

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2015

MEMORANDUM

SUBJECT:	MATHEMATICS P1 (10611)
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GAUTENG DEPARTMENT OF EDUCATION
PREPARATORY EXAMINATION – 2015

MATHEMATICS
(First Paper)

MEMORANDUM

QUESTION 1		[21 MARKS]	
1.1	1.1.1	$x = -\frac{5}{2}$ or $x = \sqrt{2}$ or $x = -\sqrt{2}$	3A
	1.1.2	$x^2 \geq 9$ or $x^2 - 9 \geq 0$	[3] 1A
		$x \geq 3$ or $x \leq -3$	1A for critical value of 3 2A for each inequality Max 2/3 if 'and' is used Full marks if 'or' is omitted
	1.1.3	$6^{2x} \cdot 2^{2x} = 8 \cdot 6^{2x}$ or $2^{4x} \cdot 3^{2x} = 8 \cdot 3^{2x} \cdot 2^{2x}$ or $2^{4x} \cdot 3^{2x} = 2^{3+2x} \cdot 3^{2x}$	[4] 1A for factorizing bases
		$2^{2x} = 8$	1CA
		$2x = 3$	1CA
		$x = \frac{3}{2}$	1CA
1.2		$(x+1)^2 = \frac{9}{2}$	[4] 1A
		$x+1 = \pm \sqrt{\frac{9}{2}}$	1CA
		$x = 1,12$ or $x = -3,12$	2CA for each solution
		OR	
		$2x^2 + 4x - 7 = 0$	1A standard form
		$x = \frac{-4 \pm \sqrt{4^2 - 4(2)(-7)}}{2(2)}$	1CA substitution into correct formula
		$x = 1,12$ or $x = -3,12$	2CA for each solution
			[4]

1.3		$\frac{(-2x+7)+5}{x-1} = \frac{1}{2}$	1A correct substitution
		$2(-2x+12) = x-1$	1CA simplification
		$x = 5$	1CA
		Substitute $x = 5$: $y = -2(5) + 7$	
		$y = -3$	1CA
		OR	
		$\frac{y+5}{-\frac{y}{2} + \frac{7}{2} - 1} = \frac{1}{2}$	1A correct substitution
		$2(y+5) = -\frac{y}{2} + \frac{5}{2}$	1CA simplification
		$y = -3$	1 CA
		substitute $y = -3$: $x = -\frac{-3}{2} + \frac{7}{2}$	
		$x = 5$	1CA
			[4]
1.4		$1 - p > 0$	1A
		$p < 1$	1CA [2]

QUESTION 2 [12 MARKS]

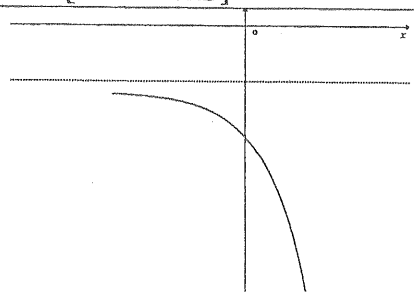
2.1	2.1.1	$x \left(-\frac{x}{2} \right)$	1A for $-\frac{x}{2}$
		$= -\frac{x^2}{2}$	1CA for multiplication with x
			[2]
	2.1.2	$x + x + 2$	1A for $x + 2$
		$= 2x + 2$	1CA for adding to x
			[2]
2.2		$-2 + x + 2x + 2 = -\frac{x^2}{2}$	1M 1CA
		$x^2 + 6x = 0$	1CA for simplified form
		$x(x+6) = 0$	1CA factorizing
		$x = -6$	1CA choosing correct x -value
			[5]
2.3		The series does NOT converge.	1CA
		$r = 3$. to converge, $-1 < r < 1$	2M for any logical explanation.
			[3]

QUESTION 3 [8 MARKS]

3.1		$(250)^2 + 4(250)$	1A substitution
		$= 63500$	1CA
			[2]
3.2		$T_{100} = S_{100} - S_{99}$	1M
		$= 100^2 + 4(100) - [99^2 + 4(99)]$	1A correct substitution
		$= 203$	1CA
		OR	
		$T_1 = 5 ; T_2 = 7 ; T_3 = 9$	1A for first three terms
		$T_{100} = 5 + 99(2)$	1M for correct formula
		$= 203$	1CA
			[3]
3.3		$n^2 + 4n = 1440$	1A
		$(n + 40)(n - 36) = 0$	1CA correct factors or correct substitution into correct formula.
		$n = 36$	1CA choice of correct n . Full marks for answer only
			[3]

