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MATHEMATICS

MARKING GUIDELINE

GRADE 11: EXAM PAPER 1 **NOV 2025** TERM 4

NOTE:

- If a candidate answers a question TWICE
- , mark the FIRST attempt ONLY.
- Consistent accuracy applies in ALL aspects of the marking guideline.
- If a candidate crossed out an attempt of a question and did NOT redo the question, mark the cross-out attempt.
- The mark for substitution is awarded for substitution into the CORRECT formula.

QUESTION 1 [28]

1.1.1	$2x^2 = 8$ ✓ $\therefore x = -2$ ✓$or\ x = 2$✓	✓ method ✓ x = -2 ✓ x = 2	(3)
1.1.2	$3x^2 + 5x - 1 = 0$ ✓✓ $x \cong 0{,}2$ ✓$or\ x = -1{,}8$ ✓	✓ standard form ✓ method ✓ $x \cong 0{,}2$ ✓ $x = -1{,}8$	(4)
1.1.3	$\sqrt{5-4x} - x = 0$ $5 - 4x = x^2$ ✓ $x^2 + 4x - 5 = 0$ ✓ $(x+5)(x-1)$✓ $= 0$ $\therefore\ x = 1$ ✓	✓ squaring ✓ standard form ✓ factors ✓ solution	(4)
1.1.4	$x^2 - 9x \leq -20$ $x^2 - 9x + 20 \leq 0$✓ $(x-4)(x-5)$✓ ≤ 0 $4 \leq x \leq 5$ ✓✓	✓ standard form ✓ factors ✓✓ solution	(4)
1.2	$2x^2 + 8x - 3 = 0$ $x^2 + 4x = \frac{3}{2}$✓ $x^2 + 4x + 4 = \frac{3}{2} + 4$✓ $(x+2)^2 = \frac{11}{2}$✓ $x = \sqrt{\frac{11}{2}} - 2\ \ or\ \ x = -\sqrt{\frac{11}{2}} - 2$ ✓	✓ isolate constant ✓ perfect square ✓ factorise ✓ solutions	(4)

1.3	$x - y = 6$ **...(1)** $x^2 - 5y^2 + 20 = xy$ **...(2)** $x = 6 + y$ **...(3)** ✓ **<u>Sub (3) in (2):</u>** $(6 + y)^2 - 5y^2 + 20 = (6 + y)y$✓ $36 + 12y + y^2 - 5y^2 + 20 = 6y + y^2$✓ $-5y^2 + 6y + 56 = 0$ $5y^2 - 6y - 56 = 0$ ✓ $(5y + 14)(y - 4) = 0$ $\therefore y = -\frac{14}{5}\ or\ y = 4$✓ $\therefore x = \frac{16}{5}\ or\ x = 10$✓ **OR** $x - y = 6$ **...(1)** $x^2 - 5y^2 + 20 = xy$ **...(2)** $y = x - 6$ **...(3)** ✓ $x^2 - 5(x - 6)^2 + 20 = x(x - 6)$ ✓ $x^2 - 5(x - 6)(x - 6) + 20 = x(x - 6)$ ✓ $-5x^2 + 66x - 160 = 0$✓ $x = \frac{-66 \pm \sqrt{66^2 - 4(-5)(-160)}}{2(-5)}$ $x = 10$ or $x = \frac{16}{5}$✓ $\therefore x = \frac{16}{5}\ or\ x = 10$✓ $\therefore y = -\frac{14}{5}\ or\ y = 4$✓	✓ equation (3) ✓ substitution ✓ simplification ✓ standard form ✓ y-values ✓ x-values ✓ equation (3) ✓ substitution ✓ simplification ✓ standard form ✓ x-values ✓ y-values	(6)
1.4	$\Delta = b^2 - 4ac$ $= (4)^2 - 4(k + 1)(-k + 1)$ ✓ $= 16 + 4k^2 - 4$ $= 4k^2 + 12$✓ Hence $\Delta > 0$✓	✓ substitution ✓ simplification ✓ conclusion	(3)
			[28]

QUESTION 2 [22]

