GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

JUNE 2024

GRADE 11

MARKING GUIDELINES

MATHEMATICS (PAPER 1)

11 pages

INSTRUCTIONS AND INFORMATION

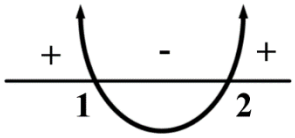
A – ACCURACY
CA. – CONTINUED ACCURACY

NOTE:

- If a candidate answerd a question TWICE, mark only the first attempt.
- If a candidate crossed OUT an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is UNACCEPTABLE.

QUESTION 1

1.1	1.1.1	$x < 9$	✓ answer	(1)
	1.1.2	$x = 9$	✓ answer	(1)
	1.1.3	$\sqrt{\frac{(1)^2+4}{9-1}}$ $\sqrt{\frac{5}{8}}$ $\therefore$ *Irrational*	✓ answer	(1)
	1.1.4	$x = 0$	✓ answer	(1)
1.2	1.2.1	$2x^2 - 3x - k = 0$ $2x^2 - 3x - 5 = 0$ $(2x-5)(x+1) = 0$ $\therefore x = \frac{5}{2} \cdots of \cdots x = -1$	✓ factors ✓ answer	(2)
	1.2.2	$2x^2 - 3x - 4 = 0$ $x = \frac{-(-3) \pm \sqrt{(-3)^2 - 4(2)(-4)}}{2(2)}$ $\therefore x = 2,35 \cdots of \cdots x = -0,85$ **NOTE:** Penalise 1 mark for incorrect rounding in this question ONLY.	✓ substitution ✓✓ answer	(3)
1.3	1.3.1	$x - 4 = -\sqrt{x-2}$ $16 - 8x - x^2 = x - 2$ $x^2 - 9x + 18 = 0$ $(x-6)(x-3) = 0$ $x = 3$ of $x \neq 6$	✓ square both sides ✓ standard form ✓ factors ✓ critical values ✓ rejection	(5)

	1.3.2	$x^2+4>3x+2$ $x^2-3x+2>0$ $(x-2)(x-1)>0$ $x<1$ or $x>2$ OR $x\in(-\infty;1)\cup(2;\infty)$  	✓ standard form ✓ factors ✓✓ answers	(4)
1.4		$y+2=2x$ $\therefore y=2x-2\cdots\cdots(1)$ $2x^2=2-y^2\cdots\cdots(2)$ $\therefore 2x^2=2-(2x-2)^2$ $2x^2=2-(4x^2-8x+4)$ $2x^2=2-4x^2+8x-4$ $\therefore 6x^2-8x+2=0$ $\therefore 3x^2-4x+1=0$ $(3x-1)(x-1)=0$ $\therefore x=\frac{1}{3}\cdots of\cdots x=1$ $\therefore y=-\frac{4}{3}\cdots of\cdots y=0$ **OR** $y+2=2x$ $\therefore x=\frac{y+2}{2}\cdots\cdots(1)$ $2x^2=2-y^2\cdots\cdots(2)$ $\therefore 2(\frac{y+2}{2})^2=2-y^2$ $2(\frac{y^2+4y+4}{4})=2-y^2$ $\therefore (\frac{y^2+4y+4}{2})=2-y^2$ $\therefore y^2+4y+4=4-2y^2$ $\therefore 3y^2+4y=0$ $y(3y+4)=0$ $\therefore y=0\cdots\cdots of\cdots\cdots y=-\frac{4}{3}$ $\therefore x=1\cdots\cdots of\cdots\cdots x=\frac{1}{3}$	✓ y as subject ✓ substitution ✓ standard form ✓ factors ✓ both x- values ✓ both y- values **OR** ✓ x as subject ✓ substitution ✓ standard form ✓ factors ✓ both y-values ✓ both x-values	(6)
1.5	1.5.1	For unequal roots: $\Delta>0$	✓ condition of Δ	

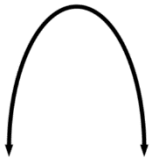
		$\therefore 2x^2-4x+(3-p)=0$ $\Delta=b^2-4ac$ $\therefore \Delta=(-4)^2-4(2)(3-p)$ $\Delta=16-24+8p$ $\therefore \Delta=-8+8p$ $\therefore -8+8p>0$ $8p>8$ $\therefore p>1$	✓ substitution into Δ ✓ expression for Δ ✓ answer	(4)
	1.5.2	From 1.5.1 $3-p>0\cdots\cdots(a>0\cdots and\cdots b<0)$ $\therefore -p>-3$ $\therefore 1<p<3$ **NOTE**: Any other valid method	✓ $c>0$ ✓ answer	(2)
1.6	$(p^2+1)x^2=-2pqx-q^2$ $\therefore (p^2+1)x^2+2pqx+q^2=0$ $\Delta=(2pq)^2-4(p^2+1)q^2$ $\Delta=4p^2q^2-4p^2q^2-4q^2$ $\therefore \Delta=-4q^2$ $\therefore q^2>0,\cdots q\in\Re;\cdots q\neq 0$ $\therefore -4q^2<0$ $\therefore$ Roots non-real		✓ standard form ✓ substitute into Δ ✓ simplification ✓ expression for Δ ✓ explanation	(5)
				[35]

