

QUESTION 1

1.1 Solve for x in each of the following:

1.1.1 (3)

1.1.2 (leave your answer correct to TWO dec. places) (4)

1.1.3 (4)

1.2 Given: and
solve for x and y simultaneously (5)

1.3 Simplify completely without the use of a calculator:

1.3.1 — — (3)

1.3.2 — (3)

=====

[22]

QUESTION 2

Consider the following sequence of numbers : 1; 4; 11; 22 ; 37; ...

2.1 If the sequence behaves consistently, determine the next TWO terms of the sequence. (2)

2.1 Calculate the formula for the n-th term of the sequence. (5)

[7]

QUESTION 3

3.1

3.1.1 the type of sequence (2)

3.1.2 d if it is an arithmetic , or r if it is a geometric sequence (1)

3.1.3 the value(s) of n. (5)

3.2 Given _____ as a geometric sequence and $x \neq 2$

3.2.1 Calculate the value(s) of x for which the sequence converges. (4)

3.2.2 Determine the sum to infinity of the series if $x = 2,5$. (4)

3.3 The sum of the first three terms of an arithmetic series is 216. The first, third and seventh terms of the series form the first three terms of a geometric series. Find the first term and the constant term of the arithmetic series. (6)

[22]**QUESTION 4**

Given _____

4.1.1 Write down the equations of the asymptotes of . (2)

4.1.2 Calculate the co-ordinates of the intercepts of the graph of with the axes. (4)

4.1.3 Sketch the graph of on DIAGRAM SHEET 1. Show all intercepts with the axes and the asymptotes. (3)

4.1.4 Write down the range of . (2)

4.2 Draw the sketch graph _____, where $a < 0, b < 0, c < 0$ and _____ has only ONE solution. (4)

[15]

QUESTION 5

The graph of $y = x^2 - 4x + 3$ and $y = 2x - 3$ are represented below.

- 5.1 Calculate the co-ordinates of P, the turning point of $y = x^2 - 4x + 3$ (1)
- 5.2 Determine the average gradient of the curve between $x = 1$ and $x = 3$ (3)
- 5.3 Hence state what you can deduce about the function $y = x^2 - 4x + 3$, between $x = 1$ and $x = 3$ (1)
- 5.4 Determine the values of x for which $y = x^2 - 4x + 3 = 0$ (2)
- 5.5 Give the co-ordinates of the turning point of $y = x^2 - 4x + 3$ (2)
- 5.6 L is a point on the straight line $y = 2x - 3$ and M is a point on the parabola $y = x^2 - 4x + 3$ such that LM is perpendicular to the x-axis. Show that the expression for LM can be written as : $\frac{1}{2}(x - 1)^2$ (4)

[13]

QUESTION 6

In the graph $y = x^2 + 2x + 3$ represents the function $y = x^2 + 2x + 3$ is symmetrical to $x = -1$ about the y-axis. The point $(-2, 3)$ lies on the curve of $y = x^2 + 2x + 3$.

- 6.1 Find the value of a. (2)
- 6.2 Write down the equation of the line of symmetry in the form $x = \dots\dots\dots$ (2)
- 6.3 Write down the domain of $y = x^2 + 2x + 3$ (1)
- 6.4 Write down the equation of the line of symmetry (2)
- 6.5 Write down the range of $y = x^2 + 2x + 3$ (1)

[8]

QUESTION 7

- 7.1 Wendy deposited R 8000 into a savings account at the beginning of 2007. She deposited R 5000 at the beginning of 2009. The bank offers 6% p.a. interest compounded monthly. How much must Wendy expect the total amount to be at the end of 2015 if no further deposits were made? (4)
- 7.2 Mark buys a car for R 125000 and he pays 20% in cash. He takes out a bank loan for the balance. If the bank charges 10,5% p.a. interest compounded monthly and he plans to pay off the loan in 5 years time:
- 7.2.1 Calculate the loan amount. (1)
- 7.2.2 Calculate the monthly repayment. (4)
- 7.2.3 If he makes a monthly payment of R 3000, calculate the loan balance after 3 years. (5)
- [14]**

QUESTION 8

- 8.1 Differentiate _____ from first principles. (5)
- 8.2 Find $\frac{d}{dx}$ if : _____
- 8.2.1 _____ (3)
- 8.2.2 $\frac{d}{dx}$ _____ (3)
- [11]**

QUESTION 9

The graph of _____ is shown below. B(1; 0) and C(3; 4) are the turning points of _____ The graph further passes through A (0; 4)

- 9.1 Show that _____ (6)
- 9.2 Determine the equation of the tangent to _____ (5)
- 9.3 Determine the x-value of the point of inflection of _____ (3)
- 9.4 Use the graph to determine the values of p for which the equation _____ will have only ONE real root. (2)
- [16]**

QUESTION 10

A pasta company has packaged their spaghetti in a box that has the shape of a rectangular prism as shown in the diagram below. The box has a volume of 540 , a breadth of 4 and a length of .

- 10.1 Express in terms of (2)
- 10.2 Hence show that the total surface area of the box (in is given by (3)
- 10.3 Determine the value of for which the total surface area is a minimum. Round the answer off to the nearest (4)
- [9]**

QUESTION 11

A doctor advises a patient to take at least 10 units of vitamin B and at least 15 units of vitamin C daily. Each tablet contains 2 units of B and 1 unit of C while each capsule contains 1 unit of B and 3 units of C.

- 11.1 Suppose the patient uses x tablets and y capsules daily. Determine a system of four inequalities in x and y . (4)
- 11.2 Sketch this system of constraints on a set of axes and show clearly the feasible region. (6)
- 11.3 The patient wants to take a few capsule and tablets as possible. How many of each should the patient take? (3)
- [13]**

TOTAL: 150