



GAUTENG PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

JOHANNESBURG WEST DISTRICT

**TERM 1
CONTROLLED TEST
01 MARCH 2023**

GRADE 11

MATHEMATICS

MARKS: 50

DURATION: 1 HOUR

This question paper consists of 5 pages including this cover sheet.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of 3 questions.
2. Answer **ALL** the questions in your answer book.
3. Use the appropriate and correct numbering system as it is used on this paper.
4. Clearly show **ALL** calculations, diagrams, graphs, et cetera that you have used in determining your answers.
5. Answers only will **NOT** necessarily be awarded full marks.
6. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
7. If necessary, answers should be rounded off to **TWO** decimal places, unless stated otherwise.
8. Diagrams are **NOT** necessarily drawn to scale.
9. It is in your own interest to write legibly and to present your work neatly.



QUESTION 1

Solve for x

1.1 $x(5x + 2) = 0$ (2)

1.2 $x(2x - 3) = 4$ (correct to TWO decimal places) (4)

1.3 $x^2 - x - 6 \geq 6$ (4)

1.4 $2^{x+2} + 2^{x-2} + 2^x = 42$ (4)

1.5 $\sqrt{4x - 11} = 2 - x$ (5)

[19]

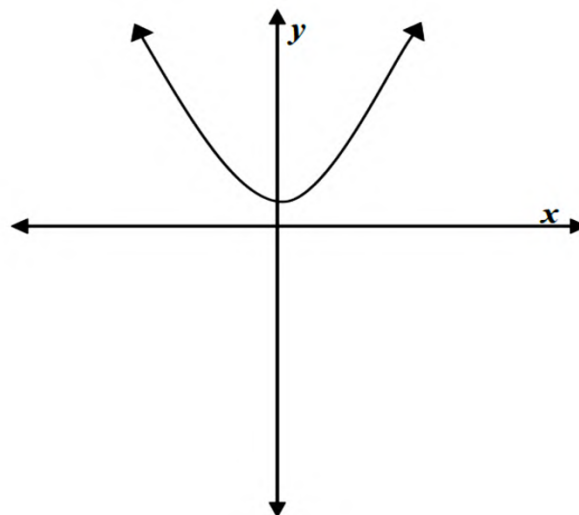
QUESTION 2

2.1 Simplify, **without using a calculator** $\left(\frac{\sqrt{7^{2011}} - \sqrt{7^{2009}}}{\sqrt{7^{2008}}} + \sqrt{7} \right)^2$ (4)

2.2 Solve for x and y simultaneously if:
 $2x - y = 3$ and $x^2 + 5xy + y^2 = 15$ (6)

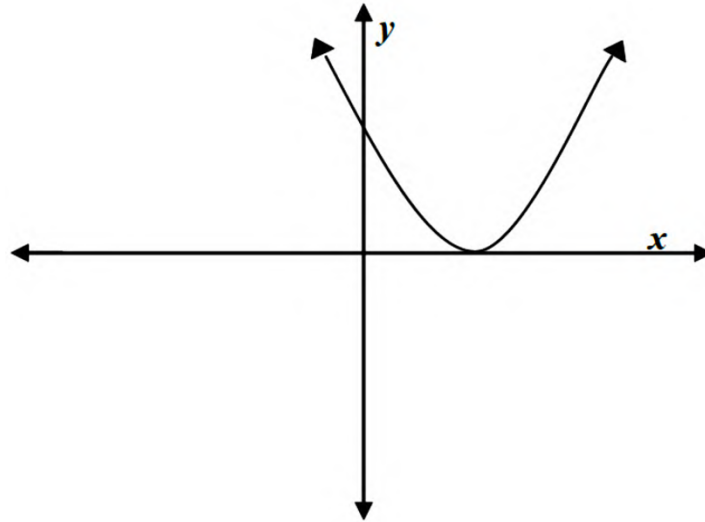
2.3 Discuss the nature of the roots of the following graphs

2.3.1



(2)

2.3.2



(2)

2.4 The solution of a quadratic equation is given by:

$$x = \frac{-2 \pm \sqrt{13 - 2k}}{3}$$

Determine the value of k for which these x -values will be rational.

