LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

GRADE 12

MATHEMATICS

TEST 1

MARKING GUIDELINES

MARCH 2026

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MARKS: 100

These marking guidelines consists of 11 pages

NOTE:

- If a candidate answers a question **TWICE,** only mark the **FIRST** attempt.
- If a candidate crossed out an attempt of a question and not redone the question**,** mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values to solve a problem is **NOT** acceptable**.**



Question 1		
1.1.1	$x^2 - 2x + 1 > 0$ $(x-1)(x-1) > 0$ $Critical\ value:\ x = 1$ $x<1 \quad or \quad x>1$ OR $\therefore x \in \mathbb{R}, x \neq 1$	✓ factors ✓✓correct notation (Accuracy) ✓✓ $x \in \mathbb{R}, x \neq 1$ (Accuracy) (3)
1.1.2	$2x - 1 = \sqrt{4 - 5x}$ $(2x-1)^2 = \left(\sqrt{4-5x}\right)^2$ $4x^2 - 4x + 1 + 5x - 4 = 0$ $4x^2 + x - 3 = 0$ $(4x-3)(x+1) = 0$ or $x = \frac{-1 \pm \sqrt{(1)^2 - 4(4)(-3)}}{2(4)}$ $\therefore x = \frac{3}{4}$ or $x \neq -1$	✓ squaring both sides ✓ standard form ✓ factors ✓ answers with selection (4)
		[7]
Question 2		
2.1.1	$T_4 = -7$	✓ -7 (1)
2.1.2	$T_n = a + (n-1)d$ $-87 = 5 + (n-1)(-4)$ $-87 = 5 - 4n + 4$ $4n = 96$ $n = 24$ **OR** $-4n + 9 = -87$ $-4n = -96$ $n = 24$	✓ $a = 5$ and $d = -4$ ✓ $-87 = 5 + (n-1)(-4)$ ✓ $n = 24$ **OR** ✓ $-4n + 9$ ✓ $-4n + 9 = -87$ ✓ $n = 24$ (3)
2.1.3	-3 ; -7 ; … ; -87 $S_n = \frac{n}{2}[a + T_n]$ $S_{22} = \frac{22}{2}[-3 - 87]$ $S_{22} = -990$	✓ $n = 22$ ✓ $a = -3$ ✓ answer

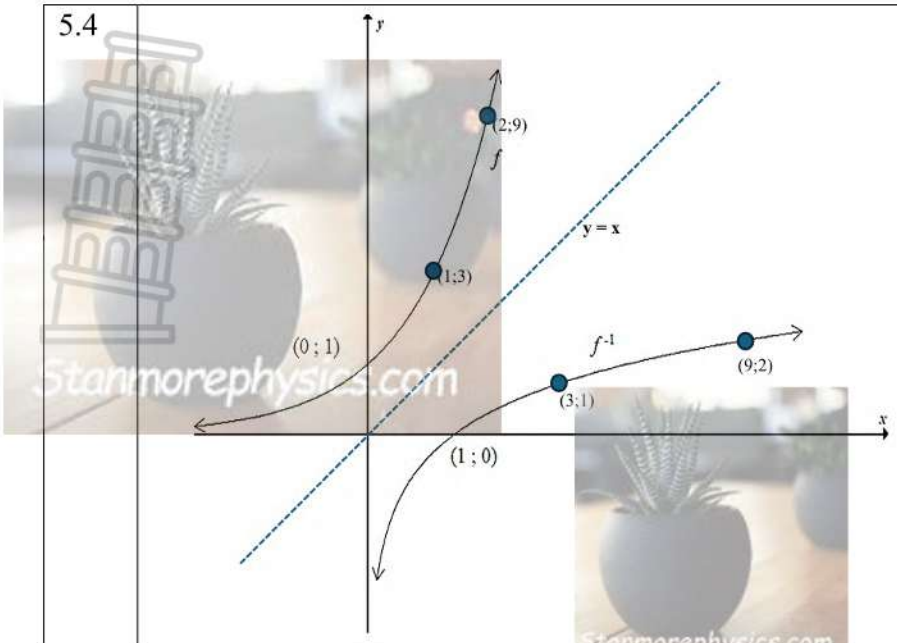
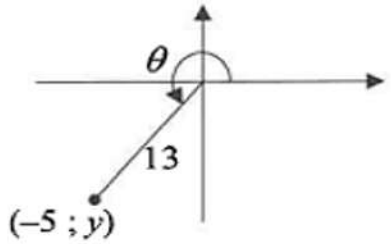
	OR $S_n = \frac{n}{2}[2a + (n-1)d]$ $S_{22} = \frac{22}{2}[2(-3) + (22-1)(-4)]$ $= -990$	✓ $n = 22$ ✓ $a = -3$ ✓ answer
	OR All negative terms can be written down and added to get the answer of -990	✓ $a = -3$ ✓ ✓answer
	OR $Sum = S_{24} - (5+1)$ $= \frac{24}{2}[5 - 87] - 6$ $= -990$	✓ $\frac{24}{2}[5 - 87]$ ✓ -6 ✓ answer (3)
2.2.1	$a + 9d = 21$ $a + 16d = 49$ $\therefore -7d = -28$ $d = 4$	✓$a + 9d = 21$ ✓$a + 16d = 49$ ✓ value of d (3)
2.2.2	$a + 9(4) = 21$ $a = -15$ $T_{18} = T_{17} + 4$ $= 49 + 4$ $T_{18} = 53$ $\therefore T_1 + T_{18}$ $= -15 + 53$ $= 38$	✓ $a = -15$ ✓ $a = -15$ ✓ answer (3)
2.3.1	$T_1 = 4(1) - 19 = -15$ $T_2 = 4(2) - 19 = -11$ $T_3 = 4(3) - 19 = -7$	✓ all three terms (1)
2.3.2	$S_n = \frac{n}{2}[2a + (n-1)d]$ $S_m = \frac{m}{2}[2(-15) + 4(m-1)]$ $1189 = \frac{m}{2}[-30 + 4m - 4]$ $0 = 2m^2 - 17m - 1189$ $(2m + 41)(m - 29) = 0$ $\therefore m = 29 \quad or \quad m \neq -\frac{41}{2}$	✓ substitution and = 1189 ✓ standard form ✓ Factors ✓ answer (4)
		[18]

