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GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL EXAMINATION

NOVEMBER 2022

GRADE 10

MATHEMATICS

(PAPER 1)

TIME: 2 hours

MARKS: 100

6 pages and 1 information sheet

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INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
2. This question paper consists of 7 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. An INFORMATION SHEET is included on page 7 of the question paper.
10. Number the questions correctly according to the numbering system used in the question paper.
11. Write neatly and legibly.

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QUESTION 1

1.1 Factorise the following expressions fully:

1.1.1 $2x^6 - 8$ (2)

1.1.2 $-x + (x-y)^3 + y$ (4)

1.2 Simplify the following completely:

1.2.1 $\left(x^{\frac{1}{2}} - 3\right)^2$ (2)

1.2.2 $x^{-3} \div x^{-5} + (x^{-2})^{-1}$ (2)

1.2.3 $\dfrac{5^{x+1}.(4^x)^3}{2^{5x-2}.10^{x-1}}$ (4)

1.2.4 $\dfrac{-11}{2x^2 - 5x - 12} - \dfrac{1}{4-x}$ (5)

1.3 Determine the value of d if $(3x+2)$ is a factor of: $6x^2 + dx - 10$ (3)

[22]

QUESTION 2

2.1 Solve for x:

2.1.1 $(3x-1)(x+2) = 0$ (2)

2.1.2 $3^x - 2.3^{x-1} = 3$ (3)

2.2 Given: $-1 \leq 1 - \dfrac{2x}{3} < 5$

2.2.1 Solve for x in the inequality. (3)

2.2.2 Write down the number of integers that will satisfy the inequality . (1)

2.3 Solve for x and y simultaneously:

$x - y = 4$ and $\dfrac{x}{5} + \dfrac{y}{2} = 5$ (5)

[14]

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QUESTION 3

3.1 Your friends Zain and Letti have been trying to solve an exercise based on the following sequence: 2; 6; 10; 14 ...

3.1.1 Letti says that $T_n = 4n - 2$ and Zain says that $T_n = 4(n-1) + 2$. Who is right?

Use algebra to justify your answer. (3)

3.1.2 Determine the value of the 27th term of the sequence. (2)

3.2 Consider the following sequence: $-3\ ;\ 2\ ;\ 7\ ;\ 12\ ;\ 17\ ;\ \ldots$

3.2.1 Determine the n^{th} term of the sequence. (2)

3.2.2 Determine the value of the 52nd number to end in a 7. (3)

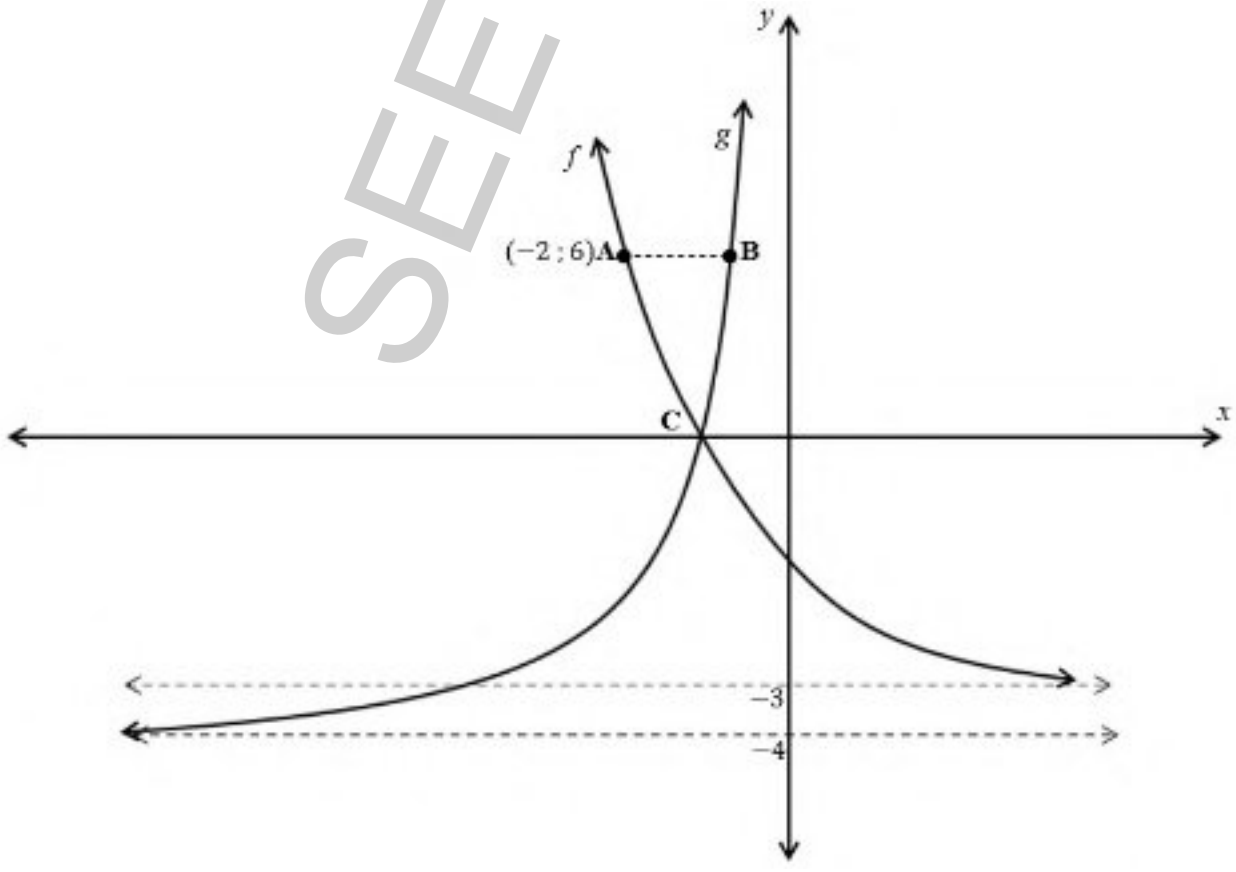
[10]

