GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

JUNIE 2018

GRADE 11

MATHEMATICS
PAPER 1

MEMORANDUM

8 pages

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

MATHEMATICS
(Paper 1)

MEMORANDUM

INFORMATION

A – Accuracy

C.A. – Continued Accuracy

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. Stop marking at the second calculation error.
- Consistent accurancy applies to **ALL** aspects of the marking memorandum.
- Assuming values / answers in order to solve a problem is **UNACCEPTABLE**.

QUESTION 1				
1.1	1.1.1	$x \geq 3$	✓ answer	(1)
	1.1.2	$x \neq 3;\ x \in R$	✓ answer	(1)
			✓	
1.2	$x \in \left(\frac{1}{3}\ ;1\right)$		✓ $\frac{1}{3}$ ✓ 1	(2)
1.3	1.3.1	$(x+1)\left(x-\frac{1}{2}\right)=0$ $x=-1$ of $x=\frac{1}{2}$	✓ $x=-1$ ✓ $x=\frac{1}{2}$	(2)
	1.3.2	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(1)\pm\sqrt{(1)^2-4(1)(-1)}}{2(1)}$ $x=\frac{-1\pm\sqrt{5}}{2}$ $x=0{,}62$ of $x=-1{,}62$	✓ Substitution ✓ $x=0{,}62$ ✓ $x=-1{,}62$ ✓ Correct rounding off	(4)

	1.3.3	$x^2 - 2x + 1 \leq 0$ $\therefore (x-1)(x-1) \leq 0$ $\therefore (x-1)^2 \leq 0$ $\therefore x = 1$	✓ factors ✓ answer	(2)
	1.3.4	$x + 3\sqrt{x-1} = 1$ $3\sqrt{x-1} = 1 - x$ $(3\sqrt{x-1})^2 = (1-x)^2$ $9(x-1) = 1 - 2x + x^2$ $x^2 - 11x + 10 = 0$ $(x-10)(x-1) = 0$ $x \neq 10$ of $x = 1$	✓ squaring ✓ standard form ✓ factors ✓ critical values ✓ choosing $x = 1$	(5)
	1.3.5	$3^x + 3^x + 3^x = 3^4$ $3^x(1+1+1) = 3^4$ $3^x(3) = 3^4$ $\frac{3^x(3)}{3} = \frac{3^4}{3}$ $3^x = 3^{4-1}$ $3^x = 3^3$ $x = 3$	✓ factors ✓ simplification $3^x = 3^{4-1}$ ✓ answer	(3)
1.2	$2y - x = 6$ $-x = -2y + 6$ $x = 2y - 6$ $(2y-6)^2 + 2y(2y-6) = 3y^2$ $4y^2 - 24y + 36 + 4y^2 - 12y = 3y^2$ $5y^2 - 36y + 36 = 0$ $(5y-6)(y-6) = 0$ $y = \frac{6}{5}$ of $y = 6$ $x = 2\left(\frac{6}{5}\right) - 6$ of $x = 2(6) - 6$ $x = -\frac{18}{5}$ of $x = 6$		✓ x as subject ✓ sub. x into equation 2 ✓ standard form ✓ factors ✓ both y-values ✓ both x-values	(6)
				[26]

