



PREPARATORY EXAMINATION

2016

MEMORANDUM

MATHEMATICS (FIRST PAPER) (10611)
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15 pages

**GAUTENG DEPARTMENT OF EDUCATION
PREPARATORY EXAMINATION**

**MATHEMATICS
(First Paper)**

MEMORANDUM

QUESTION 1			
1.1	1.1.1	$3x^2 + 5x = 2$ $3x^2 + 5x - 2 = 0$ $(3x - 1)(x + 2) = 0$ $x = \frac{1}{3} \dots \text{OR} \dots x = -2$	✓ standard form ✓ factors ✓ both x values
			(3)
	1.1.2	$\sqrt{x+7} - 1 = x$ $\sqrt{x+7} = x + 1$ $x + 7 = (x + 1)^2$ $x + 7 = x^2 + 2x + 1$ $x^2 + x - 6 = 0$ $(x + 3)(x - 2) = 0$ $x = -3 \quad \text{OR} \quad x = 2$ N/A. $\therefore x = 2$	✓ $x + 7 = (x + 1)^2$ ✓ standard form ✓ factors ✓ N/A ✓ $x = 2$
			(5)
	1.1.3	$x^2 - 8x = 10$ $x^2 - 8x - 10 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(-10)}}{2(1)}$ $x = 9,1 \quad \text{OR} \quad x = -1,1$	✓ standard form ✓ substitution ✓ $x = 9,1$ ✓ $x = -1,1$
			(4)

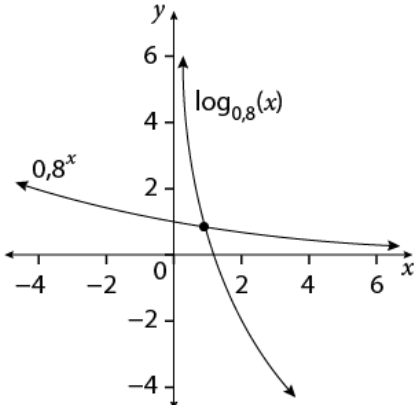
1.1.4	$3^x + 3^{-x+1} \cdot 5 = 8$ $3^x + \frac{3 \cdot 5}{3^x} = 8$ $3^{2x} - 8 \cdot 3^x + 15 = 0$ $(3^x - 5)(3^x - 3) = 0$ $3^x = 5 \quad \text{OR} \quad 3^x = 3$ $x = \log_3 5 \quad x = 1$ $x = 1,46$ OR $\text{Let } 3^x = k$ $k + \frac{3 \cdot 5}{k} = 8$ $k^2 - 8k + 15 = 0$ $(k - 3)(k - 5) = 0$ $k = 3 \quad \text{OR} \quad k = 5$ $3^x = 3 \quad 3^x = 5$ $x = 1 \quad x = \log_3 5$ $x = 1,46$	✓ standard form ✓✓ factors ✓ $x = 1$ ✓ $x = \log_3 5$ OR $x = 1,46$ ✓ substitute with k ✓ standard form ✓ factors ✓ $x = 1$ ✓ $x = \log_3 5$ OR $x = 1,46$
		(5)
1.2	$\frac{2^{2015} + 2^{2013}}{4^{1006}}$ $= \frac{2^{2013}(2^2 + 1)}{2^{2012}}$ $= 2(5)$ $= 10$	✓ factors ✓ 2^{2012} ✓ answer
		(3)
		[20]

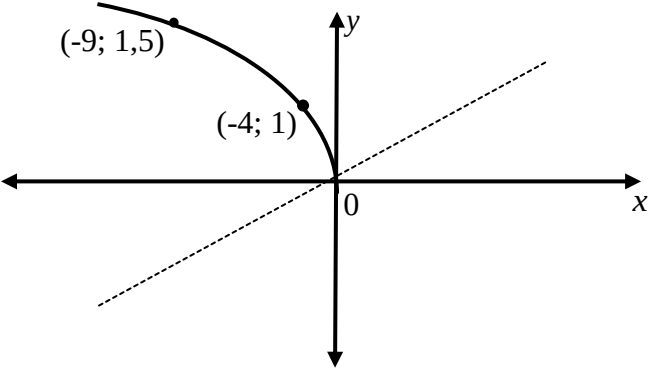
	QUESTION 2		
2.1	$kx^2 + kx + 1 = 0$ $\Delta = b^2 - 4ac$ $= (k)^2 - 4(k)(1)$ $\dots = k^2 - 4k$ $= k(k - 4)$ <i>for non-real roots</i> $\Delta < 0$ $k(k - 4) < 0$ $\therefore 0 < k < 4$		✓ correct substitution in Δ ✓ $\Delta < 0$ ✓ 0 and 4 ✓ inequality signs
			(4)
2.2	$2^{x+1} = 4^y \dots\dots 1$ $x^2 + 2y = 3 \dots\dots 2$ $2^{x+1} = 2^{2y}$ $x + 1 = 2y$ $x = 2y - 1 \dots\dots 3$ <i>Substitute in 2</i> $(2y - 1)^2 + 2y = 3$ $4y^2 - 4y + 1 + 2y - 3 = 0$ $4y^2 - 2y - 2 = 0$ $2(2y + 1)(y - 1) = 0$ $\dots y = -\frac{1}{2}$ OR $y = 1$ <i>Substitute in 3</i> $x = 2\left(-\frac{1}{2}\right) - 1 \dots\dots x = 2(1) - 1$ $x = -2 \dots\dots\dots x = 1$ OR	$2^{x+1} = 4^y \dots\dots 1$ $x^2 + 2y = 3 \dots\dots 2$ $2^{x+1} = 2^{2y}$ $x + 1 = 2y \dots\dots 3$ <i>Substitute in 2</i> $x^2 + x + 1 = 3$ $x^2 + x - 2 = 0$ $(x + 2)(x - 1) = 0$ $x = -2 \dots$ OR $x = 1$ <i>Substitute in 3</i> $-2 + 1 = 2y \dots 1 + 1 = 2y$ $y = -\frac{1}{2} \dots\dots\dots y = 1$	✓ simplify equation ✓ substitute ✓ factors ✓ both y values ✓ both x values
			(5)
			[9]

