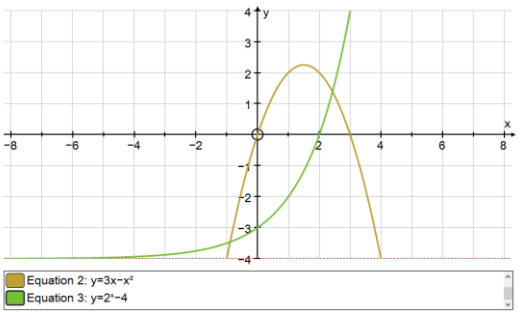
2023 Grade 11 Paper 1 MEMO

QUESTION 1

1.1.1	$2x\left(x^2-1\right)=0$ $x=0 \;\; OR \;\; x=\pm 1$	• x = 0 • $x=\pm 1$	(2)
1.1.2	$3x^2-2x=6$ $3x^2-2x-6=0$ $x=\frac{-(-2)\pm\sqrt{(2)^2-4(3)(-6)}}{2(3)}$ $x=\frac{2\pm\sqrt{76}}{6}$ $x=1,79 \;\; or \;\; x=-1,12$ *Penatly for rounding*	• std form • subst in formula • answer • answer	(4)
1.1.3	$x=2\sqrt{x+6}+2$ $x-2=2\sqrt{x+6}$ $x^2-4x+4=4x+24$ $x^2-8x-20=0$ $(x-10)(x+2)=0$ $x=10$	• isolating surd • squaring • standard form CA • factors • choosing	(5)
1.1.4	$\frac{x}{x+2}+\frac{2}{x^2+5x+6}=\frac{5}{x+3}$ $\frac{x}{x+2}+\frac{2}{(x+2)(x+3)}=\frac{5}{x+3}$ $x(x+3)+2=5(x+2)$ $x^2+3x+2=5x+10$ $x^2-2x-8=0$ $(x-4)(x+2)=0$ $x=4; x\neq -2$	• factoring • LHS • RHS • standard form CA • factors CA • choosing CA	(6)
1.1.5	$(x-1)(x+4)\geq 6$ $x^2+3x-10\geq 0$ $(x+5)(x-2)\geq 0$ $x\leq -5 \;\; or \;\; x\geq 2$	• std form • factors • ≤ -5 • ≥ 2	(4)

1.1.6	$3^x + \frac{3}{3^x} = 4$ $3^{2x} - 4.3^x + 3 = 0$ $\left(3^x - 3\right)\left(3^x - 1\right) = 0$ $x = 1 \ or \ \ x = 0$ $OR \ \ k + \frac{3}{k} = 4$ $k^2 - 4k + 3 = 0$ $\left(k - 1\right)\left(k - 3\right) = 0$ $3^x = 1 \ \ or \ \ 3^x = 3$ $x = 0 \qquad x = 1$	• std form • factors • 0 • 1	4
1.1.7	$4^{2x1} = \sqrt{8^{2x-10}}$ $2^{4x+2} = \sqrt{2^{6x-30}}$ $2^{4x+2} == 2^{3x-15}$ $4x + 2 = 3x - 15$ $x = -17$	• prime bases • equate • answer	3
1.1.8	$\left(x + \sqrt{m}\right)^2 = 2x\sqrt{m} + \left(9 + m\right)$ $x^2 + 2x\sqrt{m} + m = 2x\sqrt{m} + 9 + m$ $x = \pm 3$	• squaring • ± 3	2
1.2	$x + 2y = 3 \quad x^2 - y^2 = x + y$ $x = 3 - 2y$ $\left(3 - 2y\right)^2 - y^2 = 3 - 2y + y$ $9 - 12y + 4y^2 - y^2 + y - 3 = 0$ $3y^2 - 11y + 6 = 0$ $(3y - 2)(y - 3) = 0$ $y = \frac{2}{3} \ or \ \ y = 3$ $x = \frac{5}{3} \ \ or \ \ x = -3$	• x subject • subs • std form CA • factors • both y • both x	6
1.3	$f\left(x\right) = \frac{3x - x^2}{2^x - 4}$		
1.3.1	$f\left(x\right) = 0$ $x = 0 \ \ or \ \ x = 3$	• both answers	1
1.3.2	$f\left(x\right) \ \ undefined$ $x = 2 \ \ or \ \ y = -4$	• both answers	1

