GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENGSE DEPARTEMENT VAN ONDERWYS

PROVINSIALE EKSAMEN

JUNIE 2018

GRAAD 11

WISKUNDE
VRAESTEL 1

MEMORANDUM

8 bladsye

GAUTENGSE DEPARTEMENT VAN ONDERWYS

PROVINSIALE EKSAMEN

WISKUNDE
(Vraestel 1)

MEMORANDUM

INLIGTING

A – Akkuraatheid

C.A. – Deurlopende Akkuraatheid

NOTA:

- Indien 'n kandidaat 'n vraag **TWEE MAAL** beantwoord het, merk slegs die eerste poging.
- Indien 'n kandidaat 'n antwoord **DOODGETREK** het, maar dit nie oorgedoen het nie, merk die doodgetrekte antwoord.
- Volgehoue akkuraatheid word in **ALLE** aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.
- Om antwoorde / waardes om 'n probleem op te los, te veronderstel, is ONAANVAARBAAR.

VRAAG 1				
1.1	1.1.1	$x \geq 3$	✓ antwoord	(1)
	1.1.2	$x \neq 3;\ x \in R$	✓ antwoord	(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 $x=-1{,}62$	✓ Vervanging ✓ $x=0{,}62$ ✓ $x=-1{,}62$ ✓ Korrekte afronding	(4)

	1.3.3	$x^2 - 2x + 1 \leq 0$ $\therefore (x-1)(x-1) \leq 0$ $\therefore (x-1)^2 \leq 0$ $\therefore x = 1$	✓ faktore ✓ antwoord	(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 $x = 1$	✓ kwadreer albei kante ✓ standaardvorm ✓ faktore ✓ kritiese waardes ✓ kies $x = 1$	(5)
	1.3.5	$3^x + 3^x + 3^x = 3^4$ $3^x(1+1+1) = 3^4$ $3^x(3) = 3^4$ $\frac{3^x(3)}{3} = \frac{3^4}{3}$ $3^x = 3^{4-1}$ $3^x = 3^3$ $x = 3$	✓ faktore ✓ vereenvoudig $3^x = 3^{4-1}$ ✓ antwoord	(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 onderwerp ✓ vervanging ✓ standaardvorm ✓ faktore ✓ beide *y*-waardes ✓ beide *x*-waardes	(6)
				[26]

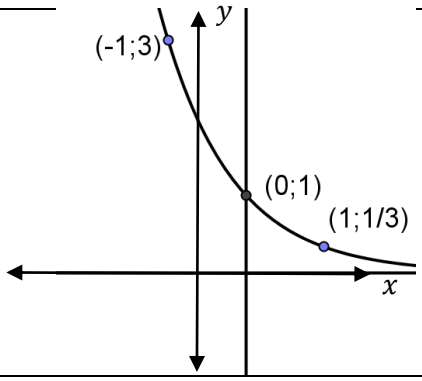
VRAAG 2

2.1	$3\sqrt{12}-\sqrt{75}$ $=3\sqrt{3\times 4}-\sqrt{3\times 25}$ $=6\sqrt{3}-5\sqrt{3}$ $=\sqrt{3}$		✓ vereenvoudig ($6\sqrt{3}$) ✓ vereenvoudig ($5\sqrt{3}$) ✓ antwoord	(3)
2.2	2.2.1	To show: $2^{2010}+2^{2012}=5.2^{2010}$ LK: $2^{2010}+2^{2010}.2^2$ $=2^{2010}(1+2^2)$ $=2^{2010}(5)$ $=5.2^{2010}$ =RK	✓ faktore ($2^{2010}.2^2$) ✓ faktore ($2^{2010}(1+2^2)$)	(2)
	2.2.2	$\frac{2^{2010}+2^{2012}+10}{2^{2009}+1}$ $=\frac{5.2^{2010}+10}{2^{2009}+1}$ $=\frac{5(2^{2010}+2)}{2^{2009}+1}$ $=\frac{5.2(2^{2009}+1)}{2^{2009}+1}$ $=10$	✓ vervanging (5.2^{2010}) ✓ faktore $5(2^{2010}+2$ ✓ faktore $5.2(2^{2009}+1)$ ✓ antwoord	(4)
2.3	2.3.1	$x^{-1}+y^{-1}$ $=\frac{1}{x}+\frac{1}{y}$ $=\frac{y+x}{xy}$	✓ $\frac{1}{x}+\frac{1}{y}$ ✓ noemer ✓ teller	(3)
	2.3.2	Som van omgekeerdes $=\frac{1}{x}+\frac{1}{y}$ ∴ som van omgekeerdes $=\frac{y+x}{xy}$ ∴ som van omgekeerdes $=\frac{10}{20}$ $=\frac{1}{2}$	✓ formule $\frac{y+x}{xy}$ ✓ vervanging (10) ✓ vervanging (20) ✓ vereenvoudigde antwoord	(4)
				[16]