	QUESTION 3				
3.1					
	3.1.1	40			✓ answer
					(1)
	3.1.2	$2a = 4$ $a = 2$ $\therefore T_n = 2n^2 - 10$	$3a + b = 6$ $3(2) + b = 6$ $b = 0$	$a + b + c = -8$ $2 + c = -8$ $c = -10$	✓ second difference = 4 ✓ $a = 2$ ✓ $b = 0$ ✓ $c = -10$
					(4)
3.2					
	3.2.1	$a = 5$ $T_6 = 10T_3$ $a + 5d = 10(a + 2d)$ $5 + 5d = 10(5 + 2d)$ $5d - 20d = 50 - 5$ $d = -3$			✓ $T_6 = 10T_3$ ✓ $a + 5d = 10(a + 2d)$ ✓ simplification ✓ $d = -3$
					(4)
	3.2.2	$S_n = \frac{n}{2}[2a + (n - 1)d]$ $S_{20} = \frac{20}{2}[2(5) + (20 - 1)(-3)]$ $= -470$			✓ correct formula ✓ correct substitution ✓ answer
					(3)

3.3	3.3.1	$\sum_{k=1}^{\infty} 2\left(\frac{1}{2}\right)^k$ $1; \frac{1}{2}; \frac{1}{4}; \dots$ $r = \frac{1}{2}$ $S_{\infty} = \frac{a}{1-r}$ $= \frac{1}{1-\frac{1}{2}}$ $= 2$	$\checkmark r = \frac{1}{2}$ $\checkmark$ correct substitution in S_{∞} $\checkmark S_{\infty} = 2$
			(3)
	3.3.2	$\sum_{k=0}^7 2\left(\frac{1}{2}\right)^k$ $2; 1; \frac{1}{2}; \dots$ $r = \frac{1}{2}$ $S_n = \frac{a(r^n - 1)}{r - 1}$ $= \frac{2\left(\left(\frac{1}{2}\right)^8 - 1\right)}{\frac{1}{2} - 1}$ $= \frac{255}{64} \dots \text{OR} \dots 3,98$	$\checkmark n = 8$ $\checkmark$ correct substitution in S_n $\checkmark S_n = \frac{255}{64}$ OR 3,98
			(3)
	3.3.3	$T = 2 - \frac{255}{64}$ $= -1\frac{63}{64}$ OR $= \frac{-127}{64}$ OR $= -1,98$	$\checkmark$ answer
			(1)

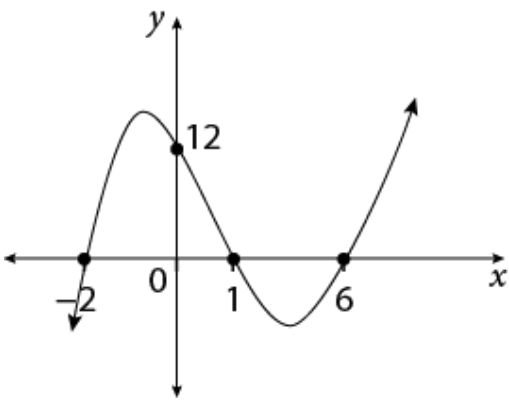
3.4	$19; 18\frac{1}{5}; 17\frac{2}{5}; \dots$ $d = -\frac{4}{5}$ $T_n = a + (n-1)d$ $19 + (n-1)\left(-\frac{4}{5}\right) < 0$ $19 - \frac{4}{5}n + \frac{4}{5} < 0$ $-\frac{4}{5}n < -19\frac{4}{5}$ $n > 24\frac{3}{4} \dots \text{OR} \dots \frac{99}{4} \dots 24,75$ $\therefore \text{The 25th Term}$	$\checkmark d = -\frac{4}{5}$ $\checkmark$ correct substitution in correct formula $\checkmark T_n < 0$ $\checkmark$ inequality $\checkmark$ answer $\checkmark$ conclusion
		(6)
		[25]
	QUESTION 4	
4.1	$p = 4$ $q = 2$ $T(5;3): y = \frac{a}{x-4} + 2$ $3 = a + 2$ $a = 1$	$\checkmark p = 4$ $\checkmark q = 2$ $\checkmark a = 1$
		(3)
4.2	$h(x) = \frac{1}{-x-4} + 2$ OR $h(x) = \frac{-1}{x+4} + 2$	$\checkmark$ answer
		(1)
4.3	$y = -x + c \dots \dots \dots (4; 2)$ $2 = -(4) + c$ $c = 6$	$\checkmark$ correct substitution of (4; 2) $\checkmark$ answer
		(2)
		[6]

