GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION

PROVINCIAL EXAMINATION

NOVEMBER 2021

GRADE 10

MATHEMATICS

PAPER 1

TIME: 2 hours

MARKS: 100

7 pages

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. This question paper consists of 11 questions.
3. Present your answers according to the instructions of each question.
4. Clearly show ALL calculations, diagrams, graphs et cetera, which were used in determining the answers.
5. Answers only will NOT necessarily be awarded full marks.
6. Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. Where necessary, answers should be rounded-off to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Number the questions correctly according to the numbering system used in the question paper.
10. Write neatly and legibly.

QUESTION 1

1.1 Factorise the following expressions fully:

1.1.1 $x^2 + x - 42$ (2)

1.1.2 $2ab^2 - b^3 + b^2 - 2ab$ (4)

1.1.3 $3 - \frac{27}{x^2}$ (2)

1.2 Simplify the following completely:

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

1.2.2 $(8x^{12})^{-\frac{1}{3}} \times 2x^{-4} - x^{-8}$ (3)

1.2.3 $\frac{7^{2n+2} - 3.7^{2n+1}}{49^n.4}$ (3)

1.3 If $6^7 = x$, determine the value of $6^2.5^3.4^4.3^5$ in terms of x, without the use of a calculator. (3)

[19]

QUESTION 2

2.1 Solve for x:

2.1.1 $\sqrt[x]{16} = 2$ (1)

2.1.2 $\frac{x}{x-3} - \frac{x}{2-x} = \frac{2x^2 - 25}{x^2 - 5x + 6}$ (5)

2.2 Given: $0 < 3 - \frac{x}{2} < 2$

2.2.1 Solve the inequality. (3)

2.2.2 Write down an integer that will make the equation invalid. (1)

2.3 Solve for x and y simultaneously:

$2x - 4y = 6$ and $3x - 5y = 10$ (5)

[15]

QUESTION 3

3.1 Consider the following pattern:

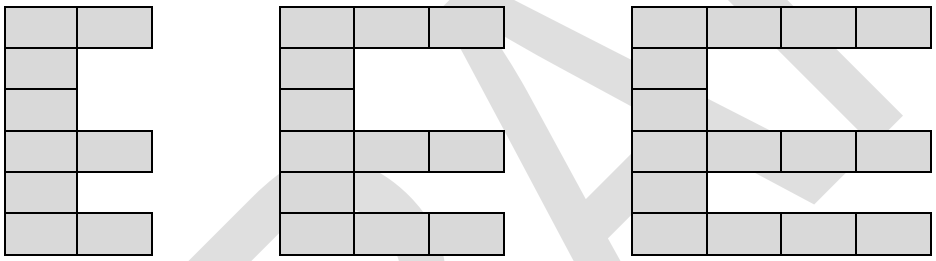
$$\frac{-3}{5};\ \frac{-6}{9};\ \frac{-9}{13};\ \ldots;\ \ldots$$

3.1.1 Write down the next two terms of the sequence. (2)

3.1.2 Write down T_n , the general term of the number pattern. (4)

3.1.3 Calculate the value of the 50th term of the sequence. (2)

3.2 Consider the following sequence of E's:



3.2.1 How many blocks will be needed to build the 5^{th} E? (1)

3.2.2 Determine the formula for calculating the number of blocks to build the n^{th} E (2)

3.2.3 125 blocks are needed to build the r^{th} term.

Calculate the value of r. (2)

