LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 11

MATHEMATICS P 1

NOVEMBER 2022

MARKS : **150**

DURATION : **3 Hours**

EMATHP1

This question paper consists of 8 pages.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of NINE questions.
2. Answer ALL the questions.
3. You are NOT allowed to use a formula sheet.
4. Clearly show ALL calculations, diagrams, and etc. that you have used in determining your answers.
5. ANSWER ONLY will not necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphic), unless stated otherwise.
7. Where necessary, round off to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Number the answers correctly according to the numbering system in this question paper.
10. Write legibly and present your work neatly.

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QUESTION 1

1.1. Solve for x in each of the following:

1.1.1. $3x(x+3)=0$ (2)

1.1.2. $7x^2+3x=2$ (Correct to TWO decimal places) (3)

1.1.3. $-x+\sqrt{2x-1}=-2$ (5)

1.1.4. $(x-3)(4-x)\leq 0$ (3)

1.2. Solve for x and y simultaneously if:

$2-x=5y$ and $y^2+x=xy+y$ (6)

1.3. For which values of k will the equation: $x^2+6x-k=0$ have equal roots? (3)

1.4. Determine the value(s) of k if:

$g(x)=-2x^2-kx+3$ has a maximum value of $\frac{25}{8}$. (5)

[27]

QUESTION 2

2.1. Without using a calculator:

2.1.1. Show that: $2^{2020}+2^{2022}=5.2^{2020}$ (2)

2.1.2. Hence, simplify the expression: $\frac{2^{2020}+2^{2022}+10}{2^{2019}+1}$ (3)

2.2. Solve for x:

2.2.1. $\left(\frac{1}{4}\right)^x=256$ (3)

2.2.2. $2^x-\frac{24}{2^x}=-2$ (5)

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2.3. If $3^a = 21^b$ and $7^c = 21^b$, show that:

$b = \frac{ac}{a+c}$, where $a+c \neq 0$. (5)

[18]

QUESTION 3

Given the linear pattern 20 ; 16 ; 12 ; . . .

3.1. Determine the next term in the linear pattern. (1)

3.2. Determine the general term T_n of the linear pattern. (2)

3.3. Calculate the value of T_{25}. (2)

3.4. Which term in the pattern has a value of -776? (2)

[7]

QUESTION 4

4.1. The following quadratic pattern is given: 9 ; 19 ; 33 ; 51 ; . . .

4.1.1. Determine the general term T_n of the quadratic pattern. (4)

4.1.2. Calculate the value of T_{190}. (2)

4.1.3. The first difference between two consecutive terms of the quadratic pattern is 206. Determine the value of these two terms. (5)

4.1.4. Show that all the terms of this quadratic number pattern will be odd numbers. (2)

4.2. 8; x; y; -1 are the first four terms of a quadratic number pattern.

$2k-4$; $k-3$; $\frac{k}{2}-1$ are the first three first differences of the same quadratic number pattern. Calculate the values of k, x and y. (5)

[18

QUESTION 5

5.1. Consider: $f(x)=\dfrac{x+1}{x-2}$

5.1.1. Show that f can be expressed as $f(x)=\dfrac{3}{x-2}+1$ (2)

5.1.2. Write down the equations of the asymptotes of f. (2)

5.1.3. Write down the domain and the range of f. (2)

5.1.4. Determine the following:

(a) y-intercept of f. (1)

(b) x-intercept of f. (2)

5.1.5. Sketch the graph of f showing clearly all intercepts and asymptotes. (3)

5.1.6. Determine the equation of axis of f with a negative gradient. (3)

5.1.7. For which values of x is $f(x)>0$? (2)

5.2. The graph of an increasing exponential function with equation $k(x)=a.b^x+q$ has the following properties:

- The range is $y\leq -1$.
- The points $(0\,;-2)$ and $(-1\,;-4)$ lie on the graph of k.