QUESTION 2

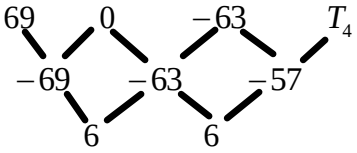
2.1	2.1.1	$(2^{-1}+3^{-1})^2$ $=(\frac{1}{2}+\frac{1}{3})^2$ $=(\frac{3+2}{6})$ $=(\frac{5}{6})^2$ $=\frac{25}{36}$	✓ converting exponents ✓ simplification ✓ answer	(3)
	2.1.2	$\frac{2.4^{x+2}-4^{x-3}}{2^x.2^x}$ $=\frac{2.4^x.4^2-4^x.4^{-3}}{4^x}$ $=\frac{4^x(32-\frac{1}{64})}{4^x}$ $=32-\frac{1}{64}$ $=\frac{2\,048-1}{64}$ $=\frac{2\,047}{64}$ **NOTE:** Accept $31\frac{63}{64}$	✓✓ factors ✓ answer	(3)
	2.1.3	$3^{-\frac{1}{2}}[\sqrt{12}+\sqrt[3]{(3\sqrt{3})}]$ $=3^{-\frac{1}{2}}[2\sqrt{3}+(3\sqrt{3})^{\frac{1}{3}}]$ $=3^{-\frac{1}{2}}[2.3^{\frac{1}{2}}+3^{\frac{1}{3}}.3^{\frac{1}{6}}]$ $=3^{-\frac{1}{2}}[2.3^{\frac{1}{2}}+3^{\frac{1}{2}}]$ $=3^{-\frac{1}{2}}.3^{\frac{1}{2}}(2+1)$ $=3^0(3)$ $=3$	✓ simplify brackets ✓ surds as rational exponents ✓ factors ✓ answer	(4)

	2.2.1	$2x^{\frac{3}{4}} = 16$ $\therefore x^{\frac{3}{4}} = 8$ $\therefore x^{\frac{3}{4}\times\frac{4}{3}} = 8^{\frac{4}{3}}$ $\therefore x = (\sqrt[3]{8})^4$ $\therefore x = 16$ **NOTE**: Any other valid method.	✓ method ✓ x as subject ✓ answer	(3)
	2.2.2	$5^{x+1} + 5^x = 150$ $5^x.5^1 + 5^x = 150$ $\therefore 5^x(5^1 + 1) = 150$ $\therefore 5^x(6) = 150$ $5^x = 25$ $\therefore 5^x = 5^2$ $\therefore x = 2$ **NOTE**: Any other valid method.	✓ factors ✓ simplification ✓ 25 as base of 5 ✓ answer	(4)
2.3	$\frac{9-\sqrt{54}}{6\sqrt{2}}$ $= \frac{(9-\sqrt{9.2.3})}{6\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ $= \frac{9\sqrt{2}-3\sqrt{2}.\sqrt{3}.\sqrt{2}}{6.2}$ $= \frac{9\sqrt{2}-3.2\sqrt{3}}{12}$ $= \frac{3(3\sqrt{2}-2\sqrt{3})}{12}$ $= \frac{3\sqrt{2}-2\sqrt{3}}{4}$	✓ $\times\frac{\sqrt{2}}{\sqrt{2}}$ ✓ simplification ✓ factorisation	(3)
				[20]

QUESTION 3

3.1	$T_4 = -17$	✓ answer	(1)
3.2	$T_n = -7n + 11$	✓ answer	(1)
3.3	$T_n = -7n + 11$ $\therefore -227 = -7n + 11$ $-238 = -7n$ $\therefore n = 34$	✓ substitute T_n ✓ answer	(2)
3.4	$2a = -7$ $a = -\frac{7}{2}$ $\therefore$ maximum  **NOTE:** Any other valid method.	✓ value for a ✓ conclusion	(2)
			[6]

QUESTION 4

4.1	 next term (T_4) is: -120	✓ answer	(1)
4.2	$T_n = an^2 + bn + c$ $\therefore T_2 = a(2)^2 + b(2) + c = 4a + 2b + c$ $\therefore T_1 = a(1)^2 + b(1) + c = a + b + c$ $\therefore T_2 - T_1 = 3a + b$ $2a = 6$ $\therefore a = 3$ $3a + b = -69$ $3(3) + b = -69$ $9 + b = -69$ $\therefore b = -78$ $a + b + c = 69$ $3 + (-78) + c = 69$ $\therefore c = 144$ $\therefore T_n = 3n^2 - 78n + 144$	✓ 2^{nd} difference ✓ value for a ✓ value for b ✓ value for c	(4)

4.3	Smallest term (minimum) is at the turning point of the quadratic equation: $\therefore n = \frac{-b}{2a} = \frac{-(-78)}{2(3)} = \frac{78}{6} = 13$ $T_n = 3n^2 - 78n + 144$ $\therefore T_{13} = 3n^2 - 78n + 144$ $\therefore T_{13} = 3(13)^2 - 78(13) + 144$ $\therefore T_{13} = -363$	✓ substitute into A.O.S ✓ value for n ✓ substitution ✓ answer	(4)
			[9]

