KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS PAPER 1

NOVEMBER 2024

MARKS: 100

TIME: 2 hours

This question paper consists of 7 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

QUESTION 1

1.1 The value of $\sqrt{70}$ lies between two integers. Determine these two integers without finding the exact value of $\sqrt{70}$. (2)

1.2 Convert the following recurring decimal fraction $0,\dot{2}\dot{3}$ to a common fraction in its simplest form. (2)

1.3 Simplify the following completely:

1.3.1 $\left(9x^2-3xy+y^2\right)\left(3x+y\right)$ (2)

1.3.2 $\dfrac{3}{x-4}+\dfrac{2}{x+3}-\dfrac{21}{x^2-x-12}$ (4)

1.3.3 $\dfrac{5^{2n+2}-3.5^{2n+1}}{25^n.4}$ (3)

1.4 Factorise the following expressions fully:

1.4.1 $x^2-13x+42$ (2)

1.4.2 $m^2+m\left(4+n\right)+4n$ (3)

1.4.3 $2y-250y^4$ (3)

[21]

QUESTION 2

2.1 Solve for x, without using a calculator:

2.1.1 $6x^2-x-1=0$ (3)

2.1.2 $3^{2x-1}=\dfrac{1}{243}$ (3)

2.2 Solve for x:

$-1<\dfrac{x+3}{2}<5$ (2)

2.3 At a restaurant a glass of orange juice costs R4 more than a glass of ice tea. It is further given that five glasses of orange juice and three glasses of ice tea together cost R84.

Let x be the cost of a glass of orange juice.
Let y be the cost of a glass of ice tea.

2.3.1 Set up a system of equations that represent the above information. (2)

2.3.2 Hence, determine the individual cost of orange juice and ice tea respectively. (4)

[14]

QUESTION 3

3.1 Consider the following linear number pattern:

$8\ ;\ 3\ ;\ -2\ ;\ \ldots$

3.1.1 Write down the next term of the pattern. (1)

3.1.2 Determine the n^{th} term of the pattern. (2)

3.1.3 Determine the value of the 25^{th} term. (2)

3.1.4 Which term of the pattern is equal to -527? (2)

3.2 $3x+1\ ;\ 2x\ ;\ 3x-7\ ;$ …are the first three terms of a linear number pattern. Determine the value of x. (3)

3.3 If the pattern **MICHAELMICHAELMICHAEL**…..is continued in this way, what will the 201^{st} letter be? (2)

[12]

QUESTION 4

4.1 Given that $f(x)=-\frac{2}{x}+4$

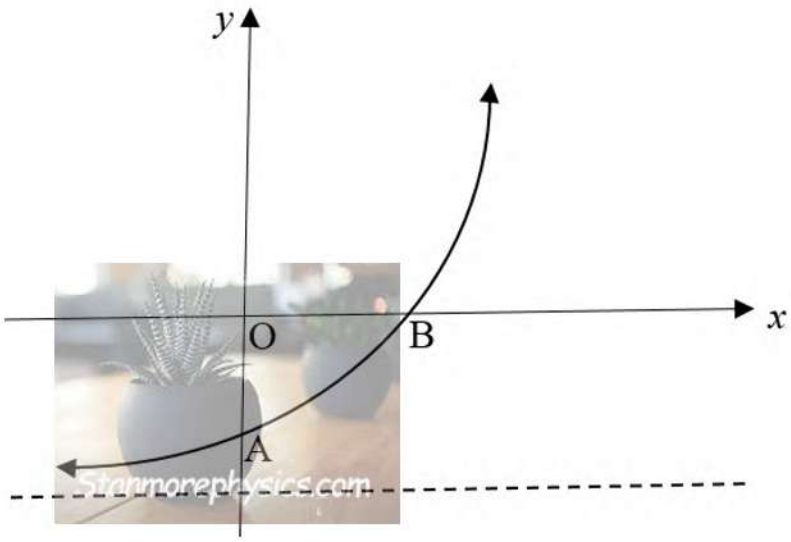
4.1.1 Determine the equation of the horizontal asymptote of f. (1)