QUESTION 4

The sketch below shows the graphs of $f(x) = a^x - 3$ and $g(x) = -\frac{4}{x} - 4$.

A$(-2\ ;\ 6)$ is a point on the graph of f and B is a point on the graph of g.

C is the x-intercept of the graphs.



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4.1 Write down the:

4.1.1 Domain of f (1)

4.1.2 Range of g (1)

4.1.3 Equation of the asymptote of f (1)

4.2 Show that the value of a is 3^{-1}. (2)

4.3 Determine the coordinates of C. (3)

4.4 Write down the values of x for which $g(x) > f(x)$ (2)

4.5 Determine the equation of:

4.5.1 The straight line through A and C (4)

4.5.2 The axis of symmetry of g with a negative gradient (2)

4.6 If AB is a horizontal line, calculate the length of AB. (3)

[19]

QUESTION 5

Consider a quadratic function, h, with the following characteristics:

- Axis of symmetry is the y-axis
- The x-intercepts are $(-4; 0)$ and $(4; 0)$
- The graph cuts the y-axis at -8

5.1 Sketch the graph of h on a system of axes. Clearly show ALL intercepts with the axes. (3)

5.2 Determine the equation of the graph in the form $h(x) = ax^2 + q$. (3)

5.3 Write down the values of x for which $h(x) \leq 0$. (2)

5.4 Write down the equation of k if $k(x) = -h(x) - 6$. (2)

[10]

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QUESTION 6

6.1 Amy needs to buy a new computer. The computer costs R7 990. Amy does not have the full amount of money available, so she has decided to enter into a hire purchase agreement. The terms of the agreement are as follows;

15% per annum simple interest
48 monthly payments
Monthly processing fee of R13,50

Determine the monthly amount payable, including interest and fees. (5)

6.2 On his 29th birthday, John invested R5 000 on the Johannesburg Stock Exchange. His shares increased in value by 20% compounded annually. How much would his investment be worth on his 60th birthday? (5)
[10]

QUESTION 7

7.1 For any two events, A and B, it is given that P(A) = 0,25, P(B) = 0,89 and P(A or B)′ = 0,05

7.1.1 Calculate P(A or B). (2)

7.1.2 Are the two events mutually exclusive? Justify your answer. (2)

7.1.3 Calculate P(A and B). (2)

7.1.4 What is the probability of event B only? (2)

7.2 In a small town of 1 500 people, there are two main banks, Add Savings and Multiplier Bank. Most of the people in the town bank with one or both of these banks. 600 people bank with Add Savings and 950 bank with Multiplier Bank. 235 people in the town do not use either Add Savings or Multiplier Bank.

7.2.1 Draw a Venn diagram to illustrate the information given above. (4)

7.2.2 What is the probability that a person from the town uses both banks? (1)

7.2.3 What is the probability that a person from the town does not use Multiplier Bank? (2)
[15]

TOTAL: 100

END

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INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1+ni) \qquad A = P(1-ni) \qquad A = P(1-i)^n \qquad A = P(1+i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r-1} \;;\; r \neq 1 \qquad S_\infty = \frac{a}{1-r} \;;\; -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i} \qquad P = \frac{x[1-(1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc.\cos A$$

$$area\ \Delta ABC = \frac{1}{2}ab.\sin C$$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$$

$$\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$$

$$\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta$$

$$\cos 2\alpha = \begin{cases} \cos^2\alpha - \sin^2\alpha \\ 1 - 2\sin^2\alpha \\ 2\cos^2\alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2\sin\alpha.\cos\alpha$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$$

$$\text{P(A)} = \frac{n(\text{A})}{n(\text{S})}$$

P(A or B) = P(A) + P(B) – P(A and B)

$$\hat{y} = a + bx$$

$$b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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