LIMPOPO

PROVINCIAL GOVERNMENT

REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF

EDUCATION

NATIONAL

SENIOR CERTIFICATE

GRADE 11

MATHEMATICS

MARCH TEST

2025

MARKING GUIDELINES

MARKS : 100

These marking guidelines consist of 9 pages.

QUESTION 1

1.1.1	$\frac{9x^{-2}}{27x^{-3}}$ $=\frac{3^2x^3}{3^3x^2}$ $=\frac{x}{3}$	✓ apply exponent law ✓ answer	(2)
1.1.2	$\frac{8^x.6^{x-1}}{27^{\frac{x}{3}}.16^x}$ $=\frac{2^{3x}.(2\times3)^{x-1}}{(3^3)^{\frac{x}{3}}.2^{4x}}$ $=\frac{2^{3x}.2^{x-1}.3^{x-1}}{3^x.2^{4x}}$ $=2^{3x+x-1-4x}.3^{x-1-x}$ $=2^{-1}.3^{-1}$ $=\frac{1}{6}$	✓ prime number bases ✓ apply exponent law ✓ apply exponent law ✓ answer	(4)
1.1.3	$(0,25x^4y^8)^{-\frac{1}{4}}$ $=(2^{-2}x^4y^8)^{-\frac{1}{4}}$ $=2^{\frac{1}{2}}x^{-1}y^{-2}$ $=\frac{2^{\frac{1}{2}}}{xy^2}$ or $\frac{\sqrt{2}}{xy^2}$	✓ prime number bases ✓ apply exponent law ✓ answer	(3)
1.1.4	$\frac{a^{-2}-b^{-2}}{b^2-a^2}$ $=\frac{\frac{1}{a^2}-\frac{1}{b^2}}{b^2-a^2}$ $=\frac{\frac{b^2-a^2}{a^2b^2}}{b^2-a^2}$ $=\frac{b^2-a^2}{a^2b^2}\times\frac{1}{b^2-a^2}$ $=\frac{1}{a^2b^2}$	✓ apply exponent law ✓ lcm ✓ answer	(3)

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1.2	$\sqrt[3]{\left(\sqrt{13}-\sqrt{5}\right)^6}.\sqrt[3]{\left(\sqrt{13}+\sqrt{5}\right)^6}$ $=\left(\sqrt{13}-\sqrt{5}\right)^{\frac{6}{3}}.\left(\sqrt{13}+\sqrt{5}\right)^{\frac{6}{3}}$ $=\left(\sqrt{13}-\sqrt{5}\right)^2.\left(\sqrt{13}+\sqrt{5}\right)^2$ $=\left(13-2\sqrt{13}\sqrt{5}+5\right).\left(13+2\sqrt{13}\sqrt{5}+5\right)$ $=\left(18-2\sqrt{13}\sqrt{5}\right).\left(18+2\sqrt{13}\sqrt{5}\right)$ $=(18)^2-\left(2\sqrt{13}\sqrt{5}\right)^2$ $=64$	✓ method ✓ simplification ✓ simplification ✓ method ✓ answer	(5)
1.3	$\frac{x-3}{x+3}-\frac{x+3}{x^2-9}$ $=\frac{x-3}{x+3}-\frac{x+3}{(x+3)(x-3)}$ $=\frac{(x-3)(x-3)-(x+3)}{(x+3)(x-3)}$ $=\frac{x^2-6x+9-x-3}{(x+3)(x-3)}$ $=\frac{x^2-7x+6}{(x+3)(x-3)}$	✓ $(x-3)(x+3)$ ✓ lcd ✓ x^2-6x+9 ✓ $-x-3$ ✓ answer	(5)
			[22]

QUESTION 2

2.1	$(3x-5)(x+1)=0$ $\therefore x=\frac{5}{3}$ or $x=-1$	✓ $x=\frac{5}{3}$ ✓ $x=-1$	(2)
2.2	$x^2-3x=0$ $x(x-3)=0$ $x=0$ or $x=3$	✓ common factor ✓ answer	(2)