2.1.1	$= \frac{2^{-x}.2^{-x}.2^{x+1}.3^{x+1}.3^{2x}}{2^{4x-2}.3^{-x}}$✓ $= 2^{-x-x+x+1-4x+2}.3^{x+1+2x+x}$✓ $= 2^{-5x+3}.3^{4x+1}$✓	✓ expansion ✓ simplification ✓ answer	(3)
2.1.2	$= \frac{7.3^{x}.3^{2}-49.3^{x}}{3^{x}.3^{-3}+3^{x}.3^{1}}$✓ $= \frac{3^{x}(7\times9-49)}{3^{x}\left(\frac{1}{27}+3\right)}$ ✓ $= \frac{63-49}{\frac{82}{27}}$✓ $= \frac{189}{41}$✓	✓ expansion ✓ factors ✓ simplification ✓ answer	(4)
2.1.3	$= \frac{2^{2x}✓-1}{2^{x}-1}$ $= \frac{(2^{x}+1)(2^{x}-1)}{(2^{x}-1)}$ ✓ $= 2^{x}+1$✓	✓ 2^{2x} ✓ factors ✓ $2^{x}+1$	(3)
2.2	$= (3\sqrt{5})^{2}-2\left(3\sqrt{5}\sqrt{7}\right)-\left(\sqrt{7}\right)^{2}$ ✓ $= 45-6\sqrt{35}+7$ ✓ $= 52-6\sqrt{35}$ ✓	✓ multiplication ✓ simplification ✓ answer	(3)
2.3.1	$5.3^{x-1}=45$ $3^{x-1}=3^{2}$✓ $x-1=2$ $\therefore x=3$✓	✓ $3^{x-1}=3^{2}$ ✓ $x=3$	(2)
2.3.2	$3(3^{2x}+9.3^{x})=30$ $3^{2x}+9.3^{x}-10=0$✓ $(3^{x}+10)(3^{x}-1)=0$✓ $3^{x}=1$✓ $\therefore x=0$ ✓	✓ $3^{2x}+9.3^{x}-10=0$ ✓ factors ✓ $3^{x}=1$ ✓ $x=0$	(4)
2.3.3	$x^{\frac{3}{2}}=3^{3}$✓ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}}=(3^{3})^{\frac{2}{3}}$✓ $x=9$✓	✓ 3^{3} ✓ $\left(x^{\frac{3}{2}}\right)^{\frac{2}{3}}=(3^{3})^{\frac{2}{3}}$ ✓ $x=9$	(3)
			[22]

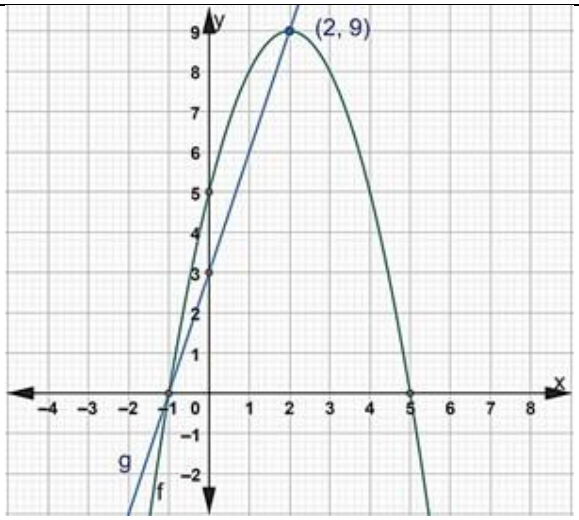
QUESTION 3 [11]

3.1	Linear✓; there is a common first difference. ✓	✓ linear ✓ reason	(2)
3.2	$\frac{12}{5}$✓;$\frac{29}{10}$✓	✓ $\frac{12}{5}$ ✓ $\frac{29}{10}$	(2)
3.3	$T_n = \frac{1}{2}n - \frac{1}{10}$✓✓ $T_{17} = \frac{1}{2}(17)$✓ $- \frac{1}{10}$ $= \frac{42}{5}$✓	✓ common difference ✓ formula ✓ substitution ✓ answer	(4)
3.4	$\frac{1}{2}n - \frac{1}{10} = \frac{62}{5}$✓ $5n - 1 = 124$ $5n = 125$✓ $\therefore n = 25$✓	✓ substitution ✓ simplification ✓ answer	(3)
			[11]

QUESTION 4 [14]

4.1	$25x^2 + 7y$✓; $36x^2 + 8y$✓	✓ 5th ✓ 6th	(2)
4.2	$T_n = n^2x^2$✓ $+ (2+n)y$✓ $= (xn)^2 + (2+n)y$ ✓	✓ n^2x^2 ✓ $(2+n)y$ ✓ $(xn)^2 + (2+n)y$	(3)
4.3	$T_9 = 9^2x^2 + (2+9)y$ $= 81x^2$✓ $+ 11y$✓	✓ $81x^2$ ✓ $11y$	(2)
4.4	$(xn)^2 + (2+n)y$ $(xn)^2 = 121x^2$ $\therefore n = 11$ $(2+n)y = 13y$ ✓ $2 + n = 13$ $\therefore n = 11$ ✓✓	 ✓ method ✓✓ n = 11	(3)
4.5	$T_1 = (3 \times \mathbf{1})^2 + (2 + \mathbf{1})(-1) = 6$ ✓ $T_2 = (3 \times \mathbf{2})^2 + (2 + \mathbf{2})(-1) = 32$ ✓ $T_3 = (3 \times \mathbf{3})^2 + (2 + \mathbf{3})(-1) = 76$ ✓ $T_4 = (3 \times \mathbf{4})^2 + (2 + \mathbf{4})(-1) = 138$ ✓	✓ 6 ✓ 32 ✓ 76 ✓ 138	(4)
			[14]

