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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This paper consists of **FOUR** question.
2. Answer **ALL** the questions.
3. Clearly show **ALL** calculations, diagrams, graphs, etc. that you have used in determining your answers.
4. Answers only will **NOT** necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round answers off to **TWO** decimal places, unless stated otherwise.
7. Diagrams are **NOT** necessarily drawn to scale.
8. Write neatly and legibly.



**QUESTION 1**

1.1 Given an arithmetic series: $7 + 11 + 15 + \dots$

1.1.1 Find the value of 25th (T_{25}) term of the series (3)

1.1.2 Calculate the sum of the first 20 terms of the series. (2)

1.2 The following geometric series is given: $x + \frac{1}{x} + \dots$

1.2.1 Which values of x will the series converge? (3)

1.2.2 If $x = 3$, calculate the sum to infinity of the geometric series (2)

[10]

QUESTION 2

2.1 Consider the quadratic pattern: 3; 10; 21; 36; ...

2.1.1 Determine the general term (T_n) in the form of $T_n = an^2 + bn + c$ (4)

2.1.2 Which term in the sequence is equal to 300? (4)

2.2 Evaluate the following:

$$\sum_{x=4}^{25} (3x - 2) \quad (4)$$

[12]



QUESTION 3

3.1 Given: $f(x) = \frac{3}{4}x^2$

3.1.1 Determine the equation of the inverse f^{-1} in the form $y = \dots$ (2)

3.1.2 State the domain of f such that f^{-1} will be a function. (2)

3.1.3 Sketch the graphs of f and f^{-1} on the same set of axes. (3)

3.2 The graph $g(x) = \log_b x$ passes through the point (9; 2).

3.2.1 Show that $b = 3$ (2)

3.2.2 Determine the equation of the inverse g^{-1} in the form $y = \dots$ (2)

3.2.3 Write down the range of g . (1)

[12]**QUESTION 4**

4. Given the function: $h(x) = \frac{2}{x-1} + 3$

4.1 Write down the equations of asymptotes of h . (2)

4.2 Calculate x and y intercepts of h . (3)

4.3 Sketch the graph of h on the grid provided. Clearly show all intercepts with axes and asymptotes. (4)

4.4 Determine the equation of the axis of symmetry of h with a negative gradient. (2)

4.5 Determine the equation of the inverse h^{-1} in the form $y = \dots$ (3)

4.6 Hence, determine the domain and range of the inverse of h . (2)

[16]