Question 3		
3.1.1	$-58\ ;\ -48$	✓ Both answers (1)
3.1.2	$T_n = an^2 + bn + c$ $2a = 2\ ;\quad 3a + b = 2\ ;\quad a + b + c = -78$ $a = 1\ ;\quad 3(1) + b = 2\ ;\quad 1 - 1 + c = -78$ $b = -1 \qquad c = -78$ $\therefore T_n = n^2 - n - 78$	✓ $a = 1$ ✓ $b = -1$ ✓ $c = -78$ ✓ answer (4)
3.2.1	5; 10; 20; ….$T_n = a.r^{n-1}$ $T_n = (5)(2)^{n-1}$	✓ answer (1)
3.2.2	$S_n = \frac{a(r^n - 1)}{r - 1}$ $S_{18} = \frac{5[(2)^{18} - 1]}{2 - 1}$ $S_{18} = 1310715$	✓ substitution into the correct formula ✓ answer (2)
3.3	$r = \frac{(2x + 4)(2x - 4)}{2x - 4} = 2x + 4$ Converge: $-1 < r < 1$ $-1 < 2x + 4 < 1$ $-5 < 2x < -3$ $-\frac{5}{2} < x < -\frac{3}{2}$	✓ $r = 2x + 4$ ✓ $-1 < r < 1$ ✓ substitution ✓ answer (4)
		[12]
Question 4		
4.1	$-2x^2 + 4x + 16 = 0$ $x^2 - 2x - 8 = 0$ $(x-4)(x+2) = 0$ $x = 4$ or $x = -2$ $\therefore$ A$(-2;0)$ and B$(4;0)$	✓ factors ✓ $x = -2$ ✓ $x = 4$ (3)
4.2	$f(x) = -2x^2 + 4x + 16$ $-\frac{b}{2a} = -\frac{-4}{-2(2)} = 1$ $f(1) = -2(1)^2 + 4(1) + 16 = 18$ $\therefore$ C$(1;18)$	✓ 1 ✓ 18 (2)
4.3	$y \leq 18$ **OR** $y \in (-\infty;18]$	✓ $y \leq 18$ **OR** ✓ $y \in (-\infty;18]$ (1)