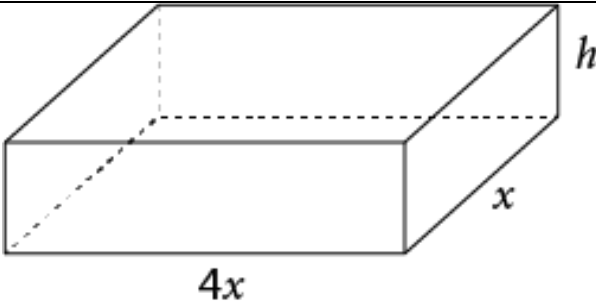
	QUESTION 5	
5.1	$f(x) = a^x$ and passes through the point $\left(-2; 1\frac{9}{16}\right)$. $\therefore 1\frac{9}{16} = a^{-2}$ $\therefore a^{-2} = \frac{25}{16}$ $\therefore a^2 = \frac{16}{25}$ $\therefore a = \sqrt{\frac{16}{25}}$ $\therefore a = \frac{4}{5}$	✓ substitution ✓ value of a
		(2)
5.2	$y = \left(\frac{4}{5}\right)^x$ $x = \left(\frac{4}{5}\right)^y$ $y = \log_{\frac{4}{5}} x$	✓ interchange x and y ✓ equation
		(2)
5.3		✓ shape f ✓ shape f^{-1} ✓ asymptotes of both graphs
		(3)
5.4	$x > 0$	✓ answer
		(1)
5.5	$y = \left(\frac{4}{5}\right)^x$ $h(x) = -\left(\frac{4}{5}\right)^x$	✓ answer
		(1)
5.6	About the line $y = x$	✓ answer
		(1)
5.7	$y > -1$	✓ answer
		(1)
		[11]

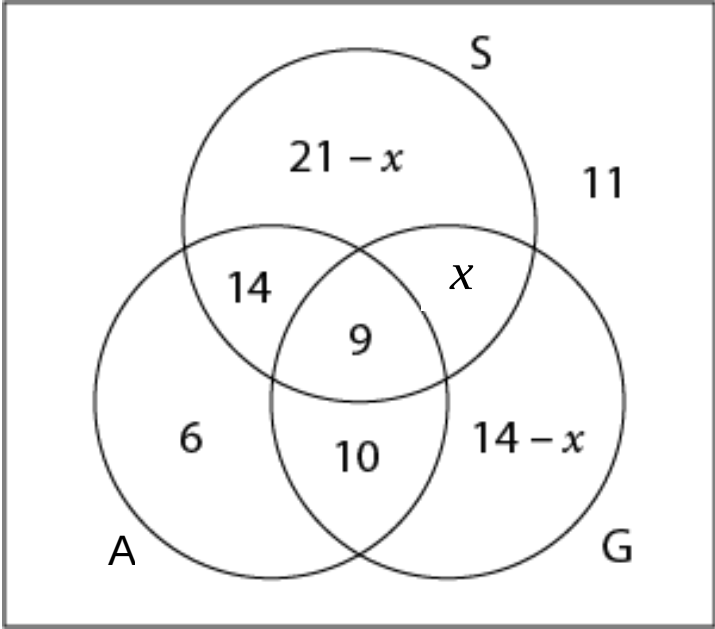
	QUESTION 6	
6.1	$y = ax^2$ $-4 = a(1)^2$ $-4 = a \quad ; x \geq 0$ $h(x) = -4x^2$	✓substitution (1; -4) ✓value of a ✓equation
		(3)
6.2	$y = -4x^2$ $-9 = -4x^2$ $x^2 = \frac{9}{4}$ $x = \pm \sqrt{\frac{9}{4}}$ $x \geq 0 \quad \therefore T\left(\frac{3}{2}; -9\right)$	✓simplification $x^2 = \frac{9}{4}$ ✓answer
		(2)
6.3	$\text{Gradient of } ST = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-9 - (-4)}{1,5 - 1}$ $= -10$	✓substitution ✓answer
		(2)
6.4	$x = -4y^2 ; y \geq 0$ $y^2 = -\frac{x}{4}$ $y = \pm \sqrt{-\frac{x}{4}}$ $h^{-1} = \sqrt{-\frac{x}{4}}$	✓interchange x and y ✓restriction ✓the value of y^2 ✓equation
		(4)
6.5		✓shape inverse ✓point on inverse ✓axis of symmetry
		(3)
		[14]