1.3.3	$f(x) \leq 0$  $0 \leq x < 2 \quad or \quad x \geq 3$	• between 0 and 2 • more than 3 • all inequalities	3
1.4	$2^{2015} \times 5^{2019}$ $= 2^{2015} \times 5^{2015} \times 5^4$ $= 10^{2015} \times 5^4$ $= 10^{2015} \times 625$ $sum\ digitd = 1+6+2+5 = 14$	• splitting 5^{2019} • $10^{2015} \times 5^4$ • answer	3

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QUESTION 2

2.1.1	$T_n = n + 4$	• n • + 4	2
2.1.2	$T_n = 124$	• 2 for answer	2
2.1.3	$4 \quad 10 \quad 18$ $6 \quad 8$ $T_n = n^2 + 3n$	• pattern • n^2 • + 3	3
2.1.4	$T_{32} = 32^2 + 3(32)$ $= 1120$	• answer • (C/A)	2
2.2.1	$1 \quad 5 \quad 11 \quad 19$ $4 \quad 6 \quad 8$ $2 \quad 2$ $a = 1$ $3a + b = 4$ $b = 1$ $a + b + c = 1$ $c = 1 - 2$ $c = -1$ $T_n = n^2 + n - 1$	• a • b • c • T_n	4

2.2.2	$n^2+n-1=9119$ $n^2+n-9120=0$ $(n+96)(n-95)$ $n=95$	• equate • std form • factors / form • pick	4
2.3	$\underline{p}\ ;\ \underline{18}\ ;\ \underline{4p-10}\ ;\ \underline{4p}$ $18-p;\ 4p-28\ ;\ 10$ $5p-46;\quad 38-4p$ $5p-46=38-4p$ $9p=84$ $p=\frac{28}{3}$	• $T_4\ ;\ T_3$ • first diff • second diff • equate • answer	5

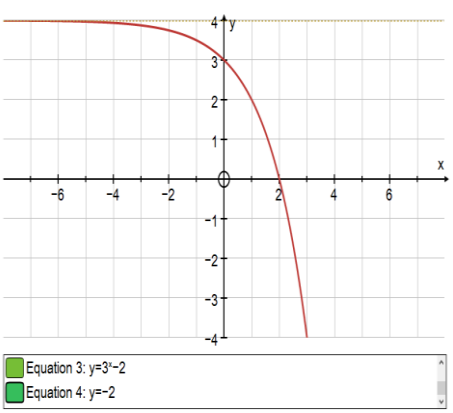
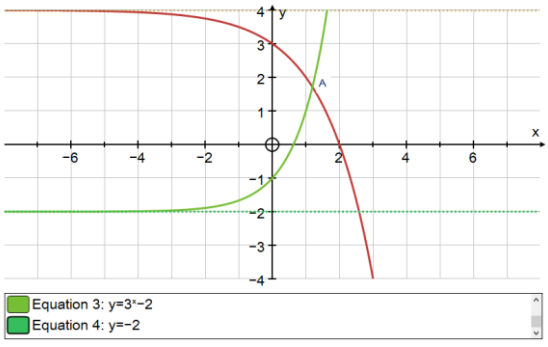
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QUESTION 3

3.1.1.	$P=7097,78\left(1+\frac{0,15}{4}\right)^{-7\times4}$ $=R2\ 531,95$	• A = 7097,78 • i and n • answer	3
3.1.2	$1+i_{ef}=\left(1+\frac{0,15}{4}\right)^4$ $r=15,87\%$	• formula • subst • answer	3
3.2	$A=14\ 000\left(1+\frac{0,09}{2}\right)^{2\times2}\left(1+\frac{0,075}{12}\right)^{3\times12}$ $=R20\ 893,22$	• 14 000 = P • first bracket • second bracket • for answer	4
3.3.1	$R70\ 000$	• two for answer •	2
3.3.2	Straight line depreciation/ simple depreciation interest	•	1
3.3	$8\ 750=70\ 000(1-i)^7$ $\sqrt[7]{\frac{1}{8}}-1=-i$ $25,7\%=r$	• A • P • formula and 7 • answer	4