4.1.2 Determine the coordinates of the x intercept of f. (2)

4.1.3 Sketch the graph of f, clearly showing the intercept with the axes and the asymptotes. (3)

4.1.4 Determine the equation of g, if g is formed by shifting the graph of f 7 units down. (1)

4.2 The graph of $h(x) = 2^x - 2$ is sketched below.



4.2.1 Determine the coordinates of A . (2)

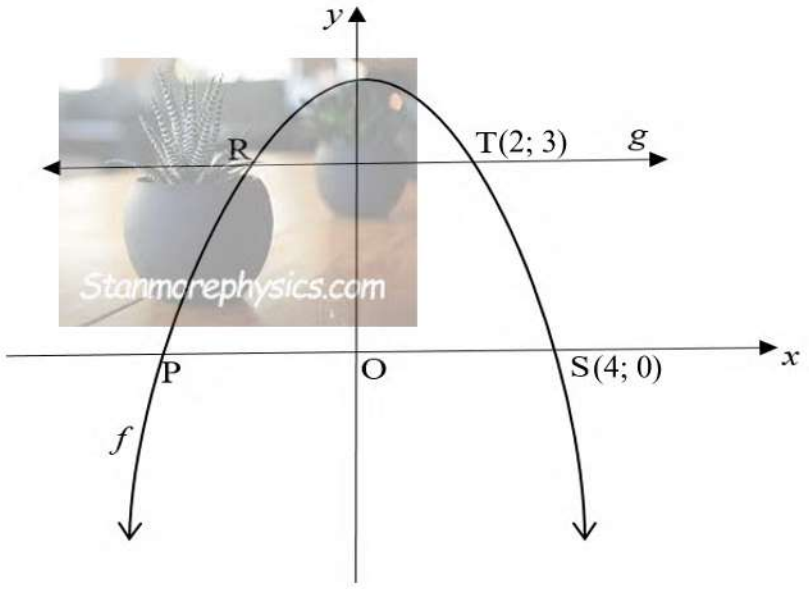
4.2.2 Write down the range of h . (2)

4.2.3 Determine the equation of j , if j is formed by reflecting the graph of h about the y-axis. (1)

[12]

QUESTION 5

5.1 Sketched below are the graphs of $f(x)=ax^2+q$ and the straight line g.
g is parallel to the x-axis and $S(4;0)$ is the x-intercept of f. The graph of f passes through points $T(2;3)$, P and R.



5.1.1 Write down the coordinates of:

a) P (1)

b) R (2)

5.1.2 Write down the equation of g. (2)

5.1.3 Determine the values of a and q. (4)

5.1.4 If $f(x)=k$, determine the value(s) of k for which f has no $x-$intercepts. (2)

5.1.5 Determine the coordinates of F, if F is the reflection of $T(2;3)$ about the x-axis. (2)

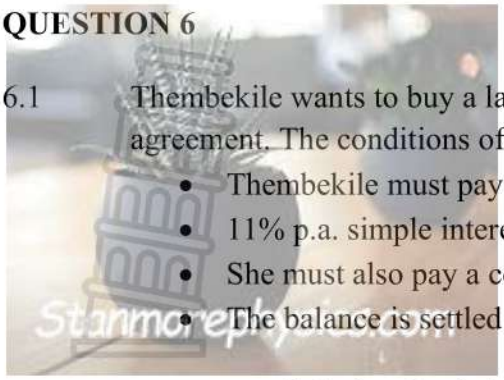
5.1.6 Using the graphs, determine for which value(s) of x:

a) $f(x)-g(x)>0$ (2)

b) $f(x)\,.\,g(x)\leq 0$ (2)

[17]

QUESTION 6



6.1 Thembekile wants to buy a laptop computer costing R11 500, on a hire-purchase agreement. The conditions of the agreement are as follows:

- Thembekile must pay a deposit of 20% of the purchase price.
- 11% p.a. simple interest is charged on the balance.
- She must also pay a compulsory monthly insurance premium of R60,75.
- The balance is settled in 36 monthly instalments.