3.3 Consider the following linear pattern:

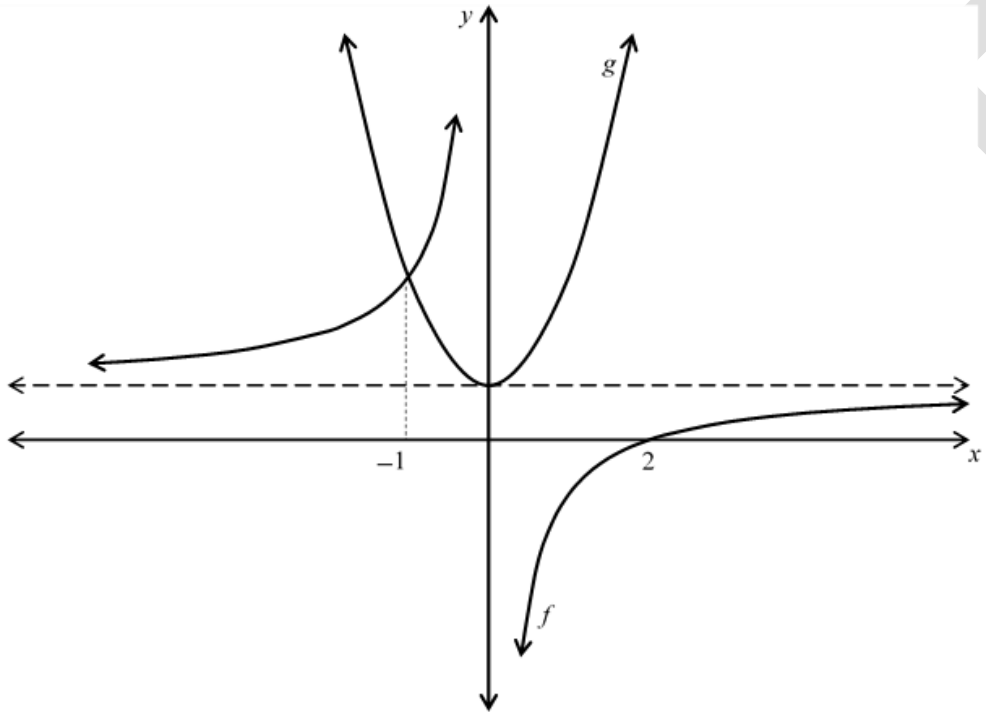
$$4x - 3;\ 6x + 4\ ;3x - 9\ ;\ ...$$

Determine the value of x (2)

[15]

QUESTION 4

The sketch below shows the graphs of $f(x) = \frac{b}{x} + 1$ and $g(x) = ax^2 + q$, (2 ; 0) is the *x*-intercept of f.



4.1 Write down the:

4.1.1 Domain of *f* (1)

4.1.2 Range of *g* (2)

4.2 Determine the value of *b*. (2)

4.3 Determine the equation of *g* if the *x* – value at the point of intersection of the two graphs is −1. (4)

4.4 Write down the equation of the line of symmetry of f, which has a negative gradient. (2)

4.5 Write down the values of *x* for which:

4.5.1 $g(x)$ is decreasing (1)

4.5.2 $f(x) > g(x)$ (2)

4.6 Calculate the *y*-value when the horizontal distance between the arms of the parabola is 6 units. (2)

4.7 Write down the equation of $k(x)$, if $k(x) = -g(x) + 3$ (2)

[18]

QUESTION 5

The exponential graph of $h(x) = \frac{1}{2}.2^x - 1$ is given.

5.1 Write down the equation of the asymptote of *h.* (1)

5.2 Calculate the:

5.2.1 The *x* intercept of *h* (2)

5.2.2 The *y* intercept of *h* (2)

5.3 Sketch the graph of *h* on a system of axes. Clearly show all intercepts with the axes and asymptotes. (3)

5.4 Write down the equation of the graph formed if *g* is reflected over the asymptote. (2)

[10]

QUESTION 6

The Nkosi family of three from Dobsonville wish to attend the Soccer World Cup in Qatar in 2022. The cost of the tickets at present is 2 150 Qatari Rials per person, per game. The family would like to attend the last four games.

6.1 Calculate the total cost, in rands, of the tickets for the family if the exchange rate is:

One Rial = R4.012778 (3)

6.2 On 1st January 2019 Mr Nkosi invested R50 000 at a simple interest rate of 13%. Determine whether the value of the investment at the end of 2021 will cover the cost of the tickets. (3)

6.3 Would the family want a strong rand or a weak rand, when they purchase the tickets? Give a reason for your answer. (2)

6.4 The inflation rate over the last four years remained at a constant rate of 0,5%. Calculate the cost of one ticket, in Qatari Rials, four years ago. (3)

[11]

QUESTION 7

7.1 For two events A and B which are not mutually exclusive, you are given the following information:

- $P(A) = 0,45$
- $P(A) = 0,55$
- $P(A \text{ or } B) = 0,8$

Let the value of $P(A \text{ and } B)$ be x.

7.1.1 Draw a Venn diagram based on the information given above. (4)

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

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

7.2 In a survey, 80 people were questioned about their preference between an iPhone (A) and Samsung (B) or both.

The results show that 30 people prefer iPhone's while 45 people prefer Samsung's. 12 people prefer neither.

Determine how many people prefer both. (4)

[12]

TOTAL: 100

END