	QUESTION 7		
7.1	$1 + 0,164 = \left[1 + \frac{i_{nom}}{12} \right]^{12}$ $\sqrt[12]{1,164} = 1 + \frac{i_{nom}}{12}$ $i_{nom} = 15,28\%$		✓ correct substitution into correct formulae ✓ $\sqrt[12]{1,164}$ ✓ answer
			(3)
7.2	$F = \frac{x[(1+i)^n - 1]}{i}$ $2\,300\,000 = \frac{x \left[\left(1 + \frac{0,12}{4} \right)^{32} - 1 \right]}{\frac{0,12}{4}}$ $x = R43\,807,22$		✓ 2 300 000 ✓ $\left[\left(1 + \frac{0,12}{4} \right)^{32} - 1 \right]$ ✓ $n = 32$ ✓ answer
			(4)
7.3			
	7.3.1	$A = P(1+i)^n$ $A = R135\,000 \left(1 + \frac{0,1475}{12} \right)^2$ $A = R138\,339,15$	✓ substitution ✓ $A = R138\,339,15$
			(2)
	7.3.2	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $R138\,339,15 = \frac{x \left[1 - \left(1 + \frac{0,1475}{12} \right)^{-18} \right]}{\frac{0,1475}{12}}$ $x = R8\,613,99$	✓ correct formula (P) ✓ correct substitution ✓ $n = 18$ ✓ answer
			(4)
			[13]

	QUESTION 8		
8.1	$f(x) = 4 - 3x^2$ $f(x+h) = 4 - 3(x+h)^2$ $= 4 - 3x^2 - 6xh - 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(4 - 3x^2 - 6xh - 3h^2) - (4 - 3x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $= \lim_{h \rightarrow 0} (-6x - 3h)$ $= -6x$		✓ simplification of $f(x+h)$ ✓ formula ✓ simplification $-6xh - 3h^2$ ✓ common factor ✓ answer $-6x$
			(5)
8.2.1	$D_x \left[x^4 - 2x + \frac{1}{x^2} \right]$ $= 4x^3 - 2 - 2x^{-3}$	✓ $4x^3$ ✓ -2 ✓ $-2x^{-3}$	
			(3)
8.2.2	$y = \frac{2x-3}{\sqrt[4]{x}}$ $= 2x^{\frac{3}{4}} - 3x^{-\frac{1}{4}}$ $\frac{dy}{dx} = \frac{3}{2}x^{-\frac{1}{4}} + \frac{3}{4}x^{-\frac{5}{4}}$	✓ simplification ✓ both values of derivatives	
			(2)
8.3	$f(x) = x^3 - 7x^2$ $f'(x) = 3x^2 - 14x$ $f'(x) = 5$ $3x^2 - 14x = 5$ $3x^2 - 14x - 5 = 0$ $(3x+1)(x-5) = 0$ $x = -\frac{1}{3} \quad \text{OR} \quad x = 5$		✓ $f'(x)$ ✓ $f'(x) = 5$ ✓ factors ✓ both answers NOTE NO PENALTY IF CANDIDATE COMMITS AN ERROR IN WRITING AN ANSWER WITH POSITIVE EXPONENTS.
			(4)
			[14]

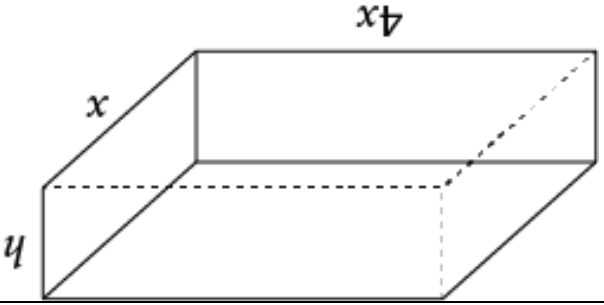
	QUESTION 9	
9.1		✓ y-intercept ✓ x-intercept ✓ shape
		(3)
9.2	$f(x) = a(x+2)(x-1)(x-6)$ $12 = a(0+2)(0-1)(0-6)$ $a = 1$ $\therefore f(x) = (x+2)(x-1)(x-6)$ $= x^3 - 5x^2 - 8x + 12$	✓ correct formulae ✓ substitution ✓ $a = 1$ ✓ expansion
		(4)
9.3	$f'(x) = 0$ $\therefore 3x^2 - 10x - 8 = 0$ $(3x+2)(x-4) = 0$ $x = -\frac{2}{3} \quad \text{OR} \quad x = 4$ $y = \frac{400}{27} \quad \text{OR} \quad y = -36$ Turning points are $\left(-\frac{2}{3}; \frac{400}{27}\right)$ AND $(4; -36)$	✓ equating to zero ✓ factors ✓ answers x ✓ answers y ✓ TPs
		(5)
9.4	$-\frac{2}{3} < x < 4$	✓ answer
		(1)
9.5	$f''(x) = 6x - 10$ $6x - 10 > 0$ $x > \frac{5}{3}$	✓ second derivative ✓ $6x - 10 > 0$ ✓ answer
		(3)
		[16]