6.1.1 Calculate her balance after paying the deposit. (2)

6.1.2 Calculate Thembekile's total monthly instalment. (4)

6.2 It costs £71,72 to fill a car with 55 litres of petrol in England. In South Africa, 1 litre of petrol costs R22,30. In which country is petrol more expensive, if the same car is used and the exchange rate between the countries is £1 = R23,23. (3)

6.3 Brent crude oil costs $77.36 a barrel. Calculate the cost in rands, of importing 100 barrels, if the exchange rate is R17,83 to the dollar. (2)

[11]

QUESTION 7

7.1 The letters of the word COORDINATES were put into a hat. A letter is chosen at random. Determine the probability that:

7.1.1 the letter N is chosen. (1)

7.1.2 the letter O is chosen. (1)

7.2 Balls numbered from 1 to 10 were put into a container.

7.2.1 From the balls numbered 1 to 10, list the numbers that will be event A, the factors of 18. (1)

7.2.2 From the balls numbered 1 to 10, list the numbers that will be event B, all the odd numbers. (1)

7.2.3 Draw a Venn diagram to illustrate the above information. (3)

7.2.4 Determine:

a) $P(A \text{ and } B)$ (2)

b) $P(A \text{ or } B)$ (2)

c) $P((\text{not } A) \text{ or } B)$ (2)

[13]

TOTAL: 100

FINAL

education

Department:
Education
PROVINCE OF KWAZULU-NATAL

MATHEMATICS PAPER 1

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MARKING GUIDELINE

NATIONAL
SENIOR CERTIFICATE

GRADE 10

MARKS: 100

This marking guideline consists of 7 pages.

GRADE 10
Marking Guideline

QUESTION 1

1.1	$\sqrt{64} < \sqrt{70} < \sqrt{81}$ $8 < \sqrt{70} < 9$	✓A 8 ✓A 9	(2)
1.2	let $0,\dot{2}\dot{3} = k$ $23,\dot{2}\dot{3} = 100k$ $23 = 99k$ $k = \frac{23}{99}$	✓A $23,\dot{2}\dot{3} = 100k$ ✓A answer **Answer only: Full marks**	(2)
1.3.1	$= 27x^3 + 9x^2y - 9x^2y - 3xy^2 + 3xy^2 + y^3$ $= 27x^3 + y^3$	✓A $27x^3 + 9x^2y - 9x^2y - 3xy^2 + 3xy^2 + y^3$ ✓CA answer	(2)
1.3.2	$= \frac{3}{x-4} + \frac{2}{x+3} - \frac{21}{(x+3)(x-4)}$ $= \frac{3(x+3)+2(x-4)-21}{(x-4)(x+3)}$ $= \frac{3x+9+2x-8-21}{(x-4)(x+3)}$ $= \frac{5x-20}{(x-4)(x+3)}$ $= \frac{5}{x+3}$	✓A $(x+3)(x-4)$ ✓CA $\frac{3(x+3)+2(x-4)-21}{(x-4)(x+3)}$ ✓CA simplification ✓CA answer	(4)
1.3.3	$= \frac{5^{2n}.5^2 - 3.5^{2n}.5}{5^{2n}.4}$ $= \frac{5^{2n}(25-15)}{5^{2n}.4}$ $= \frac{5}{2}$	✓A $\frac{5^{2n}.5^2 - 3.5^{2n}.5}{5^{2n}.4}$ ✓A $5^{2n}(25-15)$ ✓CA answer	(3)
1.4.1	$= (x-6)(x-7)$	✓A✓A each factor	(2)
1.4.2	$= m^2 + 4m + mn + 4n$ $= m(m+4) + n(m+4)$ $= (m+4)(m+n)$	✓A $m^2 + 4m + mn + 4n$ ✓A $m(m+4) + n(m+4)$ ✓CA answer	(3)
1.4.3	$= 2y(1-125y^3)$ $= 2y(1-5y)(1+5y+25y^2)$	✓A $2y(1-125y^3)$ ✓CA✓CA answer	(3)
			[21]