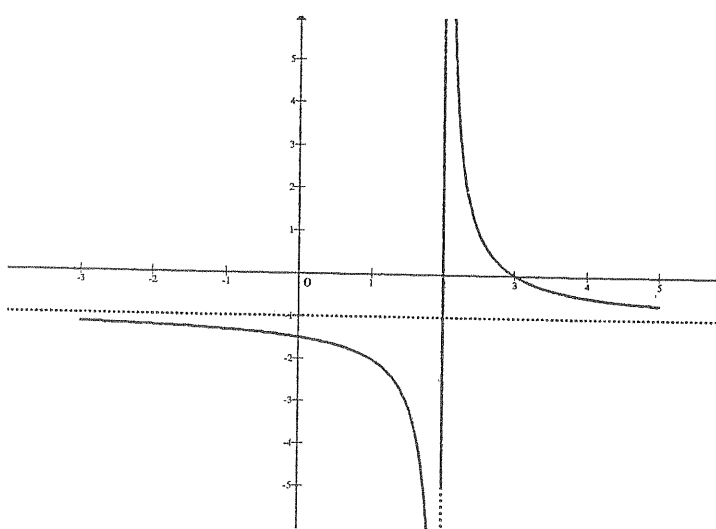
QUESTION 4 [6 MARKS]

4.1		2; 6; 12; 20	1A for first three terms
			1A for the 4 th term
			[2]
4.2		$a = 1; b = 1; c = 0$	3A finding a, b, c using any correct method.
		$T_n = n^2 + n$ or $T_n = n(n + 1)$	
		$T_{100} = 100(100 + 1)$	
		$= 10100cm^2$	1CA
			[4]

QUESTION 5 [15 MARKS]			
5.1	5.1.1	$A = 650\,000(1 - 0,3)^4$ $= R156\,065$	1A substitution into correct formula 1CA [2]
	5.1.2	$A = 650\,000(1 + 0,15)^4$ $= R1\,136\,854,06$	1A substitution into correct formula 1CA [2]
	5.1.3	$1136854,06 - 156065 = 980789,06$	1CA
		$980789,06 = \frac{x \left[\left(1 + \frac{0,095}{12} \right)^{48} - 1 \right]}{\frac{0,095}{12}}$	1M for use of correct formula 1CA us of correct formula
		$= R16\,875,92$	1CA
			[4]
5.2	5.2.1	$OB = 1275000 \left(1 + \frac{0,092}{12} \right)^{84} - \frac{11636,02 \left[\left(1 + \frac{0,092}{12} \right)^{84} - 1 \right]}{\frac{0,092}{12}}$	1M 1A correct substitution
		$= R1056\,675,39$	1CA
			[3]
	5.2.2	$1056675,39 \left(1 + \frac{0,092}{12} \right)^5$	1CA substitution into correct formula
		$= R1097807,15$	1CA
		$1097807,15 = \frac{x \left(1 - \left(1 + \frac{0,092}{12} \right)^{-151} \right)}{\frac{0,092}{12}}$	1CA substitution into correct formula
		$= R12297,82$	1CA
			[4]
QUESTION 6 [3 MARKS]			
			1M for correct shape 1A for horizontal asymptote 1A for negative y-value
			[3]

QUESTION 7 [19 MARKS]			
7.1		$-2x^2 - 4x + 30 = 0$	1M equating to 0
		$(x+5)(x-3) = 0$	1A correct factors
		$A(-5;0) \quad B(3;0)$	2CA for both intercepts -1 if not in coordinate form
			[4]
7.2		$y = -2(x^2 + 2x - 15)$	1A for taking out -2
		$y = -2(x^2 + 2x + 1 - 15 - 1)$	1CA $\left(\frac{b}{2}\right)^2$ added and deducted
		$y = -2[(x+1)^2 - 16]$	1CA in complete square form
		$y = -2(x+1)^2 + 32$	1CA
		Tpt $(-1;32)$	1CA
		OR	
		$x = -\frac{-4}{2(-2)}$	1A substitute into correct formula
		$x = -1$	1CA
		$y = 32$	1CA
		$y = -2(x+1)^2 + 32$	1CA in correct form
		Tpt $(-1;32)$	1CA
			[5]
7.3		$y = -2(1)^2 - 4(1) + 30$	1M substitution into equation
		$y = 24$ - No	1CA value and conclusion
		OR	
		$-2x^2 - 4x + 30 = 2x + 10$	1M finding point of intersection
		$x^2 + 3x - 10 = 0$	
		$x = 2$ or $x = -5$ - No	1CA for values with conclusion
			[2]
7.4		$-2x^2 - 4x + 30 = mx + 32$	1M for equating
		$-2x^2 + (-4-m)x - 2 = 0$	1CA for standard form
		$\Delta = 0$	1M
		$(-4-m)^2 - 4(-2)(-2) = 0$	1CA correct substitution
		$m = 0$ or $m = -8$	2 CA for each value of m
			[6]
7.5		$(-\infty;3) - \{-5\}$ or $x < 3; x \neq -5$	2A
			[2]

