



GAUTENGSE DEPARTEMENT VAN ONDERWYS
PROVINSIALE EKSAMEN
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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 **ONAAANVAARBAAR**.

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	$x^2 - 2x + 1 \leq 0$ $\therefore (x - 1)(x - 1) \leq 0$ $\therefore (x - 1)^2 \leq 0$ $\therefore x = 1$	<ul style="list-style-type: none"> ✓ faktore ✓ antwoord 	(2)
1.3.4	$x + 3\sqrt{x-1} = 1$ $3\sqrt{x-1} = 1 - x$ $(3\sqrt{x-1})^2 = (1-x)^2$ $9(x-1) = 1 - 2x + x^2$ $x^2 - 11x + 10 = 0$ $(x-10)(x-1) = 0$ $x \neq 10 \text{ of } x = 1$	<ul style="list-style-type: none"> ✓ kwadreer albei kante ✓ standaardvorm ✓ faktore ✓ kritiese waardes ✓ kies $x = 1$ 	(5)
1.3.5	$3^x + 3^x + 3^x = 3^4$ $3^x(1 + 1 + 1) = 3^4$ $3^x(3) = 3^4$ $\frac{3^x(3)}{3} = \frac{3^4}{3}$ $3^x = 3^{4-1}$ $3^x = 3^3$ $x = 3$	<ul style="list-style-type: none"> ✓ faktore ✓ vereenvoudig $3^x = 3^{4-1}$ ✓ antwoord 	(3)
1.2	$2y - x = 6$ $-x = -2y + 6$ $x = 2y - 6$ $(2y - 6)^2 + 2y(2y - 6) = 3y^2$ $4y^2 - 24y + 36 + 4y^2 - 12y = 3y^2$ $5y^2 - 36y + 36 = 0$ $(5y - 6)(y - 6) = 0$ $y = \frac{6}{5} \text{ of } y = 6$ $x = 2\left(\frac{6}{5}\right) - 6 \text{ of } x = 2(6) - 6$ $x = -\frac{18}{5} \text{ of } x = 6$	<ul style="list-style-type: none"> ✓ x as onderwerp ✓ vervanging ✓ standaardvorm ✓ faktore ✓ beide y-waardes ✓ beide x-waardes 	(6)
			[26]