QUESTION 5 [19]

5.1	(2;9) ✓	✓ (2;9)	(1)
5.2	$-x^2 + 4x - 4 + 9 = 0$ ✓ $x^2 - 4x - 5 = 0$ ✓ $(x + 1)(x - 5)$✓ $= 0$ $\therefore x = -1 \; or \; x = 5$ ✓	✓ simplification ✓ standard form ✓ factors ✓ x-intercepts	(4)
5.3	$3x + 3 = 0$ ✓ $3x = -3$ $\therefore x = -1$ ✓	✓ equal to 0 ✓ x-intercept	(2)
5.4		$f(x)$: ✓ x-intercepts ✓ y-intercept ✓ shape $g(x)$: ✓ intercepts ✓ gradient	(5)
5.5.1	$x < -1$✓ $or \; x > 5$✓	✓ $x < -1$ ✓ $x > 5$	(2)
5.5.2	$-1 \leq x \leq 2$ ✓✓	✓✓ $-1 \leq x \leq 2$	(2)
5.6.1	$k = -9$ ✓✓	✓✓ $k = -9$	(2)
5.6.2	Translation 3 units upwards. ✓✓	✓ 3 units up	(1)
			[19]

QUESTION 6 [11]

6.1	(1;0) ✓	✓ (1;0)	(1)
6.2	F(0✓;-3✓)	✓ 0 ✓ -3	(2)
6.3	$a^1 - 3 = 0$ ✓ $\therefore a = 3$ ✓	✓ $a^1 - 3 = 0$ ✓ $a = 3$	(2)
6.4	$y \in R; y > -3$ ✓✓	✓✓ $y > -3$	(2)
6.5	$x \geq 1$ ✓✓	✓✓ $x \geq 1$	(2)
6.6	$g(x) = 3^{-x} - 3$ ✓ $= \left(\frac{1}{3}\right)^x - 3$✓	✓ $3^{-x} - 3$ ✓ $\left(\frac{1}{3}\right)^x - 3$	(2)
			[11]

QUESTION 7 [15]

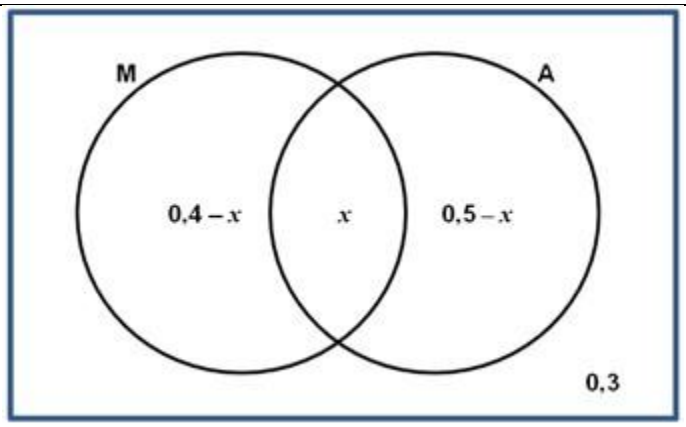
7.1	A(-1;2) ✓ B: $y = \frac{4}{0+1} + 2$✓ $= 6$ ∴B(0;6) ✓ C: $0 = \frac{4}{x+1} + 2$ $4 = -2(x+1)$ ✓ $4 = -2x - 2$ $2x = -6$ $x = -3$ ∴ $C(-3;0)$✓	✓ A(-1;2) ✓ substitution ✓ B(0;6) ✓ substitution ✓ $C(-3;0)$	(5)
7.2.1	*g* is the symmetry axis ✓ (with a positive gradient) of *f*.	✓ symmetry axis	(1)
7.2.2	$g(x) = (x+1) + 2$ ✓ $= x + 3$✓	✓ $(x+1)+2$ ✓ $x+3$	(2)
7.3	$\frac{4}{x+1} + 2 = x + 3$✓ $\frac{4}{x+1} = x + 1$ $4 = (x+1)(x+1)$ $4 = x^2 + 2x + 1$ $x^2 + 2x - 3 = 0$✓ $(x-1)(x+3) = 0$ E: $y = 1 + 3 = 4$ E(1;4) ✓	✓ equation ✓ standard form ✓ E(1;4)	(3)