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4.4	TP (1 ; 18) for f TP (2 ; 15) for h $\therefore p = -1 \quad q = -3$	✓ TP (2 ; 15) for h ✓ $p = -1$ ✓ $q = -3$ (3)
4.5	$y = 2x + 4$ $x = 2y + 4$ $\therefore y = \frac{1}{2}x - 2$	✓ swop x and y ✓ $y = \frac{1}{2}x - 2$ (2)
4.6	$g(x) = 0$ or $g^{-1}(x) = 0$ $x = 4$ or $x = -2$ (product 0 at x-intercepts)	✓ $x = 4$ ✓ $x = -2$ (2)
		[13]
Question 5		
5.1	$y > 0$ **OR** $y \in (0 ; \infty)$	✓ answer **OR** ✓ answer (1)
5.2	f: $y = 3^x$ f^{-1}: $x = 3^y$ $y = \log_3 x$	✓ $x = 3^y$ ✓ equation (2)
5.3	$y = \log_3 x$ $2 = \log_3 a$ $a = 3^2 = 9$	✓ correct subst into correct formula (a ; 2) ✓ answer (2)

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5.4	Stanmorephysics.com	For f ✓ shape ✓ y-intercept & a point ✓ axis of symmetry/ y=x For f^{-1} ✓ shape ✓ x-intercept & a point (5)
5.5	Yes. The vertical line test cuts f^{-1} once **OR** Yes. For every x – value there is a unique y – value **OR** Yes. f is a one-to-one function	✓ yes (2) ✓ valid reason **OR** ✓ yes ✓ valid reason (2) **OR** ✓ yes ✓ valid reason (2)
		[12]
Question 6		
6.1.1	$y^2 = \sqrt{(13)^2 - (-5)^2}$ [Pythagoras] $y = -12$  $sin^2\theta$ $= \left(-\frac{12}{13}\right)^2$ $= \frac{144}{169}$ OR $sin^2\theta = 1 - cos^2\theta$	✓ y = -12 ✓ substitution ✓ answer (3) ✓ square identity

	$sin^2\theta = 1 - \left(-\frac{5}{13}\right)^2$ $sin^2\theta = \frac{144}{169}$	✓ substitution ✓ answer (3)
6.1.2	$\cos(\theta - 135°)$ $= cos\theta cos135° + sin\theta sin135°$ $= cos\theta(-cos45°) + sin\theta(sin45°)$ $= \left(-\frac{5}{13}\right)\left(-\frac{\sqrt{2}}{2}\right) + \left(-\frac{12}{13}\right)\left(\frac{\sqrt{2}}{2}\right)$ $= -\frac{7\sqrt{2}}{26}$ OR $\left(-\frac{5}{13}\right)\left(-\frac{1}{\sqrt{2}}\right) + \left(-\frac{12}{13}\right)\left(\frac{1}{\sqrt{2}}\right)$ $-\frac{7}{13\sqrt{2}}$	✓expansion ✓ reduction ✓ substitution ✓ answer (4)
6.2	$LHS = 2cos^2(45° + x)$ $= 2cos^2(45° + x) + 1 - 1$ $= \cos[2(45° + x)] + 1$ $= \cos(90° + 2x) + 1$ $= (-sin2x) + 1$ $= 1 - sin2x$ RHS OR $LHS = 2cos^2(45° + x)$ $= 2(\cos(45° + x))^2$ $= 2(cos45°cosx - sin45°sinx)^2$ $= 2\left(\frac{\sqrt{2}}{2}cosx - \frac{\sqrt{2}}{2}sinx\right)^2$ $= 2\left(\frac{1}{2}cos^2x - sinxcosx + \frac{1}{2}sin^2x\right)$ $= cos^2x - 2sinxcosx + sin^2x$ $= 1 - sin2x$ $= RHS$	✓ +1 – 1 ✓ double angle ✓ simplify ✓ reduction (4) ✓ compound expansion ✓ subst special angle ✓ simplification ✓ square identity (4)
6.3.1	$LHS = \sin(A - B) - \sin(A + B)$ $= sinAcosB - cosAsinB - (sinAcosB + cosAsinB)$ $= sinAcosB - cosAsinB - sinAcosB - cosAsinB$ $= -2cosAsinB$ $= RHS$	✓ $sinAcosB - cosAsinB$ ✓$-sinAcosB - cosAsinB$ (2)
6.3.2	$sin4x - sin10x$ $= \sin(7x - 3x) - \sin(7x + 3x)$ $= -2cos7xsin3x$	✓ $7x - 3x$ & $7x + 3x$ ✓ answer (2)