	QUESTION 10	
		
10.1	$V = 128$ $4x \cdot x \cdot h = 128$ $h = \frac{128}{4x^2}$	✓ substitution ✓ answer
		(2)
10.2	$= 4x \cdot x + 2xh + 8xh$ $= 4x^2 + 10xh$ Total surface area $= 4x^2 + 10x \cdot \frac{32}{x^2}$ $= 4x^2 + \frac{320}{x}$	✓ formula ✓ simplification ✓ answer
		(3)
10.3	$Dx \left(4x^2 + \frac{320}{x} \right) = 0$ $8x - \frac{320}{x^2} = 0$ $8x^3 - 320 = 0$ $8x^3 = 320$ $x^3 = \frac{320}{8}$ $x = \sqrt[3]{\frac{320}{8}}$ $x = \sqrt[3]{40}$ $x = 2\sqrt[3]{5}$ Height $= \frac{32}{\left(2\sqrt[3]{5} \right)^2} = 2,74$	✓ derivative ✓ equate to zero ✓ simplification ✓ answer
		(4)
		[9]

	QUESTION 11	
11.1	Let S represent the participants for swimming; G represent the gymnastics participants and A for the athletics participants. 	✓ 6 ✓ $21 - x$ ✓ $14 - x$ ✓ all other values in the Venn diagram correct (CA)
		(4)
11.2	$21 - x + x + 14 - x + 9 + 14 + 10 + 6 + 11 = 80$ $85 - x = 80$ $x = 5$	✓ equation ✓ answer
		(2)
11.3	$P(\text{Participants in at least 2 events}) = \frac{5 + 14 + 10 + 9}{80}$ $= 0,475$	✓ equation ✓ division by 80 ✓ answer
		(3)
		[9]

	QUESTION 12	
12.1	$9! = 362\,880$ (Any other valid representation of the answer)	✓ answer
		(1)
12.3	$\frac{9!}{5!}$ $= 3\,024$ OR $9 \times 8 \times 7 \times 6$ $= 3\,024$	✓ 9! ✓ 5! ✓ answer ✓✓ $9 \times 8 \times 7 \times 6$ ✓ answer
		(3)
		[4]
	TOTAL: 150	

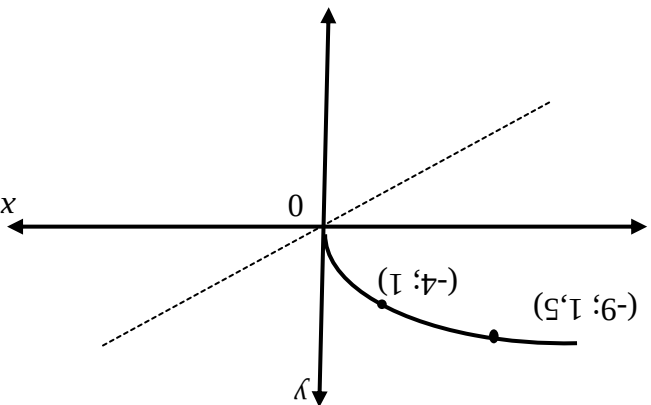
VRAAG 12		
12.1	9i = 362 880	✓ antwoord
	(Enige ander moontlike voorstelling van die antwoord)	
		(1)
12.2	$\frac{9i}{5i} = 3\ 024$ OF $9 \times 8 \times 7 \times 6 = 3\ 024$	✓ 9i ✓ 5i ✓ antwoord ✓ 9i ✓ 8i ✓ 7i ✓ 6i ✓ antwoord
		(3)
		[4]
TOTAAL: 150		