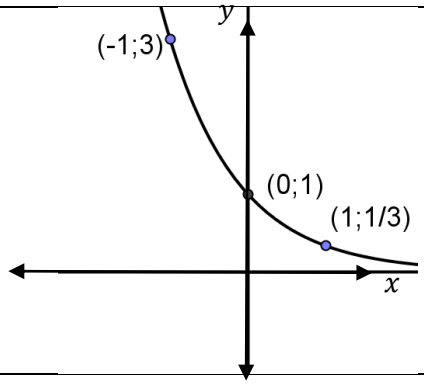
QUESTION 2

2.1		$3\sqrt{12}-\sqrt{75}$ $=3\sqrt{3\times 4}-\sqrt{3\times 25}$ $=6\sqrt{3}-5\sqrt{3}$ $=\sqrt{3}$	✓ simplification ($6\sqrt{3}$) ✓ simplification ($5\sqrt{3}$) ✓ answer	(3)
2.2	2.2.1	To show: $2^{2010}+2^{2012}=5.2^{2010}$ LHS: $2^{2010}+2^{2010}.2^2$ $=2^{2010}(1+2^2)$ $=2^{2010}(5)$ $=5.2^{2010}$ =RHS	✓ factors ($2^{2010}.2^2$) ✓ factors ($2^{2010}(1+2^2)$)	(2)
	2.2.2	$\frac{2^{2010}+2^{2012}+10}{2^{2009}+1}$ $=\frac{5.2^{2010}+10}{2^{2009}+1}$ $=\frac{5(2^{2010}+2)}{2^{2009}+1}$ $=\frac{5.2(2^{2009}+1)}{2^{2009}+1}$ $=10$	✓ substitution (5.2^{2010}) ✓ factors $5(2^{2010}+2$ ✓ factors $5.2(2^{2009}+1)$ ✓ answer	(4)
2.3	2.3.1	$x^{-1}+y^{-1}$ $=\frac{1}{x}+\frac{1}{y}$ $=\frac{y+x}{xy}$	✓ application $\frac{1}{x}+\frac{1}{y}$ ✓ correct numerator ✓ correct denominator	(3)
	2.3.2	sum of reciprocals $=\frac{1}{x}+\frac{1}{y}$ ∴ sum of reciprocals$=\frac{y+x}{xy}$ ∴ sum of reciprocals$=\frac{10}{20}$ $=\frac{1}{2}$	✓ formula $\frac{y+x}{xy}$ ✓ substitution (10) ✓ substitution (20) ✓ simplified answer	(4)
				[16]

QUESTION 3				
3.1	3.1.1	-27 ; -39	✓ -27 ✓ -39	(2)
	3.1.2	1 -3 -9 -17 \ / \ / \ / -4 -6 -8 \ / \ / -2 -2 $2a =$ second difference $\therefore 2a = -2$ $\therefore a = -1$ $3a + b = -4$ $\therefore 3(-1) + b = -4$ $\therefore b = -1$ $a + b + c = 1$ $\therefore -1 + (-1) + c = 1$ $\therefore c = 3$ $\therefore T_n = -n^2 - n + 3$	✓ method mark for finding the first and the second row differences ✓ $a = -1$ ✓ $b = -1$ ✓ $c = 3$	(4)
	3.1.3	$T_n = -n^2 - n + 3$ $\therefore T_{30} = -(30)^2 - (30) + 3$ $\therefore T_n = -927$	✓ substitution ✓ answer	(2)
	3.1.4	$T_n = -n^2 - n + 3$ and $T_n = -7479$ $\therefore -n^2 - n + 3 = -7479$ $\therefore -n^2 - n + 7482 = 0$ $\therefore n^2 + n - 7482 = 0$ $\therefore (n - 86)(n + 87) = 0$ $\therefore n = 86$ $\therefore\therefore 86th$ term	✓ $T_n = -7479$ ✓ standard form ✓ $n = 86$	(3)

3.2	The pattern that is forming is: 1; 4; 6; 9; 16; 25;..... $T_n = n^2$ where n refers to the nth odd number Which odd number is 1001? Formula for the odd numbers are $T_n = 2n - 1$ (This is a linear pattern with $b = 2$ and $c = -1$ $\therefore 1001 = 2n - 1$ $\therefore 1002 = 2n$ $\therefore n = 501$ $\therefore 1 + 3 + 5 + 7 + \ldots + 1001 = 501^2 = 251001$	✓ $T_n = 2n - 1$ ✓ $1001 = 2n - 1$ ✓ simplification ✓ $n = 501$ ✓ $501^2 = 251001$	(6)
3.3	$5n - 2 \geq 100$ $5n \geq 102$ $n \geq 20{,}4$ $\therefore n = 20$ 20 questions	✓ correct equating ✓ $n \geq 20{,}4$ ✓ $n = 20$	(3)
			[20]

