x - 6$ $0 = 3.2^x - 6$ $6 = 3.2^x$ $2 = 2^x$ $x = 1$	✓ equate to 0 ✓ answer	(2)
	6.1.3	$h(x) = 3.2^x - 6$ $y = 3.2° - 6$ $y = -3$	✓ answer	(1)
	6.1.4	$x > 1$	✓ answer	(1)
6.2			✓ x-intercept ✓ asymptote ✓ shape	(3)
				[8]
			TOTAL:	**100**