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QUESTION 4

4.1.1	$y > -2$	• answer	2
4.1.2	$g(x) = -3^x + 2$	• -3^x • +2	2
4.1.3	$f(x) - 1 < 0$ $f(x) < 1$ $x < 1$	• y < 1 • x < 1	2
4.2.1	$y = -2^{-x} + 4$ *or* $y = -\left(\frac{1}{2}\right)^x + 4$	• two for answer	2
4.2.2	p>2	• answer	2
4.2.3		• asymptote • (2;0) and (0;3)	2
4.2.4	$3^x + 2^x = 6$ $3^x = -2^x + 6$ $3^x - 2 = -2^x + 4$ 	• Take 2^x over and 6 =2+ 4 • Indicating clearly	2

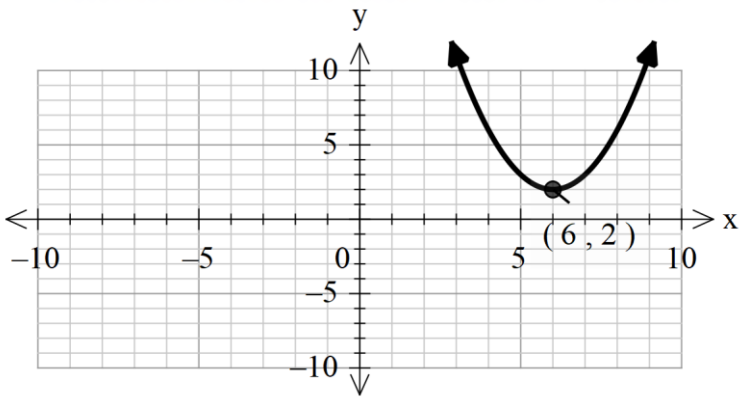
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QUESTION 5

5.1	$x \in \mathbb{R};\quad x \neq 0$	• answer	1
5.2	Y = 8	• answer	1
5.3	X = -1	• answer	1
5.4	$g(-1) = \frac{-3}{-1} + 8$ $g(-1) = 11$ $D(-1;11)$	• substituting • answer	2
5.5	$y = x + 8$	• m • 8	2
5.6	$0 = -2(x+1)^2 + 8$ $0 = -2x^2 - 4x - 2 + 8$ $0 = x^2 + 2x - 3$ $0 = (x+3)(x-1)$ $x = 3 \quad or \quad x = 1$ $g(x) = -\frac{3}{x} + 8$ $x = \frac{3}{8}$	• = 0 • st form • answers for f • answer for g	4
5.7	$x \leq -3 \quad or \quad 0 < x \leq \frac{3}{8} \quad \text{or} \quad x \geq 1$	• - 3 • $x \leq \frac{3}{8}$ • $x \leq 1$	3
5.8	$k = 8$	• two for answer	2
5.9	$x = -2$ $g(-2) = 9,5$ $f(-2) = 6$ $AB = 9,5 - 6$ $=3,5$	• x = -2 • 9,5 • 6 • answer	4

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QUESTION 6

6.1	$N(8;0) \quad m(6;0)$ $f(x) = a(x - x_1)(x - x_2)$ $2 = a(4-0)(4-6)$ $2 = -8a$ $\frac{-1}{4} = a$ $f(x) = \frac{-1}{4}(x-0)(x-)$ $= -\frac{1}{4}x^2 + \frac{3}{2}x$ $x = \frac{-b}{2a}$ $= \frac{\frac{-3}{2}}{-\frac{1}{2}}$ $= 3$ $f(1) = \frac{-1}{4}(3)^2 + \frac{3}{2}(3)$ $= \frac{9}{4} \quad H\left(3; \frac{9}{4}\right)$	• m • a • equation • for axis of symmetry • y value	5
6.2		• axis of symmetry 6 • TP (6; 2) • $\Delta < 0$	3

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