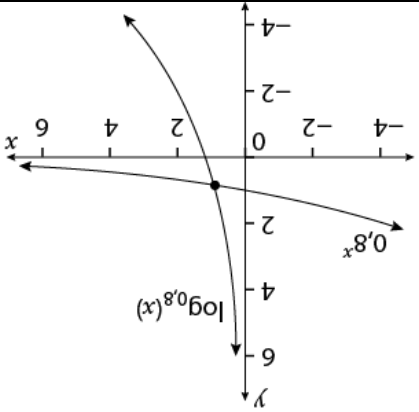
VRAAG 10		
		
10.1	$V = 128$ $4x \cdot x \cdot h = 128$ $h = \frac{128}{4x^2}$	✓ verandering ✓ antwoord
10.2	$= 4x \cdot x + 2xh + 8xh$ $= 4x^2 + 10xh$ Totale buit-oppervlak $= 4x^2 + 10x \cdot \frac{x^2}{32}$ $= 4x^2 + \frac{x}{320}$	✓ formule ✓ vereenvoudiging ✓ antwoord
		(2)
10.3	$Dx \left(4x^2 + \frac{x}{320} \right) = 0$ $8x - \frac{x^2}{320} = 0$ $8x^3 - 320 = 0$ $8x^3 = 320$ $x^3 = \frac{320}{8}$ $x = \sqrt[3]{\frac{320}{8}}$ $x = \sqrt[3]{40}$ $x = 2\sqrt[3]{5}$ $\frac{32}{\left(\frac{2}{3} \right)^z} = 2,74$ $\left(\frac{2}{3} \right)^z = 5$	✓ afgeleide ✓ vereenvoudiging ✓ antwoord
		(4)
		[9]

VRAAG 9		
9.1	✓ y-afsnit ✓ x-afsnit ✓ vorm	
9.2	$f(x) = a(x+2)(x-1)(x-6)$ $12 = a(0+2)(0-1)(0-6)$ $a = 1$ $\therefore f(x) = (x+2)(x-1)(x-6)$ $= x^3 - 5x^2 - 8x + 12$ ✓ korrekte formule ✓ vervanging ✓ $a = 1$ ✓ uitbreiding	
9.3	$f'(x) = 0$ $\therefore 3x^2 - 10x - 8 = 0$ $(3x+2)(x-4) = 0$ $x = -\frac{2}{3} \quad \text{OF} \quad x = 4$ $y = \frac{400}{27} \quad \text{OF} \quad y = -36$ Draaipunte $\left(-\frac{2}{3}; \frac{400}{27}\right)$ EN $(4; -36)$ ✓ vergelyking = 0 ✓ faktore ✓ x antwoorde ✓ y antwoorde ✓ albei draaipunte	
9.4	$-\frac{3}{2} < x < 4$	✓ antwoord
9.5	$f''(x) = 6x - 10$ $6x - 10 > 0$ $x > \frac{5}{3}$	✓ tweede differensiasie ✓ $6x - 10 > 0$ ✓ antwoord
(3)		[16]

VRAAG 8			
8.1	$f(x) = 4 - 3x^2$ $f(x + h) = 4 - 3(x + h)^2$ $= 4 - 3x^2 - 6xh - 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{(4 - 3x^2 - 6xh - 3h^2) - (4 - 3x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $= \lim_{h \rightarrow 0} (-6x - 3h)$ $= -6x$	✓ vereenvoudiging van $f(x + h)$ ✓ formule ✓ vereenvoudiging $-6xh - 3h^2$ ✓ gemeenskaplike faktor ✓ antwoord $-6x$	(5)
8.2	8.2.1 $D_x \left[x^4 - 2x + \frac{1}{x^2} \right] = 4x^3 - 2 - 2x^{-3}$	✓ $4x^3$ ✓ -2 ✓ $-2x^{-3}$	(3)
8.2.2	$y = \frac{\sqrt[4]{x}}{2x - 3}$ $= 2x^{\frac{3}{4}} - 3x^{\frac{3}{4}}$ $\frac{dy}{dx} = \frac{2}{3}x^{-\frac{1}{4}} + \frac{4}{3}x^{-\frac{4}{5}}$	✓ vereenvoudiging ✓ albei waardes van afgeleide	(2)
8.3	$f(x) = x^3 - 7x^2$ $f'(x) = 3x^2 - 14x$ $f'(x) = 5$ $3x^2 - 14x = 5$ $3x^2 - 14x - 5 = 0$ $(3x + 1)(x - 5) = 0$ $x = -\frac{1}{3}$ OF $x = 5$	✓ $f'(x)$ ✓ $f'(x) = 5$ ✓ faktore ✓ albei antwoorde LET WEL MOENIE LEERDER PENALISEER INDIEN FOUT VOORKOM IN SKRYF VAN POSITIEWE ANTWOORD NIE.	(4)
			[14]

