BERGVLIET HIGH SCHOOL

MATHEMATICS DEPARTMENT

NOVEMBER EXAMINATION

GRADE 10

MATHEMATICS P1

19 NOVEMBER 2024

MARKS: **100**

TIME: **2 HOURS**

EXAMNER: **Z EBERSOHN**

MODERATOR: **S WHITEHORN**

INSTRUCTIONS AND INFORMATION

1. This question paper consists of **6** questions. Answer all the questions.
   Question 6.2.1 must be answered on the diagram sheet provided on the back of this cover page. **ATTACH THE DIAGRAM SHEET TO YOUR LINED PAPER.**

2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.

3. Answers only will NOT necessarily be awarded full marks.

4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

5. If necessary, round off answers to TWO decimal places, unless stated otherwise.

6. Diagrams are NOT necessarily drawn to scale.

7. Number the questions correctly according to the numbering on the question paper.
   Write neatly and legibly.

DIAGRAM SHEET.

Detach this page and attach it to the FRONT of your lined paper.

NAME: _____ **TEACHER:** _____

FORMULAS

$$T_n = a + (n-1)d$$

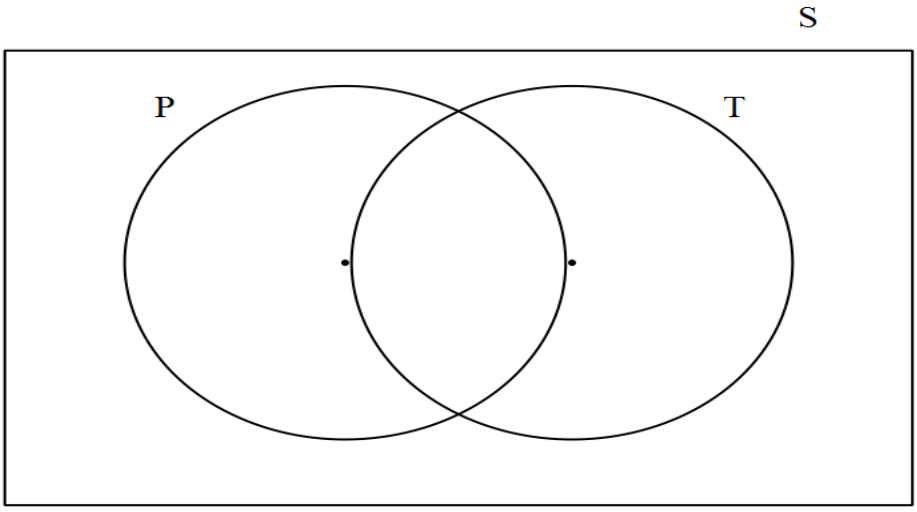
$$A = P(1+in) \qquad A = P(1+i)^n$$

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

$$y = mx + c \qquad P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

QUESTION 6.2.1



Q1	Q2	Q3	Q4	Q5	Q6	TOTAL
24	19	13	15	14	15	100

QUESTION 1

1.1 Factorise the following expressions fully:

1.1.1 $2x^4 - 32$ (3)

1.1.2 $2x^2 + 3x - 5$ (2)

1.1.3 $\dfrac{x^3 + 1}{x^2 - x + 1}$ (2)

1.2 Simplify the following completely:

1.2.1 $\dfrac{x^2 + x - 6}{3x^2 - 12x} \times \dfrac{x^2 - 16}{x^2 - 2x} \times \dfrac{1}{x + 4}$ (5)

1.2.2 $\dfrac{6^{2-x}.12^x}{2^{x+2}}$ (4)

1.2.3 $\dfrac{3^m - 3^{m-2}}{2.3^m - 3^m}$ (3)

1.3 Given: $A = \dfrac{1}{\sqrt{3+x}}$ (2)

If $x \in \{-4; -3; -1; 0; 1; 3; 4\}$; for which value(s) of x will the expression A be

1.3.1 Undefined

1.3.2 Non-Real

1.4 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)

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QUESTION 2

2.1 Solve for x:

2.1.1 $x(x-4)=12$ (3)

2.1.2 $\frac{x-3}{1-x^2}-\frac{2x+4}{x+1}=\frac{2x}{1-x}$ (5)

2.1.3 $-4\leq\frac{1-x}{3}<3$ (3)

2.2 Renate drives to work at an average speed of y km/h and drives the same route home at an average speed of x km/h. Determine an expression for the average speed of her total trip. (4)

2.3 Solve for x and y simultaneously:

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

[19]

QUESTION 3

3.1 Seven years ago, Mrs Grey decided to invest R18 000 in a bank that paid simple interest at 4,5% p.a.

3.1.1 Calculate how much interest Mrs Grey has earned over the 7 years. (3)

3.1.2 Mrs Grey now wants to buy a television set that costs R27 660,00. If the average rate of inflation over the last 7 years was 6,7% p.a., calculate the cost of the television set 7 years ago. (3)