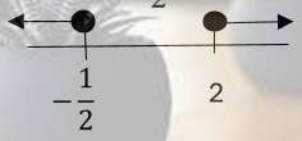
2.3	$\frac{x}{2x+1}=\frac{2}{x+3}$ $x(x+3)=2(2x+1)$ $x^2+3x=4x+2$ $x^2+3x-4x-2=0$ $x^2-x-2=0$ $(x-2)(x+1)=0$ $\therefore x=2$ or $x=-1$	✓ method ✓ simplifying ✓ standard form ✓ factor ✓ answer	(5)
2.4	$2x^2+7x=2$ $2x^2+7x-2=0$ $x=\frac{-(7)\pm\sqrt{(7)^2-4(2)(-2)}}{2(2)}$ $x=\frac{-7\pm\sqrt{65}}{4}$ $\therefore x=0,27$ or $x=-3,77$	✓ standard form ✓ substitution ✓ simplifying ✓ both answers	(4)
2.5	$x^{\frac{2}{3}}=4$ $\left(x^{\frac{2}{3}}\right)^3=4^3$ $x^2=64$ $\sqrt{x^2}=\pm\sqrt{64}$ $\therefore x=\pm 8$ OR $x^{\frac{2}{3}}=4$ $\left(x^{\frac{2}{3}}\right)^3=4^3$ $x^2=64$ $x^2-64=0$ $(x+8)(x-8)=0$ $\therefore x=-8$ or $x=8$	✓ simplifying ✓ simplifying ✓✓ both answers ✓ simplifying ✓ factors ✓✓ both answers	(4)
2.6	$\sqrt{x-3}-4=5$ $\sqrt{x-3}=9$ $\left(\sqrt{x-3}\right)^2=(9)^2$ $x-3=81$ $\therefore x=84$	✓ isolating surd ✓ squaring both sides ✓ simplifying ✓ answer	(4)

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2.7	$9^x + 9 = 10.3^x$ $3^{2x} - 10.3^x + 9 = 0$ Let $k = 3^x$ $k^2 - 10k + 9 = 0$ $(k-1)(k-9) = 0$ $k = 1$ or $k = 9$ $\therefore 3^x = 3^0$ or $3^x = 3^2$ $\therefore x = 0$ or $x = 2$ ALTERNATIVE METHOD: $9^x + 9 = 10.3^x$ $3^{2x} - 10.3^x + 9 = 0$ $(3^x - 1)(3^x - 9) = 0$ $3^x = 1$ or $3^x = 9$ $\therefore 3^x = 3^0$ or $3^x = 3^2$ $\therefore x = 0$ or $x = 2$	✓ standard form ✓ k-method ✓ factors ✓ both answers for k ✓ answer ✓ standard form ✓ factors ✓ both answers for x ✓ prime number base ✓ answer	(5)
			[26]

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QUESTION 3

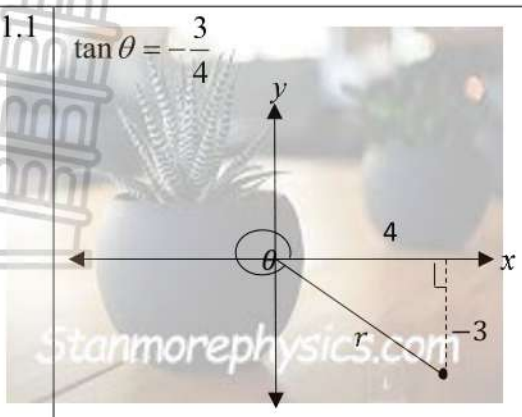
3.1	$2x^2 - 2 \geq 3x$ $2x^2 - 3x - 2 \geq 0$ $(2x+1)(x-2) \geq 0$ CV: $x = -\frac{1}{2}$ or $x = 2$  $x \leq -\frac{1}{2}$ or $x \geq 2$	✓ standard form ✓ factors ✓ critical values ✓ answer	(4)

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3.2	$2y^2+4xy=6x^2\ldots①$ $y-2x=-1\ldots②$ From ② then: $y=2x-1\ldots③$ Substitute ③ into ① $2(2x-1)^2+4x(2x-1)=6x^2$ $2(4x^2-4x+1)^2+8x^2-4x-6x^2=0$ $8x^2-8x+2+2x^2-4x=0$ $10x^2-12x+2=0$ $5x^2-6x+1=0$ $(5x-1)(x-1)=0$ $x=\frac{1}{5}$ or $x=1$ $y=2\left(\frac{1}{5}\right)-1$ or $y=2(1)-1$ $y=-\frac{3}{5}$ or $y=1$	✓ …③ ✓ substitution ✓ simplifying ✓ standard form ✓ values of x ✓ values of y	(6)
3.3	$m^2+mx-12=0$ $\Delta=(m)^2-4(m)(-12)$ $\Delta=m^2+48m$ $m^2>0$ if $m>0$ and $48m>0$ if $m>0$ $\therefore\Delta>0$	✓ substitution ✓ Δ ✓ $m^2>0$ ✓ $48m>0$	(4)
			[14]