VRAAG 7		
7.1	$1 + 0,164 = \left[1 + \frac{i_{nom}}{12} \right]^{12}$ $\sqrt[12]{1,164} = 1 + \frac{i_{nom}}{12}$ $i_{nom} = 15,28\%$	✓ korrekte vervanging in die korrekte formule ✓ $\sqrt[12]{1,164}$ ✓ antwoord
7.2	$F = x \frac{i}{(1+i)^n - 1}$ $2\,300\,000 = \frac{x \left[1 + \frac{0,12}{4} \right]^{32} - 1}{0,12}$ $x = R43\,807,22$	✓ $2\,300\,000$ ✓ $n = 32$ ✓ antwoord
7.3	$A = P(1+i)^n$ $A = R135\,000 \left(1 + \frac{0,1475}{2} \right)^2$ $A = R138\,339,15$	✓ vervanging ✓ $A = R138\,339,15$
		(2)
7.3.2	$P = x \frac{i}{1 - (1+i)^{-n}}$ $R138\,339,15 = \frac{x \left[1 - \left(1 + \frac{0,1475}{12} \right)^{-18} \right]}{0,1475}$ $x = R8\,613,99$	✓ korrekte formule (P) ✓ korrekte vervanging ✓ $n = 18$ ✓ antwoord
		(4)
		[13]

VRAAG 6		
6.1	$y = ax^2$ $-4 = a(1)^2$ $-4 = a$ $h(x) = -4x^2$ $; x \geq 0$	✓ vervanging (1; -4) ✓ waarde van a ✓ vergelyking
6.2	$y = -4x^2$ $-9 = -4x^2$ $x^2 = \frac{9}{4}$ $x = \pm \sqrt{\frac{9}{4}}$ $x \geq 0 \therefore T\left(\frac{3}{2}; -9\right)$	✓ antwoord ✓ vereenvoudiging $x^2 = \frac{9}{4}$
6.3	$Gradiënt van ST = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-9 - (-4)}{1,5 - 1} = \frac{-5}{0,5} = -10$	✓ vervanging ✓ antwoord
6.4	$x = -4y^2; y \geq 0$ $y^2 = -\frac{x}{4}$ $y = \pm \sqrt{-\frac{x}{4}}$	✓ ruil x en y om ✓ beperking ✓ die waarde van y^2 ✓ vergelyking
6.5		✓ vorm van inverse ✓ punt op inverse ✓ simmetrie-as
		(3)
		[14]

VRAAG 5		
5.1	$f(x) = a^x$ en gaan deur die punt $\left(-2; 1\frac{16}{9}\right)$. $\therefore 1\frac{16}{9} = a^{-2}$ $\therefore a^{-2} = \frac{16}{25}$ $\therefore a^2 = \frac{16}{25}$ $\therefore a = \sqrt{\frac{16}{25}}$ $\therefore a = \frac{4}{5}$	✓ vervanging ✓ waarde van a
	(2)	
5.2	$y = \left(\frac{5}{4}\right)^x$ $x = \left(\frac{5}{4}\right)^y$ $y = \log_{\frac{5}{4}} x$	✓ ruil x en y om ✓ vergelyking
	(2)	
5.3		✓ vorm f ✓ vorm f^{-1} ✓ asymptotes van beide grafieke
	(3)	
5.4	$x > 0$	✓ antwoord
	(1)	
5.5	$y = \left(\frac{5}{4}\right)^x$ $h(x) = -\left(\frac{5}{4}\right)^x$	✓ antwoord
	(1)	
5.6	Om die lyn $y = x$	✓ antwoord
	(1)	
5.7	$y > -1$	✓ antwoord
	(1)	
[11]		

3.4	19; $18\frac{1}{2}$; $17\frac{5}{2}$; ... $d = -\frac{5}{4}$ $T_n = d + (n-1)d$ $\left(-\frac{5}{4}\right)(n-1) > 0$ $19 - \frac{5}{4}n + \frac{5}{4} > 0$ $-\frac{5}{4}n > -19\frac{5}{4}$ $n > 24\frac{3}{4} \dots OF \dots \frac{4}{99} \dots 24,75$ ∴ Die 25 ste Term	✓ korrekte vervanging in korrekte formule ✓ $T_n < 0$ ✓ ongelykheid ✓ antwoord ✓ gevolgtrekking
(6)	[25]	
VRAAG 4		
4.1	$p = 4$ $b = 2$ $T(5;3): y = \frac{x-4}{d} + 2$ $3 = d + 2$ $d = 1$	✓ $d = 4$ ✓ $b = 2$ ✓ $d = 1$
4.2	$h(x) = \frac{-x-4}{1} + 2$ OF $h(x) = \frac{-1}{-1} \frac{x+4}{2} + 2$	✓ antwoord
(1)		
4.3	$y = -x + c \dots\dots\dots (4;2)$ $2 = -(4) + c$ $c = 6$	✓ korrekte vervanging van (4; 2) ✓ antwoord
(2)		
[6]		