7.4	Equation of DB: $y = x + 6$ ✓ $\frac{4}{x+1} + 2 = x + 6$✓ $\frac{4}{x+1} = x + 4$ $4 = x^2 + 5x + 4$ $x^2 + 5x = 0$✓ $x(x+5) = 0$ $x = -5$ $y = 1$ D(-5;1) ✓	 ✓ $y = x + 6$ ✓ equation ✓ standard form ✓ D(-5;1)	(4)
			[15]

QUESTION 8 [14]

8.1.1	$A = 50000\left(1 + \frac{0,12}{12}✓\right)^{5\times12✓}$ $= R90\,834,83$✓	✓ $\frac{0,12}{12}$ ✓ $5 \times 12=60$ ✓ $R90\,834,83$	(3)
8.1.2	$1 + i_{eff} = \left(1 + \frac{0,12}{12}\right)^{12}$ ✓ $i_{eff} = \left(1 + \frac{0,12}{12}\right)^{12} - 1$ $r_{eff} = 12,68\%$✓	 ✓ substitution ✓ $12,68\%$	(2)
8.1.3	$A = 50000\left(1 + \frac{0,126825✓}{1}\right)^{5✓\times1}$ $= R90\,834,82$✓	✓ $0,126825$ ✓ 5 ✓ $R90\,834,82$	(3)
8.2	$A = \left[6000✓\left(1 + \frac{0,13}{4}✓\right)^{2\times4✓}\left(1 + \frac{0,11}{12}✓\right)^{2\times12} + 4000✓\right]$ $\left[\left(1 + \frac{0,11}{12}\right)^{2\times12}\right]$ $= R16\,987,87$✓	✓ 6000 ✓ $\frac{0,13}{4}$ ✓ $2 \times 4=8$ ✓ $\frac{0,11}{12}$ ✓ $+4000$ ✓ $R16\,987,87$	(6)
			[14]

QUESTION 9 [16]

9.1		✓ 0,4-x ✓ x ✓ 0,5-x ✓ 0,3	(4)
9.2	$0{,}4 - x + x + 0{,}5 - x + 0{,}3$✓✓ $= 1$ ✓ $\therefore x = 0{,}2$ ✓	✓ probabilities ✓ addition ✓ equal to 1 ✓ 0,2	(4)
9.3	0,2✓ = 20%✓	✓ 0,2 ✓ 20%	(2)
9.4.1	= 1 – 0,3 ✓ = 0,7✓ = $\frac{7}{10}$✓	✓ method ✓ 0,7 ✓ $\frac{7}{10}$	(3)
9.4.2	P(only M or only A) = (0,4 – 0,2) ✓ + (0,5 – 0,2) ✓ = 0,5✓	✓ 0,4 – 0,2 ✓ 0,5 – 0,2 ✓ 0,5	(3)
			[16]

TOTAL: 150

TAXONOMY LEVELS					
GRADE 11					
MATHEMATICS					
PAPER 1 - TERM 4 - 2025					
MARKS: 150					
QUESTION	KNOWLEDGE	ROUTINE PROCEDURES	COMPLEX PROCEDURES	PROBLEM SOLVING	TOTAL
DESIRED %	20%	35%	30%	15%	100%
1.1.1	3				3
1.1.2		4			4
1.1.3		4			4
1.1.4		4			4
1.2			4		4
1.3			6		6
1.4				3	3
2.1.1			3		3
2.1.2			4		4
2.1.3			3		3
2.2			3		3
2.3.1		2			2
2.3.2			4		4
2.3.3			3		3
3.1	2				2
3.2	2				2
3.3	4				4
3.4		3			3
4.1	2				2
4.2		3			3
4.3		2			2
4.4			3		3
4.5	4				4
5.1	1				1
5.2		4			4
5.3	2				2
5.4		5			5
5.5.1		2			2
5.5.2		2			2
5.6.1				2	2
5.6.2			1		1
6.1	1				1
6.2	2				2
6.3	2				2
6.4	2				2
6.5	2				2
6.6	2				2
7.1		5			5

7.2.1	1				1
7.2.2	2				2
7.3		3			3
7.4				4	4
8.1.1		3			3
8.1.2		2			2
8.1.3		3			3
8.2				6	6
9.1			4		4
9.2		4			4
9.3	2				2
9.4.1		3			3
9.4.2			3		3
Total	**36**	**58**	**41**	**15**	**150**
Actual %	**24,0**	**38,7**	**27,3**	**10,0**	**100,0**
Desired %	**20%**	**35%**	**30%**	**15%**	**100**