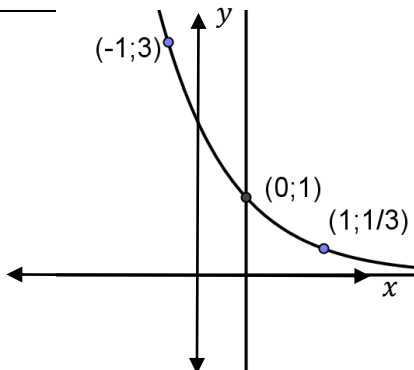
VRAAG 2

2.1	$3\sqrt{12} - \sqrt{75}$ $= 3\sqrt{3 \times 4} - \sqrt{3 \times 25}$ $= 6\sqrt{3} - 5\sqrt{3}$ $= \sqrt{3}$	<ul style="list-style-type: none"> ✓ vereenvoudig ($6\sqrt{3}$) ✓ vereenvoudig ($5\sqrt{3}$) ✓ antwoord 	(3)	
2.2	2.2.1	<p>To show: $2^{2010} + 2^{2012} = 5 \cdot 2^{2010}$</p> <p>LK: $2^{2010} + 2^{2010} \cdot 2^2$</p> $= 2^{2010}(1 + 2^2)$ $= 2^{2010}(5)$ $= 5 \cdot 2^{2010} = \text{RK}$	<ul style="list-style-type: none"> ✓ faktore ($2^{2010} \cdot 2^2$) ✓ faktore ($2^{2010}(1 + 2^2)$) 	(2)
	2.2.2	$\frac{2^{2010} + 2^{2012} + 10}{2^{2009} + 1}$ $= \frac{5 \cdot 2^{2010} + 10}{2^{2009} + 1}$ $= \frac{5(2^{2010} + 2)}{2^{2009} + 1}$ $= \frac{5 \cdot 2(2^{2009} + 1)}{2^{2009} + 1}$ $= 10$	<ul style="list-style-type: none"> ✓ vervanging ($5 \cdot 2^{2010}$) ✓ faktore $5(2^{2010} + 2)$ ✓ faktore $5 \cdot 2(2^{2009} + 1)$ ✓ antwoord 	(4)
2.3	2.3.1	$x^{-1} + y^{-1}$ $= \frac{1}{x} + \frac{1}{y}$ $= \frac{y+x}{xy}$	<ul style="list-style-type: none"> ✓ $\frac{1}{x} + \frac{1}{y}$ ✓ noemer ✓ teller 	(3)
	2.3.2	<p>Som van omgekeerdes = $\frac{1}{x} + \frac{1}{y}$</p> <p>∴ som van omgekeerdes = $\frac{y+x}{xy}$</p> <p>∴ som van omgekeerdes = $\frac{10}{20}$</p> $= \frac{1}{2}$	<ul style="list-style-type: none"> ✓ 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	$ \begin{array}{cccc} 1 & -3 & -9 & -17 \\ \swarrow & \searrow & \swarrow & \searrow \\ -4 & -6 & -8 & \\ \swarrow & \searrow & & \\ -2 & -2 & & \end{array} $ $2a = \text{tweede verskil}$ $\therefore 2a = -2$ $\therefore a = -1$ $3a + b = -4$ $\therefore 3(-1) + b = -4$ $\therefore b = -1$ $a + b + c = 1$ $\therefore -1 + (-1) + c = 1$ $\therefore c = 3$ $\therefore T_n = -n^2 - n + 3$	✓ 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	$T_n = -n^2 - n + 3 \text{ en}$ $T_n = -7479$ $\therefore -n^2 - n + 3 = -7479$ $\therefore -n^2 - n + 7482 = 0$ $\therefore n^2 + n - 7482 = 0$ $\therefore (n - 86)(n + 87) = 0$ $\therefore n = 86 \therefore \therefore 86\text{ste term}$	✓ $T_n = -7479$ ✓ standaardvorm ✓ $n = 86$	(3)

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

VRAAG 4

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

4.3	4.3.1	$k(x) = 3^{-x+1} + 2$ $\therefore k(x) = 3^{-(x-1)} + 2$ $\therefore k(x) = (3^{-1})^{x-1} + 2$ $\therefore k(x) = \left(\frac{1}{3}\right)^{x-1} + 2$ \therefore Gereflekteer in die y -as en daarna getransleer 1 eenheid na regs en 2 eenhede opwaarts	<ul style="list-style-type: none"> ✓ 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 $y = a(x + p)^2 + q$ $y = -2(x + 1)^2 + 18$	<ul style="list-style-type: none"> ✓ 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)	<ul style="list-style-type: none"> ✓ $x = 1$ ✓ $y = 18$ 	(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 $E(4 ; 0)$	<ul style="list-style-type: none"> ✓ 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 $q = 18$	<ul style="list-style-type: none"> ✓ $x = -2$ ✓ $y = 18$ ✓ $p = 2$ ✓ $q = 18$ 	(4)
5.5	$x > 1$ OF $x \in (1; \infty)$	<ul style="list-style-type: none"> ✓✓ $x > 1$ <li style="text-align: center;">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 $x \in (-\infty; -2) \cup (-2; \infty)$	<ul style="list-style-type: none"> ✓ $x \in (-\infty; \infty)$ ✓ $x \neq -2$ <li style="text-align: center;">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 $c = 6$	<ul style="list-style-type: none"> ✓ $p = 1$ ✓ $q = 8$ ✓ $-2x^2 + 4x + 6$ ✓ $b = 4$ ✓ $c = 6$ 	(5)
6.2	$g(x) = -2(x + 1)^2 + 11$ OF $g(x) = -2(x + 2)^2 + 4(x + 2) + 6 + 3$ $\therefore g(x) = -2x^2 - 4x + 9$	<ul style="list-style-type: none"> ✓ $a = -2$ ✓ $p = 1$ ✓ $q = 11$ <li style="text-align: center;">OF ✓ $a = -2$ ✓ $b = -4$ ✓ $c = 9$ 	(3)
			[8]
TOTAAL:			100