QUESTION 4

4.1	A(0 ; 1)		✓ $x = 0$ ✓ $y = 1$	(2)
4.2	4.2.1	$g(x) = 3^{-x}$ **OR** $g(x) = (\frac{1}{3})^x$	✓✓ $g(x) = 3^{-x}$ **OR** ✓✓ $g(x) = (\frac{1}{3})^x$	(2)
	4.2.2		✓ shape ✓ y- intercept ✓ x-axis asymptote	(3)

4.3	4.3.1	$k(x) = 3^{-x+1} + 2$ $\therefore k(x) = 3^{-(x-1)} + 2$ $\therefore k(x) = (3^{-1})^{x-1} + 2$ $\therefore k(x) = (\frac{1}{3})^{x-1} + 2$ $\therefore$ first reflected in y-axis then moved 1 unit right and 2 units upwards	✓ reflection in y-axis ✓ 1 unit right ✓ 2 units up	(3)
				[10]

QUESTION 5

5.1	$g(x) = -2(x^2 - 2x) + 16$ $\therefore g(x) = -2(x^2 - 2x + 1 - 1) + 16$ $\therefore g(x) = -2[(x-1)^2 - 1] + 16$ $\therefore g(x) = -2(x-1)^2 + 18$ **OR** $x = \frac{-b}{2a} = \frac{-4}{2(-2)} = 1$ $y = \frac{4ac - b^2}{4a} = 18$ $\therefore TP = (1; 18)$ Subst in $y = a(x+p)^2 + q$ $y = -2(x+1)^2 + 18$	✓ calculating +1 ✓ -1 ✓ factorizing $(x-1)^2$ ✓ simplification of $-2[(x-1)^2 - 1] + 16$ **OR** ✓ $x = \frac{-b}{2a} = \frac{-4}{2(-2)} = 1$ ✓ $y = \frac{4ac-b^2}{4a} = 18$ ✓ $\therefore TP = (1; 18)$ ✓ substitution	(4)
5.2	Q(1 ; 18)	✓ $x = 1$ ✓ $y = 18$	(2)
5.3	$-2x^2 + 4x + 16 = 0$ $\therefore x^2 - 2x - 8 = 0$ $\therefore (x-4)(x+2) = 0$ $\therefore x = 4$ of $x = -2$ $\therefore D(-2\,;0)$ and $E(4\,;0)$	✓ standard form ✓ factorisation ✓ $x = 4$ of $x = -2$ ✓$D(-2; 0)$ and $E(4; 0)$	(4)

5.4	Vert: $x = -2$ and Hor: $y = 18$ $\therefore p = 2$ and $q = 18$	✓ $x = -2$ ✓ $y = 18$ ✓ $p = 2$ ✓ $q = 18$	(4)
5.5	$x > 1$ **OR** $x \in (1; \infty)$	✓✓ $x > 1$ **OR** ✓✓ $x \in (1; \infty)$	(2)
5.6	$y \in (-\infty; 18)$	✓✓ $y \in (-\infty; 18)$	(2)
5.7	$x \in (-\infty; \infty), x \neq -2$ **OR** $x \in (-\infty; -2) \cup (-2; \infty)$	✓ $x \in (-\infty; \infty)$ ✓ $x \neq -2$ **OR** ✓ $x \in (-\infty; -2)$ ✓ $(-2; \infty)$	(2)
			[20]

QUESTION 6			
6.1	$f(x) = -2(x-1)^2 + 8$ $\therefore f(x) = -2(x^2 - 2x + 1) + 8$ $\therefore f(x) = -2x^2 + 4x + 6$ $\therefore b = 4$ and $c = 6$	✓ $p = 1$ ✓ $q = 8$ ✓ $-2x^2 + 4x + 6$ ✓ $b = 4$ ✓ $c = 6$	(5)
6.2	$g(x) = -2(x+1)^2 + 11$ **OR** $g(x) = -2(x+2)^2 + 4(x+2) + 6 + 3$ $\therefore g(x) = -2x^2 - 4x + 9$	✓ $a = -2$ ✓ $p = 1$ ✓ $q = 11$ **OR** ✓ $a = -2$ ✓ $b = -4$ ✓ $c = 9$	(3)
			[8]
		TOTAL:	**100**