LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

SEKHUKHUNE SOUTH DISTRICT

GRADE 10

MATHEMATICS

TEST 1

MARCH 2023

MARKS : 50 MARKS

DURATION: 1 HOUR.

This question paper consist of 4 pages including cover page.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions .

1. This question paper consists of 2 questions.
2. Answer all the questions.
3. Clearly show all the calculations, diagrams, graphs, et cetera that you have used in determining your answers.
4. Answers only will not necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round your answers off to two decimal places, unless stated otherwise.
7. Number your answers correctly according to the numbering system used in this question paper.
8. It is in your best interest to write neatly and legibly.

QUESTION 1

1.1 If $x = \sqrt{2}$ and $y = -2$, decide whether the following expressions are rational, irrational or no real

1.1.1 xy (1)

1.1.2 $\frac{1}{x}$ (1)

1.1.3 x^2 (1)

1.1.4 $\sqrt{y}$ (1)

1.2 Expand the following expressions:

1.2.1 $(a-2)(a^2+2a+4)$ (2)

1.2.2 $-(2x-5)^2$ (2)

1.2.3 $\left(\frac{a}{2}+1\right)\left(\frac{a}{2}-1\right)$ (2)

1.3 Simplify completely

1.3.1 $x-3-\frac{5x-6}{2-x}-\frac{4}{x-2}$ (4)

1.3.2 $\frac{4^{2y-1}.9^{y+1}}{18^y.8^{y-1}}$ (4)

1.3.3 $\frac{2^{2n+2}-2^{2n+1}}{4^{n+1}}$ (3)

1.4 Factorise the following:

1.4.1 $8x^3+1$ (2)

1.4.2 $2x^2-x-6$ (2)

1.4.3 $a^2-2ab-2b^2+ab$ (3)

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QUESTION 2

2.1 Solve for x :

2.1.1 $x^2 = 5x$ (3)

2.1.2 $R = \frac{2\sqrt{x}}{3S}$ (3)

2.1.3 $\left(\frac{1}{3}\right)^{x-1} = 27$ (3)

2.1.4 $3(2 - 3x) \geq 15$ (4)

2.2 Solve for a and b simultaneously:

$a + b = 12$ and $4a + 2b = 44$ (5)

2.3 George is 7 times as old as his son. In 25 years' time he will be twice as old as his son. Calculate his son's present age.

HINT: variable x may be used to develop equations. (4)

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TOTAL : 50

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GRADE 10

MATHEMATICS
MEMORANDUM
MARCH 2023

MARKS: 50 MARKS

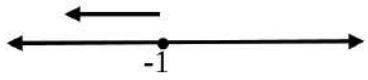
DURATION: 1 HOUR.

This memorandum consist of 6 pages including cover page.

QUESTION 1				
1.1				
	1.1.1	Irrational	✓ Irrational	(1)
	1.1.2	Irrational	✓ Irrational	(1)
	1.1.3	Rational	✓ Rational	(1)
	1.1.4	Non-real	✓ Non-real	(1)
1.2				
	1.2.1	$(a-2)(a^2+2a+4) = a^3-8$	✓ a^3 ✓ -8	(2)
	1.2.2	$-(2x-5)^2 = -(4x^2-20x+25)$ $= -4x^2+20x-25$	✓ $4x^2-20x+25$ ✓ Answer	(2)
	1.2.3	$\left(\frac{a}{2}+1\right)\left(\frac{a}{2}-1\right) = \frac{a^2}{4}-1$	✓ $\frac{a^2}{4}$ ✓ -1	(2)
1.3				
	1.3.1	$x-3-\frac{5x-6}{2-x}-\frac{4}{x-2} = x-3+\frac{5x-6}{x-2}-\frac{4}{x-2}$ $= \frac{x(x-2)-3(x-2)+5x-6-4}{x-2}$ $= \frac{x^2-2x-3x+6+5x-6-4}{x-2}$ $= \frac{x^2-4}{x-2}$ $= \frac{(x-2)(x+2)}{x-2}$ $= x+2$	✓ LCD: $(x-2)$ ✓ Simplifying ✓ Factors ✓ Answer	(4)