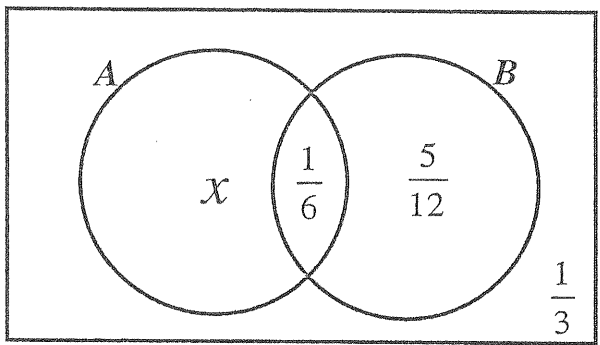
QUESTION 8 [11 MARKS]

8.1	VA: $x = 2$	1A
	HA: $y = -1$	1A
		[2]
8.2	y-intercept: $y = \frac{1}{0-2} - 1$	1M
	$= -\frac{3}{2}$	1CA
	x-intercept: $\frac{1}{x-2} - 1 = 0$	1M
	$x = 3$	1CA
		[4]
8.3		1A intercepts with axes 1A asymptotes 1A Shape [3]
8.4	$2 = \frac{1}{k-2} - 1$	1A correct substitution
	$k = \frac{4}{3}$	1CA
		[2]

QUESTION 9 [6 MARKS]			
9.1		$-2 = \log_a \left(\frac{9}{4} \right)$	1A correct substitution
		$a^{-2} = \left(\frac{9}{4} \right)$	1CA exponential form
		$a = \frac{2}{3}$	1CA
			[3]
9.2		$y = -\log_{\frac{2}{3}} x$ or $y = \log_{\frac{3}{2}} x$	1A
			[1]
9.3		$g(x) > -2$	1A
			[1]
9.4		$(-\infty; \infty)$	1A
			[1]
QUESTION 10 [14 MARKS]			
10.1	10.1.1	$\frac{f(3+h) - f(3)}{h}$	1M correct formula
		$= \frac{-2(3+h)^2 + 1 - [-2(3)^2 + 1]}{h}$	1A correct substitution
		$= \frac{-12h - 2h^2}{h}$	1CA correct simplification
		$= \frac{h(-12 - 2h)}{h}$	1CA
		$= -12 - 2h$	Max 1/3 if 'limit' is used
		OR	
		$\frac{f(x+h) - f(x)}{h}$	1M correct formula
		$= \frac{-2(x+h)^2 + 1 - [-2x^2 + 1]}{h}$	1A correct substitution
		$= \frac{-4xh - 2h^2}{h}$	1CA correct simplification
		$= \frac{h(-4(3) - 2h)}{h}$	1CA substitution of $x=3$
		$= -12 - 2h$	Max 1/3 if 'limit' is used
			[4]
	10.1.2	$\lim_{h \rightarrow 0} (-12 - 2h)$	1M using limit
		$= -12$	1CA
			[2]
	10.1.3	$m = 0$	1A
			[1]

[illegible]

QUESTION 12 [9 MARKS]			
12.1		$x^2 \left(40 - \frac{x}{3} \right) < 0$	1M for inequality
		$x > 120 \text{ km / hour}$	1A for inequality sign 1CA for 120km/hour Full marks if units are omitted.
			[3]
12.2		$P = 40x^2 - \frac{x^3}{3}$	
		$P'(x) = 0$	1M
		$80x - x^2 = 0$	1CA
		$x(80 - x) = 0$	1CA correct factorization
		$x = 80 \text{ km / hour}$	1CA
		$P = 10(80)^2 - \frac{80^3}{3}$	1CA
		$P = 21333.33 \text{ Rand / day}$ $\text{R } 85333.33$	1CA Full marks if units are omitted.
			[6]

QUESTION 13 [15 MARKS]			
13.1		$\frac{1}{6} + \frac{7}{16}$	2A for both outcome 1M for addition
		$= \frac{29}{48}$	1CA for simplification
			[4]
13.2	13.2.1		3A for each section
			[3]
	13.2.2	$x + \frac{1}{6} + \frac{5}{12} + \frac{1}{3} = 1$	1M
		$x = \frac{1}{12}$	1A
		$P(A) = \frac{1}{6} + \frac{1}{12} = \frac{1}{4}$	1CA
			[3]
13.3		36 000	1A
			[1]
13.4	13.4.1	2.9!	2A
			[2]
	13.4.2	8.8!	2A
			[2]

