HOËRSKOOL JOHAN JURGENS

MATHEMATICS

GRADE 10: EXAMINATION PAPER 1 **NOV 2025** TERM 4

TIME: 2 HOURS **TOTAL MARKS**: 100

EXAMINER: Z CRONJE **MODERATOR:** M BOTHA

Instructions to Learners:

1. Please write your name, surname, grade, and date on the answer sheet.
2. Read all questions carefully and think before your answer.
3. Clearly show ALL calculations, diagrams, graphs, etcetera that you have used in determining the answers.
4. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
5. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write with a black or blue pen and cross out with a pencil if you make a mistake.
9. Please write neatly and legibly.
10. Good luck!!!!

This paper consists of 7 pages and 8 questions including an information sheet.

QUESTION 1

1.1 Simplify the algebraic expressions below:

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

1.1.2 $\dfrac{5x-15y}{3x-4} \div \dfrac{5}{6x-8}$ (3)

1.2 Completely factorise the expressions below:

1.2.1 $12a^2-8a+4$ (2)

1.2.2 $3p(2x-1)-(1-2x)$ (2)

1.2.3 $4x-8y^2+4xy-8y$ (3)

1.2.4 $k+\dfrac{1}{k}-\left(k^2-\dfrac{1}{k^2}\right)$ (3)

[15]

QUESTION 2

2.1 Solve for x:

2.1.1 $x^2-7x+6=0$ (2)

2.1.2 $\dfrac{2-x}{4}=\dfrac{3+x}{8}$ (2)

2.1.3 $-1 \leq x+1 < 5$ (2)

2.2 Solve for x and y simultaneously:

$2x-y=0$ and $y=4x+2$ (3)

[9]

QUESTION 3

3.1 Simplify the exponential expressions below:

3.1.1 $-5^2-(n-t)^0+\left(\dfrac{1}{5}\right)^{-2}$ (2)

3.1.2 $\dfrac{2^{2x}-3.4^x}{2^{2x}}$ (3)

3.2 Solve for x in each of the exponential equations below:

3.2.1 $5^{x+2} = 125$ (2)

3.2.2 $3x^3 = 24$ (2)

3.3 Given $3^{x-y} = \frac{1}{27}$

Determine the value of y in terms of x. (3)

[12]

QUESTION 4

The table below shows cubic blocks which form a geometric pattern. Study the table and answer the questions that follow.

FIGURE **1** **2** **3** **4**

4.1 Write down the number of cubes in the 5th figure. (1)

4.2 Is this pattern *linear*, *quadratic* or *cubic*? Motivate your answer. (2)

4.3 Determine the general term for the pattern in the form $T_n = bn + c$. (2)

4.4 Calculate the number of cubes in the 19th figure. (2)

4.5 Which figure will have 87 cubes? (2)

4.6 Determine the value(s) of n for which $T_n > 123$ (4)

[13]

QUESTION 5

Given the function $f(x) = 9 - x^2$

5.1 Write down the coordinates of the y-intercept. (2)

5.2 Determine the x-intercepts of the graph. (3)

5.3 Sketch the graph of f, ON THE ANSWER SHEET, showing all intercepts with the axes. (3)

5.4 Write down the range of f. (1)

5.5 Determine the:

5.5.1 value(s) of x for which $f(x) < 0$ (2)

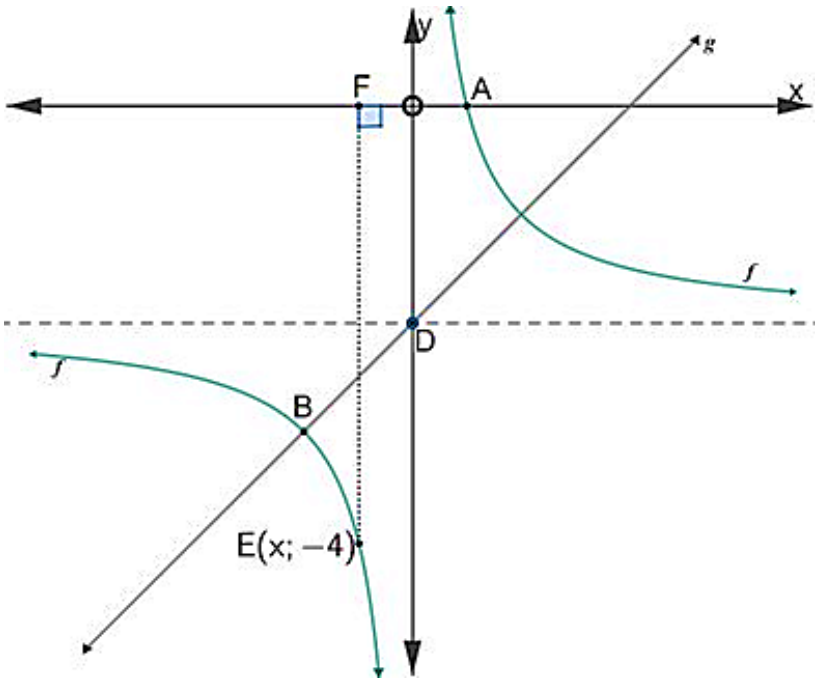
5.5.2 equation of g, the reflection of f in the x-axis. (2)

[13]

QUESTION 6

The diagram below shows the graphs of $f(x) = \frac{1}{x} - 2$ and $g(x) = x + c$

- A is the x-intercept of f
- B is a point where f and g intersect
- D is the y-intercept of g and, also the point through which the horizontal asymptote passes
- E is a point on f such that EF is perpendicular to the y-axis.