	1.3.2	$\frac{4^{2y-1}.9^{y+1}}{18^y.8^{y-1}} = \frac{(2^2)^{2y-1}.(3^2)^{y+1}}{(2.3^2)^y.(2^3)^{y-1}}$ $= \frac{2^{4y-2}.3^{2y+2}}{2^y.3^{2y}.2^{3y-3}}$ $= 2^{4y-2-y-3y+3}.3^{2y+2-2y}$ $= 2^1.3^2$ $= 18$	✓ prime bases ✓ simplifying ✓ $2^1.3^2$ ✓ answer	(4)
	1.3.3	$\frac{2^{2n+2} - 2^{2n+1}}{4^{n+1}}$ $= \frac{2^{2n}.2^2 - 2^{2n}.2^1}{2^{2n}.2^2}$ $= \frac{2^{2n}(2^2-2)}{2^{2n}.2^2}$ $= \frac{4-2}{4}$ $= \frac{1}{2}$	✓ prime bases ✓ common factor: 2^{2n} ✓ answer	(3)
1.4				
	1.4.1	$8x^3 + 1 = (2x+1)(4x^2 - 2x + 1)$	✓ $2x+1$ ✓ $4x^2 - 2x + 1$	(2)
	1.4.2	$2x^2 - x - 6 = (2x+3)(x-2)$	✓ $2x+3$ ✓ $x-2$	(2)

	1.4.3	$a^2 - 2ab - 2b^2 + ab = (a - 2b) + b(a - 2b)$ $= (a + b)(a - 2b)$	✓ $a(a - 2b)$ ✓ $b(a - 2b)$ ✓ *answer*	(3)
				[28]
QUESTION 2				
2.1	2.1.1	$x^2 = 5x$ $x^2 - 5x = 0$ $x(x - 5) = 0$ $x = 0$ *or* $x = 5$	✓ $x^2 - 5x = 0$ ✓ $x(x - 5) = 0$ ✓ both x *values*	(3)
	2.1.2	$R = \frac{2\sqrt{x}}{3S}$ $3RS = 2\sqrt{x}$ $\frac{3RS}{2} = \sqrt{x}$ $x = \frac{9R^2S^2}{4}$	✓ multiplying by 3S ✓ dividing by 2 ✓ answer	(3)
	2.1.3	$\left(\frac{1}{3}\right)^{x-1} = 27$ $(3^{-1})^{x-1} = 3^3$ $3^{-x+1} = 3^3$ $-x + 1 = 3$ $x = -2$	✓ simplifying ✓ $-x + 1 = 3$ ✓ answer	(3)

	2.1.4	$3(2-3x) \geq 15$ $6-9x \geq 15$ $-9x \geq 9$ $x \leq -1$  OR $2-3x \geq 5$ $-3x \geq 3$ $x \leq -1$	✓ simplifying ✓ $-9x \geq 9$ ✓ answer ✓ number line	(4)
2.2		$a+b=12$……..(1) $4a+2b=44$……..(2) From (1) : $a=12-b$ $4(12-b)+2b=44$ $48-4b+2b=44$ $-2b=-4$ $b=2$ $a=10$ OR From (1)….. $b=12-a$ $4a+2(12-a)=44$ $4a+24-2a=44$ $2a=20$	✓ $a=12-b$ ✓ $4(12-b)+2b=44$ ✓ $48-4b+2b=44$ ✓ $b=2$ ✓ $a=10$ or ✓ $b=12-a$ ✓ $4a+2(12-a)+2b=44$ ✓ $4a+24-2a=44$	

		$a = 10$ $b = 2$	✓ $a = 10$ ✓ $b = 2$	(5)
2.3		Son George Now x $7x$ In 25 years $x + 25$ $7x + 25$ Equation : $7x + 25 = 2(x + 25)$ $7x + 25 = 2x + 50$ $5x = 25$ $x = 5$ His son is 5 years old .	✓ $x + 25$ ✓ $7x + 25$ ✓ $7x + 25 = 2x + 50$ ✓ $5x = 25$ ✓ Answer	(4)
				[22]
		TOTAL: 50		