GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

JOHANNESBURG WEST DISTRICT

MARKING MEMORANDUM
CONTROLLED TEST 1
01 MARCH 2023

GRADE 11

MATHEMATICS

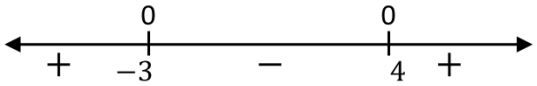
MARKS: 50

This Marking Guidelines consists of 6 pages including this cover page.

IMPORTANT NOTES AND INFORMATION

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Accept any other Mathematically valid attempt which yields a correct answer and credit full marks.
- Consistent accuracy applies in ALL aspects of the marking memorandum.
- Assuming answers/values in order to solve a problem is NOT acceptable.

QUESTION 1

1.1	$x(5x+2)=0$ $x=0$ or $x=-\frac{2}{5}$	✓✓Each root	(2)
1.2	$2x^2-3x-4=0$ $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\frac{-(-3)\pm\sqrt{(-3)^2-4(2)(-4)}}{2(2)}$ $=\frac{3\pm\sqrt{41}}{4}$ $x=-0{,}85$ or $x=2{,}35$	✓Standard form ✓Substitution into quadratic formula ✓✓Each root $x=-0{,}85$ or $x=2{,}35$ **(-1, if incorrect rounding)**	(4)
1.3	$x^2-x-6\geq 6$ $x^2-x-12\geq 0$ $(x+3)(x-4)\geq 0$  $x\leq -3$ or $x\geq 4$	✓Standardd form ✓Factors ✓Both critical values ✓notation	(4)
1.4	$2^{x+2}+2^{x-2}+2^x=42$ $2^2 2^x+\frac{2^x}{2^2}+2^x=42$ $2^x\left(2^2+\frac{1}{2^2}+1\right)=42$ $2^x=\frac{42.4}{21}$ $2^x=2^3$ $x=3$	✓Common factor ✓Simplification ✓Same base ✓Answer	(4)

1.5	$\sqrt{4x-11}=2-x$ $4x-11=4-4x+x^2$ $x^2-8x+15=0$ $(x-5)(x-3)=0$ $x=5$ or $x=3$ Checking shows No Solution	✓Squaring both sides ✓Standard form ✓Factors ✓Each root ✓No solution	(5)
			[19]

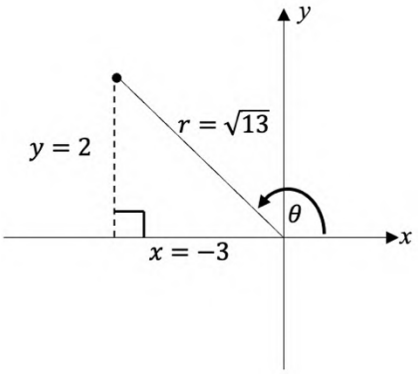
QUESTION 2

2.1	$\left(\frac{\sqrt{7^{2011}}-\sqrt{7^{2009}}}{\sqrt{7^{2008}}}+\sqrt{7}\right)^2$ $=\left(\frac{\sqrt{7^{2008}}\left(\sqrt{7^3}-\sqrt{7^1}\right)}{\sqrt{7^{2008}}}+\sqrt{7}\right)^2$ $=\left(\sqrt{7^3}-\sqrt{7^1}+\sqrt{7}\right)^2$ $=\left(7\sqrt{7}-\sqrt{7}+\sqrt{7}\right)^2$ $=\left(7\sqrt{7}\right)^2$ $=343$ **OR** $\left(\frac{\sqrt{7^{2011}}-\sqrt{7^{2009}}}{\sqrt{7^{2008}}}+\sqrt{7}\right)^2$ $=\left(\frac{7^{\frac{2011}{2}}-7^{\frac{2009}{2}}}{7^{\frac{2008}{2}}}+7^{\frac{1}{2}}\right)^2$ $=\left(\frac{7^{\frac{2009}{2}}(7-1)}{7^{1004}}+7^{\frac{1}{2}}\right)^2$ $=\left(7\cdot 7^{\frac{1}{2}}\right)^2$ $=343$	✓$\sqrt{7^{2008}}$ ✓$\sqrt{7^3}-\sqrt{7^1}$ ✓$\left(7\sqrt{7}\right)^2$ ✓Answer ✓$7^{\frac{2009}{2}}$ ✓$(7-1)$ ✓$\left(7\cdot 7^{\frac{1}{2}}\right)^2$ ✓Answer	(4) (4)