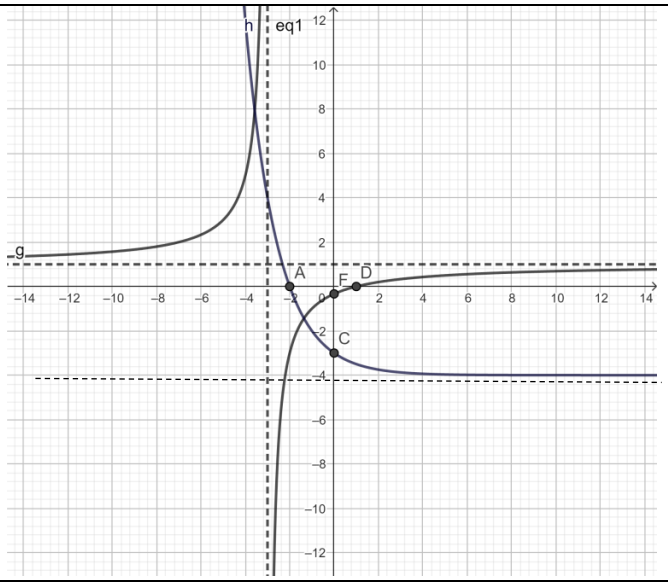
QUESTION 5

5.1	The points A$(-4\ ;\ 0)$ and B$(0\ ;\ 8)$ lie on g. $m_{AB} = \frac{8-0}{0-(-4)}$ $m_{AB} = 2$ $y = mx + c$ $\therefore 8 = 2(0) + c \cdots\cdots A(0;8)$ $\therefore c = 8$ $\therefore g(x) = 2x + 8$ **NOTE:** Any other valid method.	✓ substitute for m_{AB} ✓ value of m_{AB} ✓ value of c	(3)
5.2	$f(x) = a(x - x_1)(x - x_2)$ $f(x) = a(x + 4)(x - 2)$ subst $(0;8)$ $8 = a(0 + 4)(0 - 2)$ $8 = a(-8)$ $a = -1$ $f(x) = -(x + 4)(x - 2)$ $f(x) = -(x^2 + 2x - 8)$ $f(x) = -x^2 - 2x + 8$ $\therefore a = -1$ $b = -2$ $c = 8$	✓ substitute points A and C ✓ value of a ✓ standard form (A) ✓ value of b ✓ value of c	(5)

5.3	$f(x) = -x^2 - 2x + 8$ $\therefore x = \frac{-b}{2a} = \frac{-(-2)}{2(-1)}$ $\therefore x = -1$ $\therefore f(-1) = -(-1)^2 - 2(-1) + 8$ $\therefore f(-1) = 9$ **NOTE:** Any other valid method.	✓ correct substitution ✓ correct substitution	(2)
5.4	$y \leq 9$	✓ answer	(1)
5.5	$m_g = 2$ $\therefore m_p = -\frac{1}{2}$ $y - y_1 = m(x - x_1)$ $\therefore y - 0 = -\frac{1}{2}(x - 2)$ $\therefore y = -\frac{1}{2}x + 1$	✓ m_p ✓ substitute point C ✓ answer	(3)
5.6	$f(-1) = 9$ $g(-1) = 6$ $\therefore f(-1) - g(-1)$ $\therefore PQ = 9 - 6$ $\therefore PQ = 3$ **OR** $DP(-1;9)$ $g(-1) = 6$ $\therefore PQ = 9 - 6$ $\therefore PQ = 3$	✓ $f(-1) = 9$ and $g(-1) = 6$ ✓ answer **OR** ✓ using TP and $g(-1)$ ✓ answer	(2)
5.7	$x \leq 2$; $x \neq -4$	✓✓ answer (A)	(2)
			[18]

QUESTION 6

6.1	$x = -3$ $y = 1$	✓ answer ✓ answer	(2)

6.2	$f(x)=\frac{-4}{x+3}+1$ $0=\frac{-4}{x+3}+1$ $-1=\frac{-4}{x+3}$ $-x-3=-4$ $-x=-1$ $\therefore x=1$ $y=\frac{-4}{0+3}+1$ $y=\frac{-4}{3}+1$ $\therefore y=-\frac{1}{3}$	✓ *x*-intercept ✓ *y*- intercept	(2)
6.3	$y=-4$	✓ answer	(1)
6.4		✓ shape of *k* ✓ *k* and *h* intercepts ✓ asymptotes *k* and *h* ✓ shape of *h*	(4)
6.5	$p(x)=3h(x)$ $\therefore p(x)=3(2^{-x}-4)$ $\therefore p(x)=3.2^{-x}-12$ asymptote: $y=-12$ **NOTE**: Answer only, full marks.	✓ answer	(1)
6.6	$q(x)=2^x-4$	✓ answer	(1)
6.7	$x=0$	✓ answer	(1)
			[12]

TOTAL: 100