(3)

[17]



QUESTION 3

3.1 If $\tan \theta = -\frac{2}{3}$ and $\sin \theta > 0$, calculate by using a sketch, the value of

$$\cos \theta \cdot \sin \theta \quad (4)$$

3.2 Simplify the following expression to a single trigonometric ratio:

$$\frac{\sin(360^\circ - x) \cdot \tan(-x)}{\cos(180^\circ + x) \cdot (\sin^2 A + \cos^2 A)} \quad (6)$$

3.3 Prove the identity:

$$\tan \theta - \frac{\cos \theta}{\sin \theta} = \frac{1 - 2 \cos^2 \theta}{\sin \theta \cdot \cos \theta} \quad (4)$$

[14]

TOTAL = 50 MARKS





JOHANNESBURG WEST DISTRICT

**MARKING MEMORANDUM
CONTROLLED TEST 1
01 MARCH 2023**

GRADE 11

MATHEMATICS

MARKS: 50

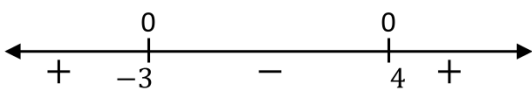
This Marking Guidelines consists of 6 pages including this cover page.



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 $x \geq 4$	✓ Standard 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)

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	$\tan \theta = -\frac{2}{3} = \frac{y}{x}$ <div style="text-align: center;"> </div> <p style="text-align: center;">[Pythagoras]</p> $r^2 = x^2 + y^2$ $r^2 = (3)^2 + (-2)^2$ $\therefore r = \sqrt{13} \text{ units}$ $\cos \theta \cdot \sin \theta = \left(-\frac{3}{\sqrt{13}}\right) \cdot \left(\frac{2}{\sqrt{13}}\right)$ $= -\frac{6}{13}$	✓ correct sketch in the correct quadrant ✓ $r = \sqrt{13}$ ✓ substitution ✓ answer	(4)
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3.2	$\frac{\sin(360^\circ - x) \cdot \tan(-x)}{\cos(180^\circ + x) \cdot (\sin^2 A + \cos^2 A)}$ $= \frac{-\sin x \cdot (-\tan x)}{-\cos x \cdot 1}$ $= \frac{-\sin x \cdot \left(-\frac{\sin x}{\cos x}\right)}{-\cos x \cdot 1}$ $= -\sin x$	✓ $-\sin x$ ✓ $-\cos x$ ✓ $-\tan x$ ✓ $-\frac{\sin x}{\cos x}$ ✓ 1 ✓ answer	(6)
3.3	$\text{LHS} = \tan \theta - \frac{\cos \theta}{\sin \theta}$ $= \frac{\sin \theta}{\cos \theta} - \frac{\cos \theta}{\sin \theta}$ $= \frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{1 - \cos^2 \theta - \cos^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{1 - 2\cos^2 \theta}{\sin \theta \cdot \cos \theta}$ <p>∴ LHS = RHS</p> <p>OR</p> $\text{LHS} = \frac{1 - 2\cos^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin^2 \theta + \cos^2 \theta - 2\cos^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta \cdot \cos \theta}$ $= \frac{\sin \theta}{\cos \theta} - \frac{\cos \theta}{\sin \theta}$ $= \tan \theta - \frac{\cos \theta}{\sin \theta}$ <p>∴ LHS = RHS</p>	$\checkmark \frac{\sin \theta}{\cos \theta}$ $\checkmark \sin^2 \theta - \cos^2 \theta$ $\checkmark \text{LCD: } \sin \theta \cdot \cos \theta$ $\checkmark 1 - \cos^2 \theta$ <p>OR</p> $\checkmark \sin^2 \theta + \cos^2 \theta$ $\checkmark \sin^2 \theta - \cos^2 \theta$ $\checkmark \frac{\sin \theta}{\cos \theta} - \frac{\cos \theta}{\sin \theta}$ $\checkmark \text{conclusion}$	(4)
			[14]

TOTAL = 50 MARKS