2.2	From (1) : $y = 2x - 3$ Subst. (1) into (2) $x^2 + 5x(2x-3) + (2x-3)^2 = 15$ $x^2 + 10x^2 - 15x + 4x^2 - 12x + 9 - 15 = 0$ $15x^2 - 27x - 6 = 0$ $(5x+1)(3x-6) = 0$ $x = \frac{-1}{5}$ or $x = 2$ $y = \frac{-17}{5}$ or $y = 1$ **OR** $2x - y = 3 \rightarrow (1)$ $x^2 + 5xy + y^2 = 15 \rightarrow (2)$ From (1) : $x = \frac{y+3}{2}$ Subst. (1) into (2) $\left(\frac{y+3}{2}\right)^2 + 5y\left(\frac{y+3}{2}\right) + y^2 = 15$ $\left(\frac{y^2+6y+9}{4}\right) + \frac{5y^2+15y}{2} + y^2 = 15$ $y^2 + 6y + 9 + 10y^2 + 30y + 4y^2 = 60$ $15y^2 + 36y - 51 = 0$ $5y^2 + 12y - 17 = 0$ $(5y+17)(y-1) = 0$ $y = \frac{-17}{5}$ or $y = 1$ $x = \frac{-1}{5}$ or $x = 2$	✓ y as subject CA✓Substitution $y = 2x - 3$ CA ✓Std. form CA ✓factors CA ✓ x values CA ✓ y values ✓ x as subject CA ✓ substitution $x = \frac{y+3}{2}$ CA ✓Std. form CA ✓factors CA ✓ y values CA ✓ y values	(6) (6)
2.3.1	Roots are non-real (imaginary), $\Delta < 0$	✓✓Roots are non-real **OR** imaginary	(2)
2.3.2	Roots are real and equal, $\Delta = 0$	✓Roots are real ✓Roots are equal	(2)

2.4	$x = \frac{-2 \pm \sqrt{13-2k}}{3}$ $\therefore \Delta = 13 - 2k \geq 0$ $\therefore 2k \leq 13$ $\therefore k \leq \frac{13}{2}$	✓$\Delta \geq 0$ ✓simplifying ✓ $k \leq \frac{13}{2}$	(3)
			[17]

QUESTION 3

3.1	$\tan\theta = -\frac{2}{3} = \frac{y}{x}$  $r^2 = x^2 + y^2$ [Pythagoras] $r^2 = (3)^2 + (-2)^2$ $\therefore r = \sqrt{13}$ units $\cos\theta \,.\, \sin\theta = \left(-\frac{3}{\sqrt{13}}\right).\left(\frac{2}{\sqrt{13}}\right)$ $= -\frac{6}{13}$	✓ correct sketch in the correct quadrant ✓ $r = \sqrt{13}$ ✓ substitution ✓ answer	(4)

3.2	$\frac{\sin(360°-x).\tan(-x)}{\cos(180°+x).(\sin^2 A+\cos^2 A)}$ $=\frac{-\sin x.(-\tan x)}{-\cos x.1}$ $=\frac{-\sin x.\left(-\frac{\sin x}{\cos x}\right)}{-\cos x.1}$ $=-\sin x$	✓ $-\sin x$ ✓ $-\cos x$ ✓ $-\tan x$ ✓ $-\frac{\sin x}{\cos x}$ ✓ 1 ✓ answer	(6)
3.3	LHS $=\tan\theta-\frac{\cos\theta}{\sin\theta}$ $=\frac{\sin\theta}{\cos\theta}-\frac{\cos\theta}{\sin\theta}$ $=\frac{\sin^2\theta-\cos^2\theta}{\sin\theta.\cos\theta}$ $=\frac{1-\cos^2\theta-\cos^2\theta}{\sin\theta.\cos\theta}$ $=\frac{1-2\cos^2\theta}{\sin\theta.\cos\theta}$ $\therefore$ LHS = RHS **OR** LHS $=\frac{1-2\cos^2\theta}{\sin\theta.\cos\theta}$ $=\frac{\sin^2\theta+\cos^2\theta-2\cos^2\theta}{\sin\theta.\cos\theta}$ $=\frac{\sin^2\theta-\cos^2\theta}{\sin\theta.\cos\theta}$ $=\frac{\sin\theta}{\cos\theta}-\frac{\cos\theta}{\sin\theta}$ $=\tan\theta-\frac{\cos\theta}{\sin\theta}$ $\therefore$ LHS = RHS	✓ $\frac{\sin\theta}{\cos\theta}$ ✓ $\sin^2\theta-\cos^2\theta$ ✓ LCD: $\sin\theta.\cos\theta$ ✓ $1-\cos^2\theta$ **OR** ✓ $\sin^2\theta+\cos^2\theta$ ✓ $\sin^2\theta-\cos^2\theta$ ✓ $\frac{\sin\theta}{\cos\theta}-\frac{\cos\theta}{\sin\theta}$ ✓ conclusion	(4)
			[14]

TOTAL = 50 MARKS