3.3				$\sum_{k=1}^{\infty} 2^k \left(\frac{1}{2} \right)^k$ $1; \frac{1}{2}; \frac{1}{4}; \dots$ $r = \frac{1}{2}$ $S_{\infty} = \frac{1-r}{d}$ $\frac{1}{1 - \frac{1}{2}} = \frac{1 - \frac{1}{2}}{\frac{1}{2}}$ $= 2$	$\checkmark r = \frac{1}{2}$ $\checkmark S_{\infty} = 2$ $\checkmark \text{korrekte vervanging in } S_{\infty}$	(3)
3.3.1						
3.3.2				$\sum_{k=0}^7 2^k \left(\frac{1}{2} \right)^k$ $2; 1; \frac{1}{2}; \dots$ $r = \frac{1}{2}$ $S_n = \frac{d(r^n - 1)}{r - 1}$ $= \frac{2 \left(\left(\frac{1}{2} \right)^8 - 1 \right)}{\frac{1}{2} - 1}$ $= \frac{2 \left(\frac{1}{256} - 1 \right)}{-\frac{1}{2}}$ $= \frac{64}{255} \dots \dots OF \dots \dots 3,98$	$\checkmark n = 8$ $\checkmark \text{korrekte vervanging in } S_n$ $\checkmark S_n = \frac{64}{255} OF 3,98$	(3)
3.3.3				$T = 2 - \frac{64}{255}$ $= -1\frac{63}{64}$ OF $= \frac{64}{-127}$ OF $= -1,98$	$\checkmark \text{antwoord}$	(1)

3.1	VRAAG 3			
	3.1.1	40		
	3.1.2	$2a = 4 \dots$ $a = 2$ $3a + b = 6$ $3(2) + b = 6$ $b = 0$	$\checkmark$ tweede verschil = 4 $\checkmark$ $a = 2$ $\checkmark$ $b = 0$ $\checkmark$ $c = -10$	(1)
				(4)
3.2				
	3.2.1	$a = 5$ $T_6 = 10T_3$ $a + 5d = 10(a + 2d)$ $5 + 5d = 10(5 + 2d)$ $5d - 20d = 50 - 5$ $d = -3$	$\checkmark$ $T_6 = 10T_3$ $\checkmark$ $a + 5d = 10(a + 2d)$ $\checkmark$ vereenvoudiging $\checkmark$ $d = -3$	(4)
	3.2.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{20} = \frac{20}{2}[2(5) + (20-1)(-3)]$ $= -470$	$\checkmark$ korrekte formule $\checkmark$ korrekte vervanging $\checkmark$ antwoord	(3)

VRAAG 2		
2.1	$kx^2 + kx + 1 = 0$ $\Delta = b^2 - 4ac$ $= (k)^2 - 4(k)(1)$ $\dots = k^2 - 4k$ $= k(k - 4)$ <i>vir nie-reëleworteles</i> $\Delta < 0$ $k(k - 4) < 0$ $\therefore 0 < k < 4$	✓ korrekte vervanging in Δ ✓ $\Delta < 0$ ✓ 0 en 4 ✓ ongelykheidstekens
		(4)
2.2	$2^{x+1} = 4^y \dots\dots\dots 1$ $x^2 + 2y = 3 \dots\dots\dots 2$ $2^{x+1} = 2_y$ $x + 1 = 2y$ $x = 2y - 1 \dots\dots\dots 3$ <i>Vervang in 2</i> $(2y - 1)^2 + 2y = 3$ $4y^2 - 4y + 1 + 2y - 3 = 0$ $4y^2 - 2y - 2 = 0$ $2(2y + 1)(y - 1) = 0$ $\dots y = -\frac{2}{1}$ OF $y = 1$ <i>Vervang in 3</i> $x = 2\left(-\frac{2}{1}\right) - 1 \dots\dots\dots x = -2$ $x = -2 \dots\dots\dots x = 1$	✓ verenvoudig vergelýking ✓ verwang ✓ faktore ✓ albei y waardes ✓ albei x waardes
		(5)
		[6]

[illegible]

GAUTENGSE DEPARTEMENT VAN ONDERWYS
VOORBEREIDENDE EKSAMEN

WISKUNDE
(Eerste Vraestel)

MEMORANDUM

VRAAG 1			
1.1	1.1.1	$3x^2 + 5x = 2$ $3x^2 + 5x - 2 = 0$ $(3x - 1)(x + 2) = 0$ $x = \frac{1}{3} \dots \text{OF} \dots x = -2$	✓ standaardvorm ✓ faktore ✓ albei x waardes
	1.1.2	$\sqrt{x+7} - 1 = x$ $\sqrt{x+7} = x+1$ $x+7 = (x+1)^2$ $x+7 = x^2 + 2x + 1$ $x^2 + x - 6 = 0$ $(x+3)(x-2) = 0$ $x = -3 \text{ OF } x = 2$ $\therefore x = 2$ N.V.T.	✓ n.v.t ✓ faktore ✓ standaardvorm
			(3)
	1.1.3	$x^2 - 8x = 10$ $x^2 - 8x - 10 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(-10)}}{2(1)}$ OF $x = -1,1$ $x = 9,1$	✓ standaardvorm ✓ vervanging ✓ $x = 9,1$ ✓ $x = -1,1$
			(4)
			(5)

WISKUNDE (EERSTE VRAESTEL) (10611)

VOORBEREIDENDE EKSAMEN 2016 MEMORANDUM