6.1 Write down the domain of f. (2)

6.2 Determine the coordinates of A. (3)

6.3 Write down the equation of the horizontal asymptote. (1)

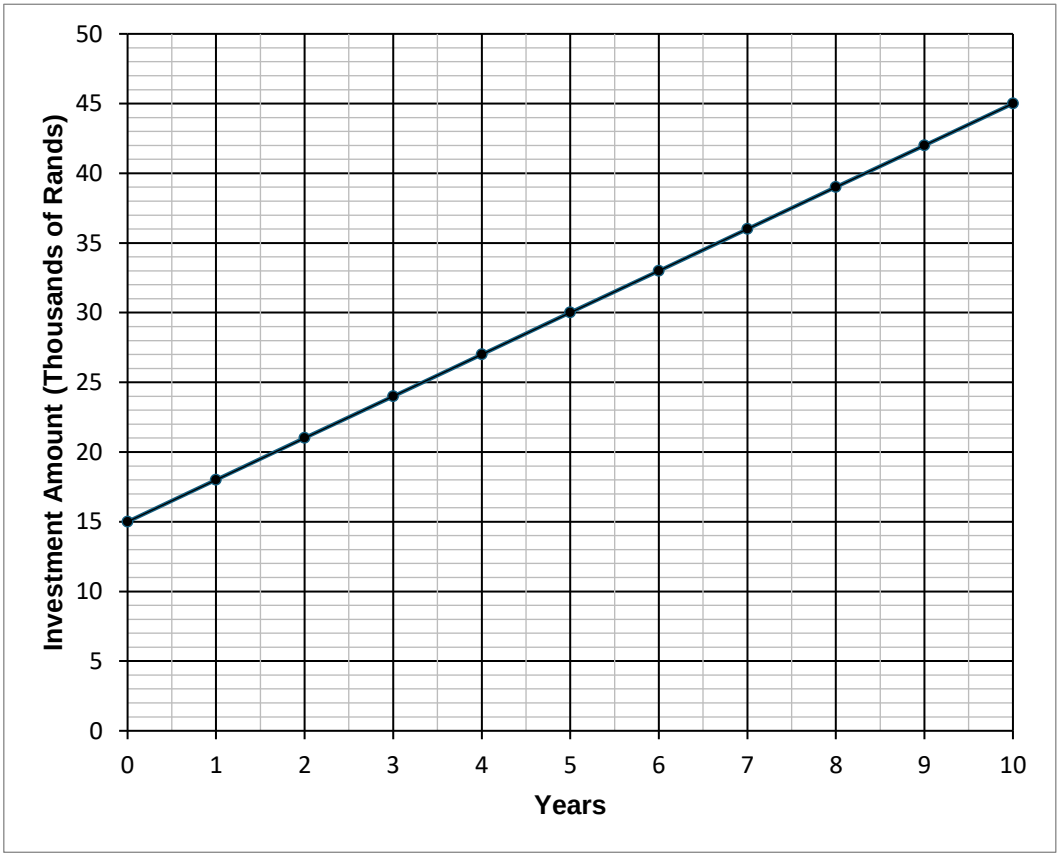
6.4 Determine the coordinates of B. (4)

6.5 Determine the x-coordinates of f. (4)

[14]

QUESTION 7

The graph below represents the growth of an investment of R15 000 at a simple interest rate of 20% per annum over a period of time. Study the graph and answer the questions that follow.



7.1 Is the growth of the investment *linear* or *exponential*? (1)

7.2 What is the value of the investment after 1 year? (1)

7.3 Use the graph to determine the amount by which the investment increases each year. (2)

7.4 Verify your answer in QUESTION 7.3 by using the appropriate formula and calculation. (3)

7.5 Determine the value of the investment after 18 years. (2)

7.6 How many years will it take the investment to grow to 8 times the original invested amount? (3)

[12]

QUESTION 8

Consider two events *A* and *B*:

- $P(A) = \frac{2}{3}$
- $P(B) = \frac{2}{6}$
- $P(A \text{ and } B) = \frac{2}{9}$

8.1 Write the probability of event A as a percentage. (1)

8.2 Write the probability of event B as a decimal. (1)

8.3 Determine the value of $P(not\ A)$. (2)

8.4 Determine the value of $P(not\ B)$. (2)

8.5 Determine whether events A and B are:

8.5.1 complementary. (3)

8.5.2 mutually exclusive. (3)

[12]

TOTAL: 100

INFORMATION SHEET

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

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

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

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

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

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

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

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

$$(x - a)^2 + (y - b)^2 = r^2 \qquad \text{In } \Delta ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{In } \Delta ABC: a^2 = b^2 + c^2 - 2bc.\cos A \qquad \text{Area } \Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

$$\cos 2\alpha = \cos^2\alpha - \sin^2\alpha = 1 - 2\sin^2\alpha = 2\cos^2\alpha - 1 \qquad \sin 2\alpha = 2\sin\alpha.\cos\alpha$$

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

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\Sigma(x - \bar{x})(y - \bar{y})}{\Sigma(x - \bar{x})^2}$$