QUESTION 2

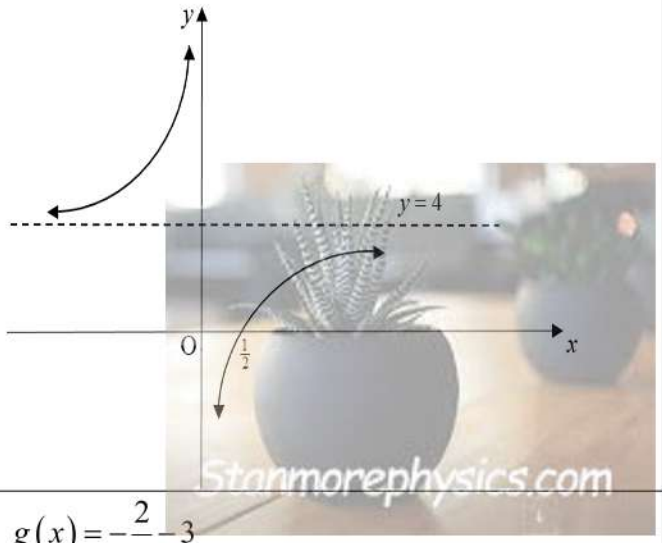
2.1.1	$(3x+1)(2x-1)=0$ $x=-\frac{1}{3}$ or $x=\frac{1}{2}$	✓A $(3x+1)(2x-1)=0$ ✓CA✓CA each answer	(3)
2.1.2	$3^{2x-1}=3^{-5}$ $2x-1=-5$ $x=-2$	✓A 3^{-5} ✓CA $2x-1=-5$ ✓CA answer	(3)
2.2	$-2<x+3<10$ $-5<x<7$	✓A $-2<x+3<10$ ✓CA $-5<x<7$	(2)
2.3.1	$x=4+y$ .....→(1) $5x+3y=84$ .....→(2)	✓A $x=4+y$ ✓A $5x+3y=84$	(2)
2.3.2	$x=4+y$ .....→(1) $5x+3y=84$ .....→(2) $-5x+5y=-20$ .....→(3) $8y=64$ $y=8$ $x=12$ **OR** $x=4+y$ .....→(1) $5x+3y=84$ .....→(2) Substitute (1) into (2) $5(4+y)+3y=84$ $8y=64$ $y=8$ $x=12$	✓CA multiplying (1) by -5 ✓CA $8y=64$ ✓CA $y-$value ✓CA $x-$value **OR** ✓CA substitution ✓CA $8y=64$ ✓CA $x-$value ✓CA $y-$value	(4)
			[14]

QUESTION 3

3.1.1	$T_4 = -7$	✓A answer	(1)
3.1.2	$T_n = -5n + 13$	✓A $-5n$ ✓A $+13$	(2)
3.1.3	$T_{25} = -5(25) + 13$ $T_{25} = -112$	✓A substitution ✓CA $T_{25} = -112$ **Answer only: Full marks**	(2)
3.1.4	$-5n + 13 = -527$ $n = 108$	✓CA $-5n + 13 = -527$ ✓CA $n = 108$ **Answer only: Full marks**	(2)
3.2	$2x - (3x + 1) = 3x - 7 - (2x)$ $-2x = -6$ $x = 3$	✓A $2x - (3x + 1) = 3x - 7 - (2x)$ ✓CA $-2x = -6$ ✓CA answer	(3)
3.3	$\frac{201}{7} = 28$ remainder is 5 $\therefore$ letter number 5 = A	✓A $\frac{201}{7} = 28$ remainder is 5 ✓A answer **Answer only: Full marks**	(2)
			[12]

QUESTION 4

4.1.1	$y = 4$	✓A answer	(1)
4.1.2	$-\frac{2}{x} + 4 = 0$ $4x = 2$ $x = \frac{1}{2}$	✓A $-\frac{2}{x} + 4 = 0$ ✓A answer	(2)

4.1.3		✓A shape ✓A asymptote ✓CA $x-$intercept	(3)
4.1.4	$g(x)=-\frac{2}{x}-3$	✓A answer	(1)
4.2.1	$h(0)=2^0-2$ $=-1$ $A(0;-1)$	✓A $x-$value ✓A $y-$value	(2)
4.2.2	$y>-2$ **OR** $y\in(-2;\infty)$	✓A✓A answer	(2)
4.2.3	$j(x)=2^{-x}-2$ or $j(x)=\left(\frac{1}{2}\right)^x-2$	✓A answer	(1)
			[12]