6.3.3	$\sin 4x - \sin 10x = \sin 3x$ $-2\cos 7x \sin 3x = \sin 3x$ $2\cos 7x \sin 3x + \sin 3x = 0$ $\sin 3x\,(2\cos 7x + 1) = 0$ $\sin 3x = 0 \quad or \quad \cos 7x = -\frac{1}{2}$ $3x = 0° \qquad 7x = 120° \quad or \quad 7x = 240°$ $x = 0° \qquad x = 17{,}14° \quad x = 34{,}29°$(N/A)	✓ substitution ✓ factorisation ✓ both equations ✓ answer ✓answer (5)
		[20]
Question 7		
7.1.1	180°	✓ answer (1)
7.1.2	1	✓ answer (1)
7.2	$1 - 2sin^2x = -\sin x$ $2sin^2x - sinx - 1 = 0$ $(2sinx + 1)(sinx - 1) = 0$ $sinx = -\frac{1}{2}$ or $sinx = 1$ Ref $\angle = 30°$ ref $\angle = 90°$ $x = 210° + k.360°$ $x = 90° + k.360°$ Or $x = 330° + k.360°$ $x = -150° \quad or \quad x = -30° \quad or \quad x = 90°$ OR $cos2x = -sinx$ $cos2x = \cos(90° - x)$ $2x = 180° - (90° - x) + k.360°$ or $2x = 180° + (90° - x) + k.360°$ $2x = 90° + x + k.360°$ or $2x = 270° - x + k.360°$ $x = 90° + k.360°$ or $x = 90° + k.120°$ $= -150° \quad or \quad x = -30° \quad or \quad x = 90°$ OR $cos2x = -sinx$ $cos2x = \cos(90° + x)$ $2x = 90° + x + k.360°$ or $2x = 360° - (90° + x) + k.360°$ $x = 90° + k.360°$ or $3x = 270° + k.360°$ $x = 90° + k.120°$ $x = -150° \quad or \quad x = -30° \quad or \quad x = 90°$	✓ identity ✓ factors ✓ $sinx = -\frac{1}{2}$ ✓ $sinx = 1$ ✓$-150°$ and $-30°$ (6) ✓ 90° ✓ co-function ✓ $2x$ in quadrant 2 ✓ $2x$ in quadrant 3 ✓ both general solutions ✓$-150°$ and $-30°$ ✓ 90° (6) ✓ co-function ✓ $2x$ in quadrant 1 ✓ $2x$ in quadrant 4 ✓ both general solutions ✓$-150°$ and $-30°$ ✓ 90° (6)

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	OR $cos2x = -sinx$ $\sin(90° - 2x) = -sinx$ $90° - 2x = 180° + x + k.360°$ or $90° - 2x = 360° - x + k.360°$ $x = -30° + k.120°$ or $x = -270° + k.360°$ $= -150°$ or $x = -30°$ or $x = 90°$	✓ co-function ✓ $90° - 2x$ in quadrant 3 ✓ $90° - 2x$ in quadrant 4 ✓ both general solutions ✓ $-150°$ and $-30°$ ✓ $90°$ (6)
7.3	$A(-150°; 0,5)$ $B(-30°; 0.5)$ AB = $-30° - (-150°)$ AB = $120°$	✓ AB = $-30° - (-150°)$ ✓ answer (2)
		[10]
Question 8		
8.1.1	$\frac{AC}{20} = \cos 30°$ $AC = 20\cos 30°$ $AC = 10\sqrt{3} = 17,32\ units$ OR $\frac{AC}{\sin 60°} = \frac{20}{\sin 90°}$ $\therefore AC = 20\sin 60° = 17,32\ units$	✓ trig ratio ✓ answer (2) ✓ trig ratio ✓ answer (2)
8.1.2	$AB^2 = AC^2 + BC^2 - 2AC.BCcos\ A\hat{C}B$ $AB^2 = \left(10\sqrt{3}\right)^2 + (8)^2 - 2(10\sqrt{3})(8)Ccos\ 100°$ $AB = 20,30\ units$	✓ cosine formula ✓ substitution into cosine formula ✓ answer (3)
8.2	$\frac{\sin A\hat{D}B}{AB} = \frac{\sin A\hat{B}D}{AD}$ $\frac{\sin A\hat{D}B}{20,3} = \frac{\sin 73,4°}{20}$ $\sin A\hat{D}B = \frac{\sin 73,4°}{20}$ $A\hat{D}B = 76,58°$	✓ sine formula in ΔABD ✓ substitution in the sine formula ✓ answer (3) **[8]**
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