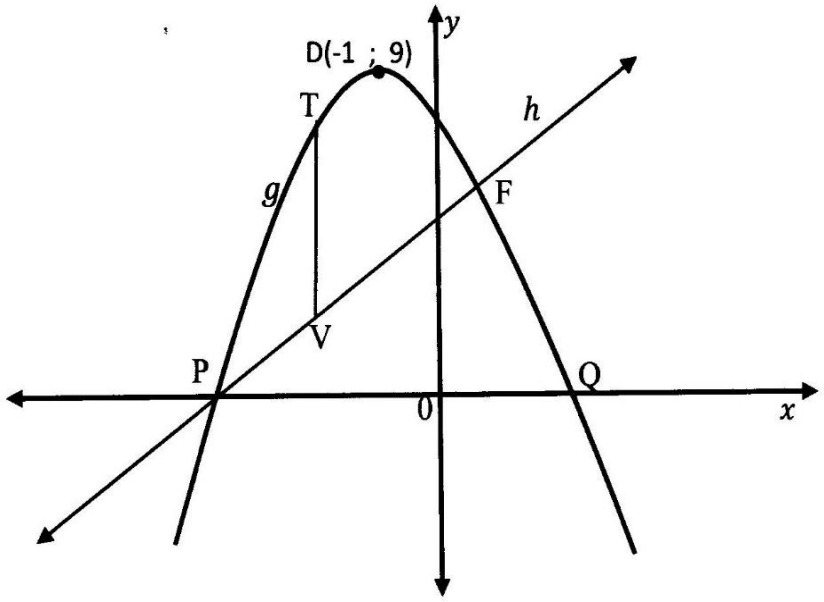
Using the given properties from above, show that: $a=-1$, $b=\dfrac{1}{3}$ and $q=-1$. (5)

[22]

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QUESTION 6

D$(-1\ ;\ 9)$ is the turning point of the graph of g defined by . $g(x) = ax^2+bx+c$. P and Q are the x-intercepts of g . TV is a straight line parallel to the y - axis. The graph of $h(x)= x+4$ has an x-intercept at P. F is the point of intersection of g and h.



6.1. Determine the coordinate of P. (2)

6.2. Hence, or otherwise, write down the coordinates of Q. (1)

6.3. Calculate the average gradient between P and D. (2)

6.4. Show that for g, $a=-1$, $b=-2$ and $c=8$. Show ALL your workings. (5)

6.5. Calculate the coordinate of F, the point of intersection between g and h. (5)

6.6. Determine the maximum length of TV between P and D. (5)

6.7. Determine the values of x for which $x \cdot g(x) < 0$ (3)

[23]

QUESTION 7

7.1. A laptop costs R17 000 in 2022. Calculate the book value of the Laptop after 4 years if it depreciates at 5% p.a. according to the reducing balance method. (3)

7.2. The nominal interest rate of an investment is 11.35% p.a. compounded monthly. Calculate the effective interest rate. (3)

7.3. Faith invested R50 000 for 5years. The investment earned interest at 12% p.a. compounded monthly for the first two years. Thereafter the interest rate changed to 10.8% p.a. compounded semi-annually for the rest of the period. Calculate the value of the investment at the end of 5 years. (3)

7.4. Simon deposited R75 000 into a savings account with an interest rate of 15% p.a. compounded monthly. Simon withdrew R8 000 from the account 2 years, after depositing the initial amount. He deposited another R4 000 into this account $3\frac{1}{2}$ years after the initial deposit. What amount will Simon have 5 years, after making the initial deposit in this account? (6)
[15]

QUESTION 8

8.1. Two events A and B are complementary and make up the entire sample space.

Also P(not A) = 0,42

8.1.1. Complete the statement: P(A) + P(B) = − − − (1)

8.1.2. Write down the value of: P(A and B) (1)

8.1.3. Write down the value of P(B) (1)

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8.2. A study on eating chocolate and gender yielded the following results:

	Eating Chocolate (EC)	**Not Eating Chocolate(NEC)**	**TOTAL**
Male (M)	43	37	80
Female (F)	42	28	70
TOTAL	85	65	q

8.2.1. Find the value of q. (1)

8.2.2. Calculate the following probabilities:

(a) P(Female). (1)

(b) P(Eating Chocolate). (1)

8.2.3. Are the events of being a female and eating chocolate independent?

Justify your answer with relevant calculations. (3)
[9]

QUESTION 9

A bag contains eight red balls, seven green balls and five yellow balls. Two balls are selected at random one after the other without replacement. Each ball has an equal chance to be selected.

9.1. Represent the above scenario by means of a tree diagram, indicating all outcomes and their corresponding probabilities. (5)

9.2. What is probability of randomly selecting two balls if:

9.2.1. they are both red. (3)

9.2.2. a green and a yellow ball are selected in any order. (3)
[11]

GRAND TOTAL: 150

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