QUESTION 5

5.1.1a	$P(-4;0)$	✓A answer	(1)
5.1.1b	$R(-2;3)$	✓A $x-$value ✓A $y-$value	(2)
5.1.2	$g(x)=3$ **OR** $m=0$ $c=3$ $\therefore g(x)=3$	✓A✓A **Answer only: full marks** **OR** ✓A $m=0$ ✓A answer	(2)

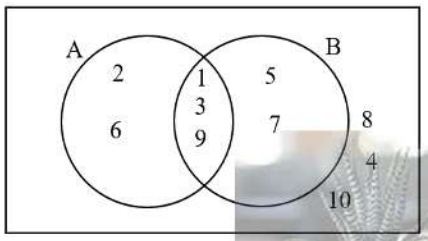
5.1.3	$f(x)=a(x-4)(x+4)$ through $T(2;3)$ $3=a(2-4)(2+4)$ $a=-\frac{1}{4}$ $f(x)=-\frac{1}{4}(x^2-16)$ $=-\frac{1}{4}x^2+4$ $\therefore q=4$	✓A $3=a(2-4)(2+4)$ ✓CA value of a on condition $a<0$ ✓CA $f(x)=-\frac{1}{4}x^2+4$ ✓CA value of q	(4)
5.1.4	$k>4$	✓CA value of q ✓A $k>$	(2)
5.1.5	$F(2;-3)$	✓A $x-$value ✓A $y-$value	(2)
5.1.6a	$x\in(-2;2)$ **OR** $-2<x<2$	✓CA✓A $-2<x<2$ **OR** ✓CA✓A $x\in(-2;2)$	(2)
5.1.6b	$x\leq -4$ or $x\geq 4$ **OR** $x\in(-\infty;-4]$ or $x\in[4;\infty)$	✓CA✓A answer	(2)
			[17]

QUESTION 6

6.1.1	Loan $=\frac{80}{100}\times$ R11 500 = R9 200 **OR** Deposit $=\frac{20}{100}\times$ R11 500 = R2 300 Loan = R11 500 – R2 300 = R9 200	✓A✓CA answer **OR** ✓A Deposit = R2 300 ✓CA answer	(2)
6.1.2	$A=P(1+in)$ $A=9\ 200(1+0,11\times 3)$ A = R12 236 Monthly instalment $=\frac{\text{R12 236}}{36}+$ R60,75 =R400,64	✓A $A=P(1+in)$ ✓A substitution ✓CA A = R12 236 ✓CA answer If compound interest formula used max 1 out of 4 for monthly instalment	(4)

6.2	In South Africa, price of full tank = R22,30 × 55L = R1 226,50 In England, price of full tank = £71,72 = Rx £1 = R23,23 x = R1 666,06 ∴ England is more expensive	✓A R1 226,50 ✓A R1 666,06 ✓CA conclusion	(3)
6.3	cost of 100 barrels = \$77,36 × R17,83 ×100 = R137 932,88	✓A \$77,36 × R17,83 ×100 ✓CA answer **Answer only: Full marks**	(2)
			[11]

QUESTION 7

7.1.1	$P(N)=\frac{1}{11}=0,09$	✓A answer	(1)
7.1.2	$P(O)=\frac{2}{11}=0,18$	✓A answer	(1)
7.2.1	$A=\{1;2;3;6;9\}$	✓A answer	(1)
7.2.2	$B=\{1;3;5;7;9\}$	✓A answer	(1)
7.2.3		✓CA 1;3;9 ✓CA 4;8;10 ✓CA 2&6 ; 5&7	(3)
7.2.4a)	$P(A \text{ and } B)=\frac{3}{10}=0,3$	✓CA numerator ✓A answer **Answer only: Full marks**	(2)
7.2.4b)	$P(A \text{ or } B)=\frac{2+3+2}{10}=\frac{7}{10}=0,7$	✓CA numerator ✓A answer **Answer only: Full marks**	(2)
7.2.4c)	$P((\text{not } A) \text{ or } B)=\frac{3+2+3}{10}=\frac{8}{10}=0,8$	✓CA numerator ✓A answer **Answer only: Full marks**	(2)
			[13]

TOTAL: 100