3.1.3 At what rate of simple interest should Mrs Gey have invested her money 7 years ago if she intends to buy the television set now using only her original investment of R18 000 and the interest earned over the last 7 years. (3)

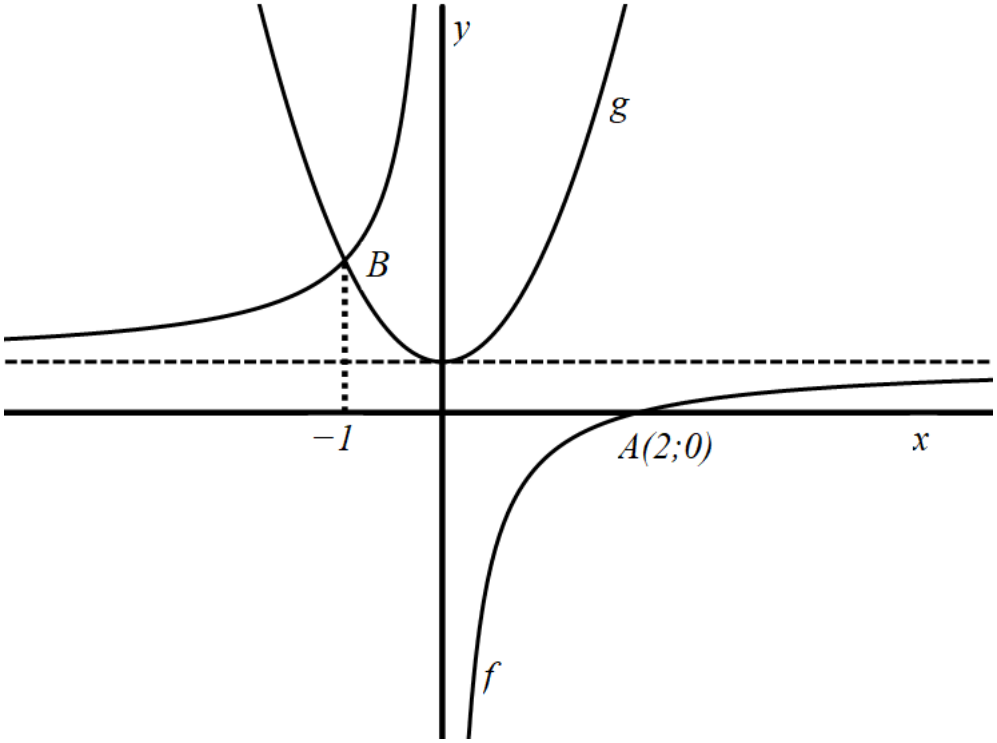
3.2 On his 29th birthday John invested R5 000 in the Johannesburg Stock Exchange. His shares increased in value by 12%, compounded annually for the first 6 years. Thereafter it increased by 8,2% compounded annually. How much would his investment be worth on his 60th birthday? (4)

[13]

QUESTION 4

The sketch below shows the graphs of $f(x)=\frac{b}{x}+1$ and $g(x)=ax^2+q$.

$A(2;0)$ is the *x*- intercept of f and *B* is the point of intersection of *f* and *g*.



4.1 Write down the domain of *f*. (1)

4.2 Write down the range of *g*. (1)

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

4.4 Determine the equation of *g* if the *x* – value at the point of intersection of the two graphs at B is -1. (3)

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

4.6 Write down the values of *x* for which $f(x)\geq g(x)$. (2)

4.7 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)

[15]

QUESTION 5

The following graph is given: $h(x) = 3^x - 9$.

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

5.2 Determine the *x* - and *y* intercepts of *h*. (3)

5.3 Draw the graph of *h* on your lined paper clearly showing the asymptote as well as the intercepts with the axes. (3)

5.4 Hence, determine the equation of *k*(*x*) if $k(x) = mx + c$ and goes through the *y* - intercept of *h* and the point B(1; -6) (3)

5.5 Write down the equation of $g(x)$ if $g(x)$ is *h* reflected over the asymptote. (2)

5.6 For which values of *x* will $k(x) < 0$? (2)

[14]

\QUESTION 6

6.1 For any two events, A and B, it is given that

$P(A) = 0,25$, $P(B) = 0,89$ and $P(\text{not}(A \text{ or } B)) = 0,05$

6.1.1 Calculate $P(\text{A or B})$. (2)

6.1.2 Are events A and B mutually exclusive? Substantiate your answer with relevant calculations. (3)

6.1.4 What is the probability of event *B* only. (2)

6.2 A survey was conducted amoing150 earners in Grade 10 to establish how many of them owned the following devices: smartphone (P) or tablet (T).
The results were as follows:

- 8 learners did not own either a smartphone nor a tablet
- 20 learners owned both a smartphone and a tablet
- 48 learners owned a tablet
- *x* leaners owned a smartphone

6.2.1 Represent the information on a Venn diagram. (3)

6.2.2 How many learners owned only a smartphone? (3)

6.2.3 Calculate the probability that a learner selected at random from the group owned at most one type of device. (2)

[15]

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