VRAAG 3				
3.1	3.1.1	-27 ; -39	✓ -27 ✓ -39	(2)
	3.1.2	1 -3 -9 -17 \ / \ / \ / -4 -6 -8 \ / \ / -2 -2 $2a =$ tweede verskil $\therefore 2a = -2$ $\therefore a = -1$ $3a + b = -4$ $\therefore 3(-1) + b = -4$ $\therefore b = -1$ $a + b + c = 1$ $\therefore -1 + (-1) + c = 1$ $\therefore c = 3$ $\therefore T_n = -n^2 - n + 3$	✓ metodepunt om die eerste en tweede verskille te vind ✓ $a = -1$ ✓ $b = -1$ ✓ $c = 3$	(4)
	3.1.3	$T_n = -n^2 - n + 3$ $\therefore T_{30} = -(30)^2 - (30) + 3$ $\therefore T_n = -927$	✓ vervanging ✓ antwoord	(2)
	3.1.4	$T_n = -n^2 - n + 3$ en $T_n = -7479$ $\therefore -n^2 - n + 3 = -7479$ $\therefore -n^2 - n + 7482 = 0$ $\therefore n^2 + n - 7482 = 0$ $\therefore (n - 86)(n + 87) = 0$ $\therefore n = 86$ $\therefore\therefore 86ste$ term	✓ $T_n = -7479$ ✓ standaardvorm ✓ $n = 86$	(3)

3.2	Die patroon wat gevorm word: 1; 4; 6; 9; 16; 25;..... $T_n = n^2$ waar n verwys na die n^{de} onewe getal Watter onewe getal is 1001? Formule vir die onewe getalle is $T_n = 2n - 1$ (Hierdie is 'n linêre getalpatroon met $b = 2$ en $c = -1$ $\therefore 1001 = 2n - 1$ $\therefore 1002 = 2n$ $\therefore n = 501$ $\therefore 1 + 3 + 5 + 7 + \ldots\ldots + 1001 = 501^2 = 251001$	✓ $T_n = n^2$ ✓ $T_n = 2n - 1$ ✓ $1001 = 2n - 1$ ✓ vereenvoudig ✓ $n = 501$ ✓ $501^2 = 251001$	(6)
3.3	$5n - 2 \geq 100$ $5n \geq 102$ $n \geq 20{,}4$ $\therefore n = 20$ 20 vrae	✓ $5n - 2 \geq 100$ ✓ $n \geq 20{,}4$ ✓ $n = 20$	(3)
			[20]

VRAAG 4

4.1	A(0 ; 1)		✓ $x = 0$ ✓ $y = 1$	(2)
4.2	4.2.1	$g(x) = 3^{-x}$ **OF** $g(x) = (\frac{1}{3})^x$	✓✓ $g(x) = 3^{-x}$ **OF** ✓✓ $g(x) = (\frac{1}{3})^x$	(2)
	4.2.2		✓ vorm ✓ *y*-afsnit ✓ *x*-as asimptoot	(3)

4.3	4.3.1	$k(x) = 3^{-x+1} + 2$ $\therefore k(x) = 3^{-(x-1)} + 2$ $\therefore k(x) = (3^{-1})^{x-1} + 2$ $\therefore k(x) = (\frac{1}{3})^{x-1} + 2$ $\therefore$ Gereflekteer in die y-as en daarna getransleer 1 eenheid na regs en 2 eenhede opwaarts	✓ refleksie in y-as ✓ 1 eenheid regs ✓ 2 eenhede op	(3)
				[10]

VRAAG 5

5.1	$g(x) = -2(x^2 - 2x) + 16$ $\therefore g(x) = -2(x^2 - 2x + 1 - 1) + 16$ $\therefore g(x) = -2[(x-1)^2 - 1] + 16$ $\therefore g(x) = -2(x-1)^2 + 18$ **OF** $x = \frac{-b}{2a} = \frac{-4}{2(-2)} = 1$ $y = \frac{4ac - b^2}{4a} = 18$ $\therefore TP = (1; 18)$ Verv in $y = a(x+p)^2 + q$ $y = -2(x+1)^2 + 18$	✓ voltooiing van vierkant +1 ✓ -1 ✓ faktoriseer $(x-1)^2$ ✓ vereenvoudiging van $-2[(x-1)^2 - 1] + 16$ **OF** ✓ $x = \frac{-b}{2a} = \frac{-4}{2(-2)} = 1$ ✓ $y = \frac{4ac-b^2}{4a} = 18$ ✓ $\therefore TP = (1; 18)$ ✓ vervanging	(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 $x = -2$ $\therefore D(-2\,;0)$ en $E(4\,;0)$	✓ standaardvorm ✓ faktoriseer ✓ $x = 4$ of $x = -2$ ✓$D(-2; 0)$ en $E(4; 0)$	(4)

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

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