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QUESTION 4

4.1.1	$\tan\theta = -\frac{3}{4}$  $r^2 = (4)^2 + (-3)^2$ Pythagoras $r^2 = 25$ $\therefore r = 5$ $\therefore \sin\theta = -\frac{3}{5}$	✓ diagram ✓ substitution ✓ value of r ✓ answer	(4)
4.1.2	$\cos(180° - \theta)$ $= -\cos\theta$ $= -\frac{4}{5}$	✓ $= -\cos\theta$ ✓ answer	(2)
4.2.1	$\sin 17° = \frac{a}{1}$ $x^2 = (1)^2 - (a)^2$ $\therefore x = \sqrt{1-a^2}$ $\tan 17° = \frac{a}{\sqrt{1-a^2}}$	✓ substitution ✓ value of x ✓ answer	(3)
4.2.2	$\sin 107°$ $= \sin(90° + 17°)$ $= \cos 17°$ $= \sqrt{1-a^2}$	✓ $\cos 17°$ ✓ answer	(2)
4.2.3	$\cos^2 253° + \sin^2 557°$ $= (\cos 180° + 73°)^2 + (\sin 180° + 17°)^2$ $= (-\cos 73°)^2 + (-\sin 17°)^2$ $= (-a)^2 + (-a)^2$ $= 2a^2$	✓ $\cos 73°$ ✓ $-\sin 17°$ ✓ method ✓ answer	(4)
			[15]

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QUESTION 5

5.1	$\frac{\cos(-225°).\sin 135° + \sin 330°}{\tan 225°}$ $= \frac{\cos 225°.\sin 135° + \sin 330°}{\tan 225°}$ $= \frac{\cos(180°+45°).\sin(180°-45°) + \sin(360°-30°)}{\tan(180°+45°)}$ $= \frac{-\cos 45°.\sin 45° - \sin 30°}{\tan 45°}$ $= \frac{-\frac{1}{\sqrt{2}}.\frac{1}{\sqrt{2}} - \frac{1}{2}}{1}$ $= -\frac{1}{2} - \frac{1}{2}$ $= -1$	✓ $-\cos 45°$ ✓ $\sin 45°$ ✓ $-\sin 45°$ ✓ $\tan 45°$ ✓ substitution ✓ answer	(6)
5.2	$\frac{\sin(180°-A).\tan A.\sin(90°+A)}{\tan(180°+A).\sin(-A).\cos(-A)}$ $= \frac{\sin A.\tan A.\cos A}{\tan A.(-\sin A).\cos A}$ $= -1$	✓ $\sin A$ ✓ $\cos A$ ✓ $\tan A$ ✓ $-\sin A$ ✓ $\cos A$ ✓ answer	(6)
			[12]

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QUESTION 6

6.1	$(\sin x+\cos x)^2=1+2\sin x.\cos x$ LHS: $(\sin x+\cos x)^2$ LHS: $\sin^2 x+2\sin x\cos x+\cos^2 x$ LHS: $1+2\sin x\cos x$ LHS = RHS	✓ $\sin^2 x+\cos^2 x$ ✓ $2\sin x\cos x$ ✓ 1	(3)
6.2.1	$\frac{\sin x}{1+\cos x}+\frac{\cos x}{\sin x}=\frac{1}{\sin x}$ LHS: $\frac{\sin x}{1+\cos x}+\frac{\cos x}{\sin x}$ LHS: $\frac{\sin^2 x+\cos x(1+\cos x)}{(1+\cos x).\sin x}$ LHS: $\frac{\sin^2 x+\cos x+\cos^2 x}{(1+\cos x).\sin x}$ LHS: $\frac{1+\cos x}{(1+\cos x).\sin x}$ LHS: $\frac{1}{\sin x}$ LHS: RHS	✓ Numerator ✓ LCD ✓ Simplifying ✓1 ✓ Simplifying	(5)
6.2.2	$x=0°;180°;360°$	✓ 0° ✓180° ✓ 360°	(3)
			[11]

TOTAL: 100 MARKS

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